RECORD OF DECISION
for the *Deepwater Horizon* Oil Spill: Louisiana Trustee Implementation Group Final Phase II Restoration Plan #3.2: Mid-Barataria Sediment Diversion and Mid-Barataria Sediment Diversion Final Environmental Impact Statement

January 2023

Lead Agency: National Oceanic and Atmospheric Administration
Cooperating Agencies:

United States Department of the Interior
United States Department of Agriculture
United States Environmental Protection Agency
Louisiana Coastal Protection and Restoration Authority
Louisiana Department of Natural Resources
Louisiana Department of Environmental Quality
Louisiana Oil Spill Coordinator's Office
Louisiana Department of Wildlife and Fisheries

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1. Summary of Action

This Record of Decision (ROD) sets forth and explains the basis for the decision by the Louisiana Trustee Implementation Group (Louisiana TIG) to select for funding and implementation the Mid-Barataria Sediment Diversion, Alternative 1 described in the Final Phase II Restoration Plan #3.2: Mid-Barataria Sediment Diversion (Final RP #3.2 or Final RP) Section 3.2.1 and Final Mid-Barataria Sediment Diversion Environmental Impact Statement (Final MBSD EIS or Final EIS) Section 2.8.1 (the MBSD/Alternative 1 or the Project). The federal and state natural resource Trustees in the Louisiana TIG for the *Deepwater Horizon* (DWH) oil spill prepared the Final RP #3.2 for the purpose of restoring injured natural resources and services resulting from the spill. In that Final RP #3.2, the Louisiana TIG determined that the MBSD best meets both the Oil Pollution Act (OPA) Evaluation Criteria and the DWH Trustees' (DWH Trustees') goals and objectives for the "Wetlands, Coastal, and Nearshore Habitats" Restoration Type and would fulfill its mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. This alternative also provides the most effective means, at this time, to meet the Final RP #3.2 and Final MBSD EIS purpose and need, which is:

> Consistent with the Louisiana *Final Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin* (SRP/EA #3) and the Louisiana Comprehensive Master Plan for a Sustainable Coast (Coastal Master Plan), the purpose is to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion in the Barataria Basin that will reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, fresh water, and nutrients to support the long-term viability of existing and planned coastal restoration efforts. The proposed project is needed to help restore habitat and ecosystem services injured in the northern Gulf of Mexico as a result of the DWH oil spill.

(See Final RP #3.2 Chapter 1.2, Final MBSD EIS Chapter 1.4). The Trustees are issuing this ROD pursuant to the National Environmental Policy Act (NEPA) regulations at 40 Code of Federal Regulations (CFR) 1505.2 and the OPA regulations at 15 CFR 990. This document serves as the NEPA ROD for the federal Trustees and the OPA decision for the Louisiana TIG.

1.1 Members of the Louisiana TIG

The following federal and state agencies are the designated members of the Louisiana TIG under OPA for this spill:

- The National Oceanic and Atmospheric Administration (NOAA), on behalf of the U.S. Department of Commerce.
- The U.S. Department of the Interior (DOI), as represented by the U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS), and Bureau of Land Management (BLM).
- The U.S. Department of Agriculture (USDA).

- The U.S. Environmental Protection Agency (EPA).
- The following state agencies are designated as members of the Louisiana TIG under OPA for the spill:
  - Louisiana Coastal Protection and Restoration Authority (CPRA)
  - Louisiana Department of Natural Resources (LDNR)
  - Louisiana Department of Environmental Quality (LDEQ)
  - Louisiana Oil Spill Coordinator's Office (LOSCO)
  - Louisiana Department of Wildlife and Fisheries (LDWF)

1.2 Deepwater Horizon Incident and Development of the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement

On April 20, 2010, the DWH mobile drilling unit exploded, caught fire, and eventually sank in the Gulf of Mexico, resulting in a massive release of oil from the Macondo well, causing loss of life and extensive natural resource injuries. Given the magnitude and breadth of restoration for injuries resulting from the DWH oil spill, the DWH Trustees prepared a *Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement* (PDARP/PEIS; see https://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan) under OPA and NEPA to analyze alternative approaches to implementing restoration and to consistently guide future restoration decisions made by each TIG. Based on the DWH Trustees' thorough assessment of impacts to the Gulf of Mexico's natural resources, a comprehensive, integrated ecosystem approach for restoration implementation was proposed. On February 19, 2016, the DWH Trustee Council issued a Final PDARP/PEIS detailing a specific proposed plan to fund and implement restoration projects across the Gulf of Mexico region over the next 15 years. On March 29, 2016, in accordance with OPA and NEPA, the DWH Trustees published a Notice of Availability of a ROD for the Final PDARP/PEIS in the Federal Register (81 FR 17438). Based on the DWH Trustees' injury determination established in the Final PDARP/PEIS, the ROD set forth the basis for the DWH Trustees' decision to select Alternative A: Comprehensive Integrated Ecosystem Alternative. The DWH Trustees' selection of Alternative A includes the funding allocations established in the Final PDARP/PEIS. More information about Alternative A can be found in Sections 5.5 and 5.10 of the Final PDARP/PEIS.

On April 4, 2016, the United States District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the DWH Trustees against BP Exploration and Production, Inc. (BP) arising out of the DWH oil spill. This historic settlement resolved the DWH Trustees' claims against BP for natural resources damages under OPA. Under the Consent Decree, BP agreed to pay a total of $8.1 billion in natural resource damages over a 15-year period, and up to an additional $700 million for adaptive management or to address injuries to natural resources that are presently unknown but may come to light in the future. As part of the settlement, proceeds are allocated to the DWH Trustees to conduct restoration within specific Restoration Areas and for specific Restoration Types, which are identified in the Final PDARP/PEIS. The total natural resource damage assessment (NRDA) funding for the Louisiana Restoration Area is $5,000,000,000 with a total remaining NRDA allocation of $3,039,048,430. Of these funds, $4,009,062,700 was allocated to the Louisiana Restoration Area for the "Wetlands, Coastal, and Nearshore Habitats" Restoration Type pursuant to the Consent Decree. This is in addition to the $259,625,700 allocated for that purpose during early restoration.

1.3 Development and Louisiana TIG Consideration of the Mid-Barataria Sediment Diversion

The concept of using a river diversion to help restore the Barataria Basin has been scoped, evaluated, and discussed with stakeholders since 1984 when the United States Army Corps of Engineers (USACE) published a feasibility report on a river diversion project in the Barataria and Breton Sound basins (USACE, 1984). In 1998, the Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority proposed several large diversions in the Barataria Basin for marsh and barrier island restoration in a report entitled *Coast 2050: Towards a Sustainable Coastal Louisiana* (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation Authority, 1998). The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Task Force approved the initiation of a feasibility study in 2001 for the Delta Building Diversion at Myrtle Grove Project (CWPPRA Project BA-33); this study examined a range of diversion capacities, from 2,500 cubic feet per second (cfs) to 15,000 cfs.

Concurrently, the USACE prepared a feasibility study for the Louisiana Coastal Area (LCA) Program to identify large-scale ecosystem restoration projects for the Louisiana coast (USACE, 2004) in which projects were evaluated through the use of ecological models. The USACE selected the medium diversion at Myrtle Grove as one of five, near-term critical restoration features (USACE, 2004). Due to funding limitations, the CWPPRA Task Force transferred the CWPRRA Project BA-33 to the USACE for further study under the LCA Program, where the USACE led a multidisciplinary team to develop hydrodynamic and salinity models of the basin under different diversion scenarios. CPRA also worked with several nongovernmental organizations in 2009 to support additional modeling of a sediment diversion in Barataria Basin to answer key stakeholder questions about potential project impacts (CPRA, 2011). In 2012 and then again in 2017, CPRA completed its legislatively mandated development of and update to the Coastal Master Plan, which were approved by the Louisiana Legislature (CPRA 2012, CPRA 2017). In both 2012 and 2017, the Plan recommended sediment diversions as a land-building restoration tool (CPRA 2012, CPRA 2017). In particular, the 2017 Coastal Master Plan included the Mid-Barataria Sediment Diversion with a 75,000 cfs capacity located at Myrtle Grove.

Consistent with the Coastal Master Plan, in 2016, CPRA submitted an application to the USACE, Mississippi Valley Division, New Orleans District (CEMVN) for a Department of Army (DA) permit for the Project. In compliance with the federal agency decision-making requirements of the NEPA, 42 U.S.C. 4321 et seq.[1], The USACE initiated NEPA evaluation of the Project, preparing the Draft Mid Barataria Sediment Diversion Environmental Impact Statement (Draft MBSD EIS or Draft EIS) (82 FR 19361). In 2018, CPRA submitted a revised permit application with a revised purpose and need (see Section 1.4 below). Thereafter, CEMVN issued the Draft MBSD EIS in March 2021 followed by public meetings on the Draft EIS in April 2021. In 2022, CPRA submitted a revised permit application based on 60 percent engineering and design (E&D) updates. On September 23, 2022, CEMVN published the Final MBSD EIS. https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/.

[1] The lead federal agency for the preparation of the MBSD EIS, the USACE, recognized that on July 16, 2020, CEQ published a Final Rule revising its NEPA-implementing regulations at 40 CFR Parts 1500 – 1508 (85 FR 43304). The revised regulations apply to NEPA processes begun after their effective date, September 14, 2020, although agencies may apply the revised regulations to ongoing NEPA evaluations begun before that date. 40 CFR 1506.13. USACE chose to proceed under the regulations in effect at the time the MBSD EIS process began in 2017 (The Notice of Intent was published on April 27, 2017 [82 FR 19361]). Hence, all citations to CEQ regulations are specific to the 1978 implementing regulations of 40 CFR Parts 1500 – 1508 (43 FR 15978).

The Final PDARP/PEIS describes how the Trustees, via TIGs for each defined Restoration Area, would prepare a series of subsequent restoration plans to propose and select specific projects for implementation. The Louisiana TIG first evaluated large-scale sediment diversions as a restoration approach in the PDARP/PEIS.[2] Building on the Final PDARP/PEIS, the Louisiana TIG began evaluating restoration strategies that could restore for injuries to natural resources in the Barataria Basin, which resulted in the SRP/EA #3. https://www.gulfspillrestoration.noaa.gov/sites/default/files/DWH-ARZ000738.pdf. In that document, the Louisiana TIG ultimately determined that a combination of "marsh creation and ridge restoration plus a large-scale sediment diversion would provide the greatest level of benefits to injured Wetlands, Coastal, and Nearshore Habitats and to the large suite of injured resources that depend in their life cycle on productive and sustainable wetland habitats" (Louisiana TIG, 2018, page 3-32) in the basin and in the broader northern Gulf of Mexico. The wetlands and marsh habitats that were significantly affected by heavy oiling throughout Barataria Basin from the DWH spill were already under stress due to the historic loss of its deltaic connection with the Mississippi River. Implementing a restoration technique here that not only builds wetlands and marsh complexes but does so by re-establishing the deltaic processes that originally built the marsh is especially appropriate (Louisiana TIG, 2018, pages 1-13, 2-6, 2-19, 3-7, and 3-8). Re-establishing deltaic processes to Barataria Basin with a large-scale sediment diversion would provide system-wide benefits to that ecosystem that would not be realized with any other restoration technique (Louisiana TIG, 2018, pages 2-19 and 3-8). The Louisiana TIG's Final RP #3.2 tiers from both the Final PDARP and the SRP/EA #3.

The Louisiana TIG supported the development of a single MBSD EIS to satisfy NEPA requirements for both the USACE and the Louisiana TIG federal Trustees (see 82 FR 19659). This decision increased public transparency, provided efficiency, and reduced redundancy by avoiding development of two separate NEPA analyses for the same project. The Louisiana TIG utilized the MBSD EIS to inform its decision under OPA and to fulfill the requirements of the federal Trustees under NEPA. Each of the federal Trustees of the Louisiana TIG participated substantially and meaningfully as a cooperating agency pursuant to NEPA (40 CFR 1508.5) and the DWH Trustee Council's Standard Operating Procedures (SOPs) (Section 2.3.3). The state Trustees for Louisiana served as commenting agencies.

1.4 Purpose and Need

CPRA and the Louisiana TIG developed the purpose and need taking into consideration CPRA's stated purpose and need along with the public input and other perspectives, including input from cooperating agencies (identified in Section 1.8 of the Final RP #3.2), and input from representatives of the Council on Environmental Quality (CEQ) and the Federal Permitting Improvement Steering Council (FPISC).[3] The underlying purpose and need for the project is:

[2] "Diversions of Mississippi River water into adjacent wetlands have a high probability of providing these types of large-scale benefits for the long-term sustainability of deltaic wetlands" (DWH NRDA Trustees, 2016, page 5-25). These benefits included helping "maintain the Louisiana coastal landscape and its ability to overcome other environmental stressors by stabilizing wetland substrates; reducing coastal wetland loss rates; increasing habitat for freshwater fish, birds, and benthic communities; and reducing storm risks, thus providing protection to nearby infrastructure" (DWH NRDA Trustees, 2016, page 5-25).

[3] The Applicant's original purpose and need statement did not reference consistency with the SRP/EA #3 or the Coastal Master Plan and did not state that the purpose is to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion. In January 2018, the Louisiana TIG submitted a proposed revised statement of purpose and need in the form set forth here. During a joint meeting between the USACE, the Applicant, the Louisiana TIG, representatives of the CEQ, and representatives of the FPISC held on January 25, 2018, the participants discussed the proposed purpose and need changes. The CEQ and FPISC representatives were supportive of the changes to the Project purpose and need and the USACE agreed to the change.

> Consistent with the LATIG's Strategic Restoration Plan and Environmental Assessment #3 and the Louisiana Coastal Master Plan, the purpose is to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion in the Barataria Basin that will reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, fresh water, and nutrients to support the long-term viability of existing and planned coastal restoration efforts. The proposed Project is needed to help restore habitat and ecosystem services injured in the northern Gulf of Mexico as a result of the DWH oil spill.

2. The MBSD Project and Alternatives Evaluated

The OPA NRDA regulations provide that trustees must consider a reasonable range of restoration alternatives before selecting their preferred alternative. 15 CFR 990.53(a)(2). Building on the SRP/EA #3, the Louisiana TIG developed, as part of the Phase II restoration planning (MBSD RP #3.2) and working with the USACE on the MBSD EIS, a reasonable range of alternatives capable of meeting the purpose and need.

Throughout the collaborative process of alternative development and evaluation, the Louisiana TIG considered the following factors:

- The purpose and need of the Project;
- Requirements of NEPA and its implementing regulations;
- Requirements of the Clean Water Act (CWA), OPA, and OPA NRDA implementing regulations;
- The interests, needs, and requirements of the Louisiana TIG under OPA;
- Recommendations in the 2017 CMP; and
- Public and agency scoping comments regarding the EIS.

Screening criteria used by the Louisiana TIG to evaluate alternatives were as follows:

- Criterion 1: reconnects and re-establishes deltaic processes between the Mississippi River and the Barataria Basin to achieve the Project's purpose and need in a sustainable manner;
- Criterion 2: delivers sediment, freshwater, and nutrients in a sustainable manner;
- Criterion 3: supports the long-term viability of existing and planned coastal restoration efforts;
- Criterion 4: helps restore habitat and ecosystem services in the northern Gulf of Mexico injured by the DWH oil spill, and is consistent with SRP/EA #3; and
- Criterion 5: is consistent with the Louisiana CMP.

In the screening process, the Louisiana TIG also considered E&D feasibility, cost of implementation, and timeliness of meeting objectives.

The Louisiana TIG examined different alternatives for a large-scale sediment diversion and developed additional considerations for evaluating the effectiveness of these potential alternatives at achieving the project's goals and objectives. This process included considerations of alternative locations, different capacity alternatives, alternative "triggers" for initiating flow above base flow through the diversion, and alternatives for a base flow through the diversion. The final step involved examining different alternatives for the diversion outfall area and evaluating the effectiveness of these potential alternatives at achieving the project's goals and objectives. A detailed description of the screening process is provided in the Final RP #3.2 (Section 2.3.2; the full OPA evaluation is in Section 3).

The Final RP #3.2 and Final MBSD EIS both evaluate a large-scale, 75,000 cfs capacity sediment diversion in the Project, as well as five alternatives for this project. The alternatives for the MBSD all focus on the same geographical location and have similar structural features, but the alternatives vary in size and maximum flows that can pass through the diversion, as well as the use of marsh terracing; consequently, their potential benefits and impacts also vary.

The structural features of the MBSD and its alternatives are located in south Louisiana on the west bank of the Mississippi River at River Mile (RM) 60.7, just north of the Town of Ironton. The anticipated outfall area for sediment, freshwater, and nutrients conveyed from the river is located within the Mid-Barataria Basin (Figure 1). The Project area of the MBSD and its alternatives includes the hydrologic boundaries of the Barataria Basin and the lower Mississippi River Delta Basin, also known as the birdfoot delta. The Mississippi River itself, beginning near RM 60.7 and extending to the mouth of the river, is also included in the MBSD Project area. Further detailed information regarding the features of the MBSD and the Project area can be found in Chapters 2 and 3 of the Final MBSD EIS.

The Project and Alternatives 2 and 3 vary by the maximum flow through the diversion, ranging from 50,000 cfs to 150,000 cfs; and Alternatives 4–6 include marsh terrace outfall features (Table 1). All of the proposed alternatives include a base flow of up to 5,000 cfs to help moderate and stabilize seasonal fluctuations in salinity that could negatively affect certain marsh areas and types. These six alternatives were developed for further analysis in the MBSD EIS. This reasonable range of alternatives is the same range of alternatives evaluated in Final MBSD EIS together with the No Action alternative.

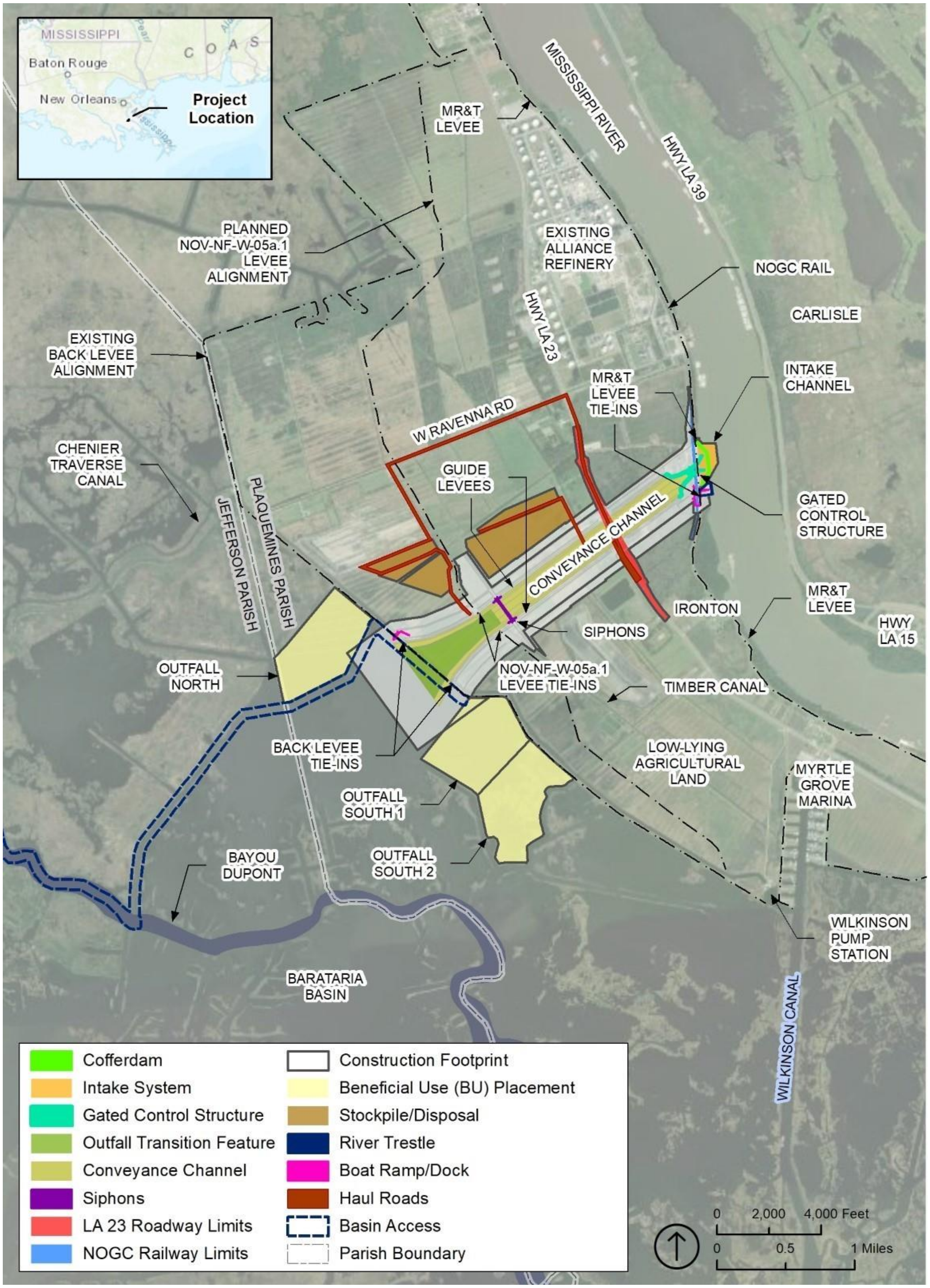
Table 1. Summary of Proposed Restoration Action Alternatives Evaluated in the Final MBSD RP and MBSD Final EIS

Proposed Restoration Alternatives	Maximum Flow-Through Diversion	Flow in Mississippi River Needed to Trigger Maximum Flow-Through Diversion[a]	On/Off Trigger for Full Diversion Operations[a,b]	Maximum Base Flow[c]	Outfall Features
1	75,000 cfs	≥ 1,000,000 cfs	450,000 cfs	Up to 5,000 cfs	Outfall transition feature (OTF)
2	50,000 cfs	≥ 1,000,000 cfs	450,000 cfs	Up to 5,000 cfs	OTF
3	150,000 cfs	≥ 1,000,000 cfs	450,000 cfs	Up to 5,000 cfs	OTF
4–6 (Alternatives 1, 2, or 3 with marsh terracing)	75,000 cfs, 50,000 cfs, and 150,000 cfs	≥ 1,000,000 cfs	450,000 cfs	Up to 5,000 cfs	OTF plus marsh terracing

[a] Flow measured at Belle Chasse gauge. [b] Trigger of opening from and closing to base flow. [c] Depending on river flow and head differential.

The preferred alternative (Alternative 1, 75,000 cfs) consists of a controlled sediment and freshwater intake diversion structure in Plaquemines Parish on the right descending bank of the Mississippi River at RM 60.7. The preferred alternative has a maximum diversion flow of 75,000 cfs, which would occur when the Mississippi River gauge at Belle Chase reaches 1,000,000 cfs or higher. The Project would operate at up to 5,000 cfs (base flow) when the river is below 450,000 cfs at Belle Chase; at river flows above 450,000 cfs, the diversion would be opened fully. At the downstream end of the diversion channel, an engineered "outfall transition feature" would be constructed to guide and disperse the channel flow into the Barataria Basin. The preferred alternative is projected to increase land area, including emergent wetlands and mudflats, in the Barataria Basin across the 50-year analysis period relative to natural recovery, with a maximum increase of 17,300 acres in 2050, at the approximate mid-point of the 50-year analysis period.

Figure 1. Project Site Map



3. OPA Decision Made by the Louisiana TIG

3.1 Identification of the Louisiana TIG's OPA Preferred Alternative

The OPA NRDA regulations provide that once the trustees have developed a reasonable range of alternatives, their selection of a preferred restoration alternative must be based on an evaluation of the factors contained in the evaluation standards for restoration alternatives. 15 CFR 990.54(a)-(b). The Louisiana TIG completed the OPA evaluation of the reasonable range of alternatives and strove to identify an alternative that would provide the right balance in terms of being cost-appropriate, meeting Trustee goals, having a high likelihood of success, avoiding collateral injury, benefiting multiple resources, and protecting public health and safety. While the Louisiana TIG concluded that all alternatives sufficiently satisfied each OPA criterion, there were clear tradeoffs among the alternatives in terms of likely benefits achieved and risks related to collateral injury and public health and safety (Figure 2). More specifically, the Trustees found that Alternative 2 (50,000 cfs) would provide substantially less benefit than Alternative 1 (75,000 cfs) in marsh preservation and restoration and associated benefits to nearshore marine ecosystems, water column resources, birds and terrestrial wildlife, recreational use, and offshore ecosystems. Not only would the smaller 50,000 cfs diversion achieve substantially fewer benefits to the overall coastal ecosystem, it would do so with only a small reduction in adverse impacts and cost, making it overall a less desirable alternative to the Louisiana TIG. The Louisiana TIG also concluded that while Alternative 3 (150,000 cfs) would provide substantially more marsh creation and associated benefits than Alternative 1, the collateral injuries and risks to public health and safety of Alternative 3 would increase to levels unacceptable to the Trustees. Given these tradeoffs, the Louisiana TIG selected Alternative 1 as the preferred alternative.

Figure 2. Summary of OPA NRDA Evaluation Criteria across Restoration Alternatives

OPA NRDA Evaluation Criteria		Alternative 1 (75,000 cfs)	Alternative 2 (50,000 cfs)	Alternative 3 (150,000 cfs)	Alternatives 4–6 (diversion plus terracing)
Cost	• Cost (vs. other alternatives)	• Intermediate[b]	• Lowest[a]	• Highest[c]	• Terracing adds cost without substantially increasing benefits
Meets Trustee Goals and Objectives	• Meets Trustee goals and objectives? • Relative amount of sediment delivered, land created, and diversity of marsh habitat sustained (vs. other alternatives)	• Yes • Intermediate[b]	• Yes • Lowest[c]	• Yes • Highest[a]	• Yes • No notable difference from non-terraced alternatives
Likelihood of Success	• High likelihood of success? • Evidence from previous diversions, extensive study and vetting, and the implementation of a Project MAM Plan all support likelihood of success?	• Yes • Yes	• Yes • Yes	• Yes • Yes	• Yes • No notable difference from non-terraced alternatives
Avoids Collateral Injury	• Avoids collateral injury through BMPs, mitigation, and ancillary restoration actions? • Relative extent of collateral injury to shrimp, oysters, and dolphins (vs. other alternatives)	• Yes • Intermediate[b]	• Yes • Lowest[a]	• Yes • Highest[c]	• Yes • No notable difference from non-terraced alternatives
Benefits Multiple Resources	• Benefits multiple resources? • Magnitude of benefits (vs. other alternatives)	• Yes • Intermediate[b]	• Yes • Lowest[c]	• Yes • Highest[a]	• Yes • No notable difference from non-terraced alternatives
Public Health and Safety	• Protects public safety by reducing overall storm surge to communities inside levee systems inland of the diversion? • Relative amount of added tidal inundation for communities outside levee systems (vs. other alternatives)[d]	• Yes • Intermediate[b]	• Yes • Lowest[a]	• Yes • Highest[c]	• Yes • No notable difference from non-terraced alternatives

A cell's green shading indicates the alternative was evaluated most favorably under that criterion by the Louisiana TIG, red shading indicates the alternative was evaluated least favorably by the Louisiana TIG for that criterion, and yellow shading indicates the alternative was evaluated as intermediate between the other two primary alternatives; comparisons among alternatives are focused within rows (i.e., by criterion). Red shading indicates where cost was deemed not practicable. Grey shading indicates there were no differences between the terraced and non-terraced alternatives for that criterion. See Section 3 for more details about the analysis of each criterion that are summarized at a high level in this figure.

[a] Evaluated as most favorable of the alternatives by Trustees for that criterion.
[b] Evaluated as intermediate among the alternatives by Trustees for that criterion.
[c] Evaluated as least favorable of the alternatives by Trustees for that criterion.
[d] Differences in tidal inundation effects among alternatives are projected to be most pronounced in the first two decades of diversion operation, with no notable differences among alternatives in later decades.

The following bullets explain in more detail the Louisiana TIG's reasoning behind the identification of Alternative 1 as preferred (and the exclusion of the other alternatives):

- Alternative 1 (75,000 cfs) is preferred because it was most favorably evaluated when integrating across all of the OPA NRDA evaluation criteria. The Louisiana TIG anticipates that Alternative 1 would meet the project's goals and objectives – creating marsh and shallow-water habitats that provide ecosystem-level benefits to nearshore marine ecosystems, water column resources (including fish and shellfish), birds and terrestrial wildlife, and recreational uses that were injured in the *Deepwater Horizon* Oil Spill (collectively, the Incident) (Figure 2). Alternative 1 would balance meeting Louisiana TIG goals and objectives for the project while reducing the extent of collateral injury to resources, such as brown shrimp, oysters, and dolphins, compared to larger-capacity alternatives. Given the necessary tradeoffs between benefits and collateral injury, the Louisiana TIG found that Alternative 1 would strike the best balance between providing benefits that restore natural resources and reducing collateral injury.
- Alternative 2 (50,000 cfs) was not preferred because it would meet Trustee goals to a much lesser extent than Alternative 1 and would provide fewer associated benefits to the marine ecosystem. These potential 'losses' of benefits relative to Alternative 1 would be associated with only minor reductions in collateral injury and cost, making Alternative 2 less desirable than Alternative 1 to the Louisiana TIG.
- Although Alternative 3 (150,000 cfs) would result in the greatest degree of benefit (best meets Trustee goals and provides the most benefits to multiple resources), it was not preferred because it would result in the greatest degree of collateral injury compared to Alternative 1 and 2, particularly to the Barrier Island stratum of Barataria Bay Estuarine System (BBES) bottlenose dolphins. It would also preclude the establishment of public oyster seed grounds in Barataria Bay, a key stewardship measure included in the Mitigation and Stewardship Measures Plan. It also would have higher impacts on public health and safety than Alternative 1 and cost nearly $1 billion more based on 2020 cost estimates. Overall, the Louisiana TIG believes Alternative 3 would not sufficiently support a diverse ecosystem that includes key resources, such as dolphins and oysters.
- Alternatives 4, 5 and 6 have the same capacities as Alternatives 1, 2, and 3, respectively, with the addition of terraces. Alternatives 4, 5 and 6 are not preferred because the terraces are anticipated to provide little additional benefit to injured resources and result in increased costs.

Pursuant to OPA NRDA regulations, the Louisiana TIG also considered a No Action Alternative "in which no human intervention would be taken to directly restore injured natural resources and services to baseline" 15 CFR 990.53(b)(2). In SRP/EA #3, the Louisiana TIG noted that the loss of deltaic processes in this estuarine ecosystem has resulted in a steady decline in the health of natural resources in the Barataria Basin, which is indicated by metrics such as decreased plant health, high rates of erosion, and higher salinities farther north in the basin (McKee et al., 2004; Alber et al., 2008; Wilson and Allison, 2008; Couvillion et al., 2011; Silliman et al., 2012, 2016; Khanna et al., 2013; McClenachan et al., 2013; Zengel et al., 2014, 2015; Rangoonwala et al., 2016; Turner et al., 2016; Beland et al., 2017). Further, the coastal habitats of the northern Gulf of Mexico support resources throughout the Gulf (Gunter, 1967; Nixon, 1980; Boesch and Turner, 1984; Baltz et al., 1993; Houde and Rutherford, 1993; Deegan et al., 2002). Thus, for the wetlands, coastal, and nearshore habitats in the Barataria Basin that are the focus of the Final RP #3.2, the Louisiana TIG concluded that a No-Action Alternative would result in further deterioration of injured resources within and beyond the Barataria Basin.

The following bullets summarize the selection of Alternative 1 based on the OPA NRDA Evaluation Criteria:

- Cost to Carry Out the Alternative: Alternative 1 was estimated to cost approximately $2 billion in 2020, including funding for associated mitigation and stewardship measures. However, the costs associated with this and other alternatives are likely to significantly exceed the costs detailed in the Draft RP #3.2 due to inflation, and final project costs will not be available until after CPRA completes negotiations for a Guaranteed Maximum Price for Project construction with the Construction Management At-Risk (CMAR) contractor. In light of this uncertainty as to total Project costs, the Louisiana TIG is limiting its contribution to the overall Project costs to $2,260,000,000. The Project will include a robust monitoring and adaptive management (MAM) plan and use CMAR to improve the quality and constructability of any alternative, reduce overall risk, and allow for scope revision during the design phase to meet the alternative's budget and goals. The Louisiana TIG has leveraged $108 million in funding for E&D, reducing the total cost to the Louisiana TIG by this amount.
- Meets the Trustee Restoration Goals and Objectives: Alternative 1 will effectively meet each of the three stated goals of the project. Alternative 1 is expected to (1) deliver sediment, freshwater, and nutrients to the Barataria Basin; (2) reconnect and re-establish deltaic processes; and (3) create, sustain, and restore wetlands and other deltaic habitats. Meeting these three goals would mean that additional sediment will be available to create and sustain wetlands and that nutrients will be available to support plant growth. This will improve habitat for fish, shellfish, and other aquatic species that depend on wetland and shallow water habitats, which will in turn support terrestrial wildlife, birds, and recreationists that enjoy birding and fishing. Improving habitat along the coast will also support offshore ecosystems when fish from the nearshore move offshore.
- Likelihood of Success. Alternative 1 is likely to succeed due to three factors: (1) the general efficacy of diversions in rebuilding marsh ecosystems; (2) the extensive scientific and modeling efforts that have been undertaken to develop and refine the concept of a sediment diversion in the Barataria Basin; and (3) the implementation of the MAM Plan for the Project (Attachment 1), which will support adaptive management over time.
- Prevents Future Injury as a Result of the Incident and Avoids Collateral Injury. The Project has not been designed to address future injury as a result of the DWH oil spill Incident to natural resources; rather, it has been designed to provide restoration for natural resource injuries incurred through the Incident. With respect to collateral injury, the Louisiana TIG expects that resources that depend on the current higher salinities found in the basin (e.g., dolphins, oysters, and brown shrimp) will experience higher levels of collateral injury under Alternative 1. The construction and operation of the Project could also result in injuries to pallid sturgeon, spotted seatrout, benthic resources, and boating related recreational use. The construction and operation of the physical structure of the diversion may also result in relative low levels of localized collateral injuries. In recognition of potentially high levels of collateral injuries to marine mammals and trust resources that support fisheries, the Louisiana TIG will implement a suite of associated mitigation and stewardship actions as part of Alternative 1 (*see* Section 3.2 below).
- Benefits Multiple Resources. Alternative 1 is expected to result in substantial benefits to nearshore marine ecosystems, water column resources (including fish and shellfish), birds, terrestrial wildlife, and offshore marine ecosystems. The diversion will help build and sustain a dynamic, interconnected landscape with a combination of shallow mudflat, floating-leaved vegetation, and emergent marsh habitat. Through providing these habitats, the Project will benefit

white shrimp, blue crab, bay anchovy, Gulf menhaden, red drum, largemouth bass, saltmarsh topminnow, and multiple species of shorebirds, waterfowl, and secretive marsh birds. Alternative 1 could also benefit offshore marine ecosystems by enhancing the productivity of fish that develop in estuaries before migrating out to the marine environment.

3.2 Mitigation, Monitoring and Intervention Plan

3.2.1 CPRA's Mitigation and Stewardship Plan

In recognition of and in an effort to address the anticipated adverse environmental impacts from the Project, CPRA prepared the *Mitigation and Stewardship Plan for the Proposed MBSD Project* (Mitigation Plan; Attachment 2) that was included in both the Final RP #3.2 and the Final MBSD EIS. The Mitigation Plan explains how adverse impacts of the Project identified in the Final EIS and Final RP will be avoided, minimized, or mitigated. The measures were developed and refined with public input via the public comment response process and community meetings as summarized in Section 1.8 of the Final RP #3.2.

The USACE *Memorandum for Record on Pending Permit Decisions* (10/404 ROD; https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/) and the USACE *Section 408 Permission Request Summary of Findings and Record of Decision* (408 ROD; https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/) both discuss the Mitigation Plan. While CEMVN made only certain measures from the Mitigation Plan conditions of the 10/404 ROD, the Mississippi Valley Division (CEMVD) made compliance with the Mitigation Plan, MAM Plan, and any other commitments contained in Appendix R of the Final EIS a special condition of the 408 ROD. Both CEMVN and CEMVD noted uncertainty about implementation of the mitigation measures and whether sufficient funds had been identified to accomplish the stated mitigation goals. The Louisiana TIG has determined that each component of the Mitigation Plan, the MAM Plan, and the Dolphin Intervention Plan[4] is a condition of its decision to fund construction and implementation of the MBSD, thereby eliminating uncertainty about funding and implementation of these measures. The Louisiana TIG determined that this suite of activities (mitigation, stewardship, monitoring and adaptive management) represented the best option for avoiding, minimizing and mitigating the effects of the Project consistent with the Project's purpose and need. CPRA is primarily responsible for implementation of the mitigation and stewardship measures. CPRA will provide regular updates to the Louisiana TIG and the public as a means to monitor implementation.

3.2.1.1 Mitigation and Stewardship Measures Listed in the Final RP #3.2

Some of these mitigation and stewardship measures were expressly identified by the Louisiana TIG in the Final RP in relation to specific collateral injuries anticipated to result from implementation of the MSBD. These measures are described briefly below by resource and in more detail in the Mitigation Plan (Appendix B of the Final RP #3.2 and Appendix R1 of the Final MBSD EIS).

3.2.1.1.1 Marine Mammals

Changes in salinity projected to occur as a result of Alternative 1 are anticipated to significantly impact the bottlenose dolphin population within the Barataria Basin (see Sections 3.2.1.5 and 3.2.2.5 of the Final RP #3.2). In recognition of the potential collateral injury to bottlenose dolphins and in response to public comments on this issue, several stewardship measures will be implemented as part of the Project to benefit dolphins in Louisiana. First, the Louisiana TIG is funding a statewide stranding program for an

[4] The Dolphin Intervention Plan is also called the Marine Mammal Intervention Plan; the two names are interchangeable and refer to the same Plan, which is included as Attachment 3.

additional 20 years beyond what the Louisiana TIG has already funded for marine mammal populations injured by the DWH spill, especially coastal and estuarine stocks of bottlenose dolphins. Enabling a more rapid response to a live stranded cetacean will increase that animal's chance of survival by reducing the time spent on the beach, reducing stress on the animals, providing rapid treatment, and, if appropriate, transport to an authorized rehabilitation facility for additional treatment and care. In addition, this program will increase the quality and quantity of data that can be collected from dead stranded cetaceans, by decreasing decomposition time on the beach and ensuring that fresher carcasses are recovered for necropsy. This will improve diagnoses of the causes of illness and death in cetaceans to better understand natural and anthropogenic threats, which will inform restoration planning and MAM. Second, the Louisiana TIG is funding the implementation of activities that reduce stressful interactions between dolphins and humans (e.g., by reducing dolphin mortalities associated with recreational fishing; reducing illegal fishing of dolphins; and assessing and mitigating the impacts of marine vessels, noise, and other threats on marine mammals in the Barataria Basin). Third, the Louisiana TIG is providing additional funding to support stranding surge capacity in the Barataria Basin. Additional measures are set forth in the Dolphin Intervention Plan, discussed in Section 3.3 3.3below and included as Appendix C to the Final RP #3.2.

3.2.1.1.2 Oysters

Changes in salinity that are projected to occur through the implementation of Alternative 1 are anticipated to adversely affect oysters (see Sections 3.2.1.5 and 3.2.2.5 of the Final RP #3.2). However, the Project-related changes in salinity in the Lower Barataria Basin could create suitable conditions for oyster culture in areas that are currently unsuitable, creating an opportunity to offset the loss of oyster culture areas elsewhere in the basin. Mitigation and stewardship measures and associated expenditures focus on establishing sustainable fisheries for oysters rather than on compensating individual oyster harvesters for their particularized economic losses. These mitigation and stewardship measures include, first, helping re-establish public seed grounds in the basin to help offset losses to seed grounds that occur as a result of the Project operations. These seed grounds will be located in areas with environmental conditions that would best support oysters after the diversion has begun operating. Second, CPRA will provide additional cultch material to current lessees, which could help maintain oyster reefs in areas where sediment could bury suitable oyster habitat. Third, CPRA will create broodstock reefs within the Barataria Basin, in recognition of losses in broodstocks that result from the operation of the diversion. Fourth, CPRA will support alternative oyster culture, which means growing oysters outside of reefs and off-bottom, typically in some kind of mesh container. Growing oysters in this way makes it feasible to cultivate them in areas where suitable reef habitat is lacking; it can also improve oyster growth due to lower turbidity. The Louisiana TIG will also provide funding to improve marketing and enhance the value of dockside harvests. Finally, CPRA will provide public access opportunities within the Barataria Basin to support subsistence oyster harvesting (see Section 3.2.1.1.4, Recreational and Subsistence Use, below).

3.2.1.1.3 Brown Shrimp, Blue Crabs, and Finfish

Changes in salinity due to the implementation of the MBSD are anticipated to adversely affect brown shrimp and other commercially harvested species (see Sections 3.2.1.5 and 3.2.2.5). As with oyster mitigation and stewardship measures noted above, the mitigation efforts focus on establishing sustainable fisheries rather than on compensating individual fishers for their particularized economic losses. A variety of approaches will be utilized in recognition of collateral injuries associated with specific fish and shellfish species that support recreational and commercial fishing. For the brown shrimp fishery, these restoration actions include supporting improvements in fishing gear and vessel refrigeration installation. For brown shrimp, blue crab, and finfish fisheries, the Louisiana TIG will provide funding to support marketing to improve the dockside value of landings, as well as workforce training to improve business practices or to facilitate transitions to a new type of employment. The Louisiana TIG will also provide funding for support for gear improvements for blue crab fisheries. The Louisiana TIG would also provide funding for public access opportunities within the Barataria Basin to support recreational and subsistence fishing (see Section 3.2.1.1.4, Recreational and Subsistence Use, below).

3.2.1.1.4 Recreational and Subsistence Use

In recognition of collateral injuries related to recreational and subsistence use of the Barataria Basin, particularly in areas near the diversion complex utilized by low-income and minority communities, the Louisiana TIG will provide funding for the support of access to public waterways to facilitate recreational access for fishing and birding, a pier for subsistence fishing, a kayak/pirogue launch, and views of the marsh creation area near the diversion structure. These public amenities would serve to enhance access to quality subsistence fishing and would improve public access to recreational boating, fishing, and birding.

3.2.1.1.5 Tidal Flooding

As explained in Sections 3.2.1.7 and 3.2.2.7 of the Final RP #3.2, as well as in the Final MBSD EIS, Alternative 1 is projected to increase flooding in several communities that are located outside of flood protection (i.e., within approximately 10 miles to the north and approximately 20 miles south of the diversion). In Myrtle Grove, CPRA plans to improve the bulkhead around the Myrtle Grove Marina Estates Subdivision, which would reduce the incidence of tidal flooding in the Myrtle Grove Marina Estates Subdivision compared to future conditions if the Project were not constructed.

In communities south of the diversion outside levee protection from Woodpark south to Grand Bayou and Happy Jack, CPRA plans to raise various roads to improve access to the properties and purchase Project servitudes from property owners that would permit CPRA to add and/or increase the water flow on landowners' properties.

3.2.1.1.6 Wetland Preservation and Restoration in the Birdfoot Delta

In recognition of the Project-related indirect wetland losses in the birdfoot delta, and consistent with FWCA Report recommendations (see Appendix T in the Final MBSD EIS), CPRA or the Louisiana TIG will provide, within 5 years of the commencement of the MBSD operations, $10,000,000 of additional funding for wetland preservation and restoration work in the Delta National Wildlife Refuge and the Pass a Loutre Wildlife Management Area. That funding may be accomplished with additional funding through the CWPPRA program, through additional restoration work sponsored by the Louisiana TIG (for example, construction of the E&D work discussed in the DWH Louisiana TIG's Restoration Plan and Environmental Assessment #7), or through a direct contribution for additional work. The funding will be proportioned between the Delta National Wildlife Refuge and the Pass a Loutre Wildlife Management Area based on the magnitude of the projected wetland losses in each area.

3.2.1.2 Additional Mitigation and Stewardship Measures

In addition to those measures identified in the Final RP, the Mitigation Plan sets forth additional measures intended to avoid, minimize and offset additional anticipated impacts from implementation of Alternative 1. As noted above, each of these measures is also a condition of this decision by the Louisiana TIG to fund construction and implementation of the MBSD. These mitigation and stewardship measures are described briefly below by resource and in more detail in the Mitigation Plan (Appendix B of the Final RP #3.2 and Appendix R1 of the Final MBSD EIS). In order to clarify the nature of each measure's implementation intent and requirements, the following are summaries for each measure or suite of measures.

3.2.1.2.1 Avoidance and Minimization Measures

The MSBD was designed to minimize incidental environmental impacts while meeting the purpose and need for the Project. The construction footprint by design is constrained to minimize excavation and fill activities in the Mississippi River riparian wetland area. In the Barataria Basin, the selected construction access routes (to allow access channels for vessels, equipment, and material transport) have been designed to avoid or minimize wetland impacts to the greatest extent practicable, along with minimizing the excavation footprint and subsequent volume of material displaced. The placement of soils in areas adjacent to channel excavation will be done in a manner to minimize the disruption of water circulation and material will be left in place as habitat enhancement or backfilled into the impacted access channel.

In addition, CPRA has committed to implement Best Management Practices (BMPs) to minimize the impacts associated with the construction and operation of the Project on each element of the environment (i.e., protection of land, water, fish and wildlife, and cultural resources). These BMPs are described in the Mitigation Plan. Final MBSD EIS Appendix R1, Mitigation and Stewardship Plan and Attachment 2 to this ROD.

CPRA has also identified potential avoidance and minimization measures that will be implemented if future circumstances warrant. CPRA's Operations and Maintenance (O&M) responsibilities for the Project include implementation of the MAM Plan which identifies baseline and operational monitoring of key environmental parameters, project performance measures, and triggers for management changes. CPRA will monitor Project and ecosystem variables in order to evaluate the Project success, Project performance, and ecological changes to inform Project operations, including decisions as to whether implementation of certain mitigation measures is necessary or practical. Further details regarding the MAM Plan are set forth in Section 3.4 below and in the MAM Plan, Appendix A to the Final RP #3.2 and Appendix R2 to the Final MBSD EIS.

3.2.1.2.2 Environmental Justice

Consistent with CEQ's guidance regarding outreach and engagement to low-income and minority populations, CPRA engaged in additional outreach to the low-income and minority populations potentially impacted by increases in tidal flooding and storm hazards, as well as those low-income and minority populations reliant on commercial or subsistence fishing, prior to issuance of the Draft and Final RP #3.2 and MBSD EIS to seek their input on additional or alternative mitigation and stewardship measures. Refinements to proposed mitigation and stewardship measures for communities with environmental justice concerns were made based in part on feedback received from CPRA's outreach.

Mitigation and stewardship measures to address potential construction-related impacts to the community of Ironton include BMPs to maintain safe and accessible conditions at all road crossings and access points during construction, dust management, engagement of a community liaison to assist with communications regarding construction impacts, and the preparation of a Community Communications Plan to assist with communications with community members. Mitigation and stewardship measures to address operations impacts on subsistence and recreational fishing include additional public access opportunities for fishing and/or boat launching. Mitigation and stewardship measures to address operations impacts on commercial fishing include reserving a portion of each of the following programs for individuals from identified communities with environmental justice concerns that may be disproportionately impacted by the Project: shrimping vessel and gear improvement grants, enhancing public and private oyster seed grounds, Alternative Oyster Culture, and overall fisheries workforce and business training. Measures to address commercial fishing impacts also include engaging an outreach coordinator to assist fishers from identified communities with environmental justice concerns to ensure they learn about and are able to access available programs, including monitoring and reporting the numbers of fishers who utilize the programs and the percentage of program resources that are utilized by fishers from identified communities with environmental justice concerns each year.

The Mitigation Plan also includes measures to address projected increases in water levels and corresponding tidal flooding in certain Project-area communities. This includes engaging an outreach coordinator to ensure that identified communities with environmental justice concerns affected by the projected water level increases are informed about and have an equal opportunity to access the benefits of the mitigation and stewardship programs, including monitoring and reporting the number of community members who utilize the programs and the amount and percentage of program resources utilized annually. Additional mitigation and stewardship measures are identified for the Grand Bayou tribal community, including provision of floating gardens, community connecting sidewalks, and the Grand Bayou Canal backfilling and ridge restoration project. The Mitigation Plan also includes assistance to the community of Ironton prior to commencing operations of the Project, through provision of a liaison to work with residents in Ironton on community preparedness for storm-based flooding and damage.

3.3 Dolphin Intervention Plan

A component of the mitigation and stewardship measures developed to address collateral injury that could potentially result from the implementation of the MBSD, the Dolphin Intervention Plan provides a strategy and best practices for marine mammal interventions.

The Dolphin Intervention Plan outlines a framework for potential intervention activities and the process for decision-making that may be used to respond to free-swimming, live dolphins that are ill; behaving abnormally; injured; in poor condition/health; or are at risk for injury, illness, or death due to adverse environmental changes in the Barataria Basin. The goals of this intervention framework for dolphins in the Barataria Basin are to reduce illness, pain, and suffering, as well as collect scientific information that may inform operational mitigation actions and adaptive management of the monitoring and response activities.

The Dolphin Intervention Plan for the Project will follow the Small Cetacean Intervention Best Practices (and other associated appendices) developed as part of the 2022 Marine Mammal Health and Stranding Response Program (MMHSRP) Programmatic Environmental Impact Statement (PEIS) to the best extent practicable but may include modifications to meet the specific needs for MBSD interventions. This intervention framework includes activities above and beyond normal emergency response activities, either due to the scale or nature of the activities (such as rescues of dolphins in their usual habitat but when the conditions within that habitat are affected by the low salinities from the Project, remote treatment of free-swimming dolphins that are not entangled or victims of a boat strike, or broader-scale hazing or translocations). Interventions may require no additional action beyond those in the MAM Plan, or include such activities as remote sample collection, assessment, and/or treatment; capture and release, rehabilitation, and/or translocation of free-swimming individual(s); and/or capture and euthanasia of sick or injured, free-swimming animals.

3.4 Monitoring and Adaptive Management

According to the NRDA regulations for OPA (15 CFR 990.55), a restoration plan should include “a description of monitoring for documenting restoration effectiveness, including performance criteria that will be used to determine the success of restoration or need for interim corrective action.” Given the unprecedented temporal, spatial, and funding scales associated with the Project, the Louisiana TIG recognized the need for a robust monitoring and adaptive management framework to measure the beneficial impacts of restoration and support restoration decision-making. For consistency with the Final

PDARP/PEIS and Trustee Council SOPs, a monitoring plan was developed and is included in Appendix A of the Final RP #3.2 and Appendix R of the Final MBSD EIS.

Implementation of the MAM Plan will be the responsibility of CPRA's MBSD Adaptive Management Team and Data Management Team, with assistance and oversight from an Operations Management Team and Executive Team (as defined in the MAM Plan). Resource agencies, parish governments, and other stakeholders will have the opportunity to inform and advise the MAM Plan implementation through a Stewardship Group and Stakeholder Review Panel, and technical focus groups and peer review groups made up of subject matter experts will be utilized as needed to inform MAM Plan implementation. Appendix A of the Final RP #3.2 describes the MAM Plan including the governance structure in more detail.

Project-specific monitoring data and reports will be provided to the public on, at least, an annual basis. (See Implementation Plan, Attachment 4.) The data and reports will also be provided to the Trustee Council to demonstrate the Trustees' collective progress toward meeting the ecosystem goals described in the Final PDARP/PEIS and to determine whether any updates based on newly emerged science and/or restoration procedures and/or Trustees' experience managing and implementing this restoration program are needed.

3.4.1 MBSD Monitoring and Adaptive Management Plan

Evaluation metrics and implementation guidance and goals are identified in the MAM Plan developed by the Louisiana TIG. These performance metrics and parameters will help determine if the Project and the related mitigation are achieving the overall objectives of the Project and the Final RP #3.2. These standards are based on attributes that are objective and verifiable by field measurements and analysis. Data collection and analysis will be based on methods established and/or approved by CPRA using established best-practices. The MAM Plan also identifies monitoring, maintenance, and adaptive management requirements to ensure that mitigation components and the Project restoration objectives are achieving the performance standards.

The MAM Plan serves as a companion to the Final RP #3.2; the Project Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) Plan (Attachment 5); and the Mitigation Plan. The MAM Plan provides a framework for adaptive management decision-making and implementation that:

- Discusses the basics of MAM and presents a conceptual understanding of a sediment diversion of Mississippi River water into the Barataria Basin that underpins the selection of key monitoring variables for the Project, and identifies key uncertainties that may affect the ability of the Project to achieve its restoration objectives;
- Outlines the structure for governance of Project operations and adaptive management, including specifying the roles and responsibilities of State and federal partners;
- Identifies monitoring needs and the key performance measures associated with each objective that the State and the Louisiana TIG will use to evaluate progress towards meeting the Project restoration objectives and to inform adaptive management. This includes describing assessment of progress toward meeting the restoration objectives as described in the Final RP #3.2. This also includes the methods for specific types of monitoring and a discussion of the spatial and temporal extent of pre-operations baseline monitoring that will be conducted before, and post-construction monitoring that will be conducted after the Project begins operating;
- Describes the framework for assessing Project success based on performance measures and potential adaptive management actions, including potential operational shifts to minimize Project

impacts if practicable given the Project's goals, objectives, and success criteria, and the schedule for evaluating data that could lead to changes in management actions;
- Discusses the above information in relation to the concurrent development of State and Louisiana programmatic adaptive management as outlined in the Louisiana Adaptive Management Status and Improvement Report: Vision and Recommendations (The Water Institute of the Gulf 2020), including data management, and reporting; and
- Establishes the basis for an estimated budget for Project-specific MAM.

Once construction is underway, CPRA will be responsible for monitoring per the MAM Plan and implementation of any required mitigation and stewardship measures. If monitoring reports comparing progress on mitigation and stewardship measures to performance standards indicate progress for any required mitigation or stewardship measures is falling short of the identified performance standards, consultation with the Louisiana TIG will be initiated regarding the need for adaptive management. See Implementation Plan, Attachment 4, for additional information about the reporting process.

The Mitigation Plan, the MAM Plan and the Dolphin Intervention Plan reflect the Louisiana TIG's consideration of public comments received on the Draft RP #3.2 and Draft MBSD EIS. The Louisiana TIG is committed to implementation of these plans as key components of the MBSD Project. These plans include proactive strategies to engage and work with the communities, individuals, and stakeholders that rely on and value the resources that would be impacted.

4. Adoption of NEPA Evaluation: USACE MBSD Environmental Impact Statement

After participating substantially and meaningfully as cooperating federal agencies throughout its development, the federal Trustees of the Louisiana TIG are adopting the Final MBSD EIS for the purpose of evaluating the Louisiana TIG's proposed action – funding and implementing the Project – according to NEPA, 40 CFR 1506.3. The Final MBSD EIS was prepared in compliance with the federal agency decision-making requirements of the NEPA of 1969, 42 U.S.C. 4321 et seq. Following the completion of the Final MBSD EIS, in accordance with 40 CFR 1506.3(b), the federal Trustees of the Louisiana TIG have reviewed the USACE Final MBSD EIS and concluded that the USACE Final MBSD EIS meets the standards for an adequate EIS under the CEQ regulations and each agency's NEPA procedures, including fully evaluating the impacts of the Louisiana TIG's proposed action to implement the MBSD. The federal Trustees found that the Final MBSD EIS has addressed all cooperating agency comments and includes all required components for adoption including:

- A discussion of the purpose and need for the action;
- A summary of the EIS, including the issues to be resolved, and in the final EIS, the major conclusions and areas of controversy including those raised by the public;
- A listing of the alternatives to the proposed action;
- A description of the affected environment;
- A description of the environmental impacts of the proposed action and alternatives, including cumulative impacts; and
- A listing of agencies and persons consulted, and to whom copies of the EIS are sent.

The analysis supporting the adoption of the Final MBSD EIS is included as Attachment 6 to this ROD. Signature on this ROD documents the federal Trustees of the Louisiana TIG decision to adopt the Final MBSD EIS.

5. NEPA Comparison of the Environmental Consequences of the Alternatives

This section summarizes and compares the environmental consequences of the alternatives, including cumulative impacts, evaluated according to NEPA. These environmental consequences relative to each alternative evaluated and the comparative analysis between the alternatives informed the OPA decision set forth in this ROD.

5.1 Summary of Impacts of the Action Alternatives

The Final MBSD EIS described all areas of the human and natural environment that may be impacted by the MBSD and its alternatives and evaluated the impacts to those resources, including geology and soils; groundwater resources; surface water and coastal processes; surface water and sediment quality; wetland resources and waters of the U.S.; air quality; noise; terrestrial wildlife and habitat; aquatic resources; marine mammals; threatened and endangered (T&E) species; socioeconomics; commercial fisheries; environmental justice; recreation and tourism; public lands; land use and land cover; aesthetic and visual resources; public health and safety, including flood risk reduction and shoreline protection; navigation; land-based transportation; hazardous, toxic, and radioactive waste; and cultural resources. A detailed discussion of the affected environment is provided in Chapter 3 of the Final MBSD EIS. Evaluation of the impacts to those resources caused by the MBSD and alternatives, as well as evaluation of cumulative impacts, is set forth in Chapter 4 of the Final MBSD EIS.

The MBSD would result in impacts on the general character of the Barataria Basin, including, but not limited to, salinity, temperature, land accretion, and water quality. These impacts would generally be either adverse or beneficial depending on habitat tolerances of area plants, animals, and people, with moderate to major adverse impacts anticipated to occur only on those plants and animals that are unable to tolerate the modified habitat, and subsequently to the people that rely on the area plants and animals for economic, recreational, or other purposes. In many cases, impacts to the Barataria Basin resources would be higher near the diversion outfall, where land building/sedimentation, salinity, and water level impacts would be greatest, and would decrease with distance from the outfall.

The major resources of interest identified during the evaluation of impacts from implementation of the MBSD are summarized in Attachment 7 and include: surface water and coastal processes; surface water and sediment quality; wetland resources and waters of the U.S.; noise; aquatic resources; marine mammals; T&E species; socioeconomics, environmental justice; commercial fisheries; recreation and tourism; public health and safety, including flood risk reduction and shoreline protection; navigation; land-based transportation; and cumulative impacts. A detailed discussion of the potential impacts from Project implementation in comparison to the other action alternatives and the No Action Alternative is provided in Chapter 4 of the Final MBSD EIS. In addition, Table 2.9 of the Final MBSD EIS is included as Attachment 8 to this ROD, summarizing the construction and operational impacts of each alternative on the Project area's resources.

5.2 The Environmentally Preferable Alternative

As required by the CEQ NEPA implementing regulations, a ROD must identify the alternative or alternatives considered to be environmentally preferable (40 CFR 1505.2(b)). The environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources.

The Louisiana TIG has determined that Alternative 1, the preferred alternative, is also the environmentally preferable alternative. In addition to representing the best path to addressing the injuries to natural resource services from the DWH spill, this alternative provides a comprehensive approach to address restoration of wetlands, coastal, and nearshore habitats in the Barataria Basin. It will address the DWH spill injuries and provide multiple benefits, including the reconnection and re-establishment of sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, freshwater, and nutrients, which will support the long-term viability of existing and planned coastal restoration efforts.

Through the evaluation of the Preferred Alternative, the Trustees' analysis has determined that, as with many environmental restoration projects, there would be ecological tradeoffs associated with any of the large-scale sediment diversion alternatives. The benefits would be significant and would primarily derive from the creation of thousands of acres of marsh that, with a steady supply of Mississippi River sediment, would be sustained over decades even in the face of rising sea levels and coastal erosion. After 50 years of operation of a diversion with a capacity of 75,000 cfs (Alternative 1), over 20% of the marsh in the Barataria Basin is projected to have been created or sustained by the diversion. The Trustees believe that a sediment diversion is the only way to achieve a self-sustaining marsh ecosystem in the Barataria Basin.

This sustained marsh is expected to benefit many fish and wildlife species in the basin, including red drum, largemouth bass, blue crab, white shrimp, Gulf menhaden, and migratory waterfowl. These benefits to fish and wildlife species would translate to benefits to recreational users who watch, fish, or hunt those species. In addition, these benefits would not only accrue in the Barataria Basin but, through the transport of marsh productivity, also in the offshore ecosystems of the northern Gulf of Mexico.

The Louisiana TIG recognize that the preferred alternative (Alternative 1) would also result in major, long-term adverse injuries to some natural resources. Reconnecting the river to the basin to restore an estuary that has been degrading and becoming more saline for almost a century would produce significant changes to current conditions in the Barataria Basin, which will adversely affect some of the species that currently reside in the basin. The primary driver of this change would be a reduction in salinity; any of the large-scale sediment diversion alternatives considered would result in a substantial reduction in salinity in portions of the basin. That reduction in salinity would adversely impact fish and wildlife species that rely on higher saline waters and have moved further into the estuary as salinities have increased due to the severed connection between the river and the basin. Key species that would be adversely affected include dolphins, brown shrimp, and oysters.

The preferred alternative (Alternative 1) would also affect storm hazards and tidal flooding in the vicinity of the diversion. The diversion would restore and expand marshes and thereby reduce storm surge and flooding in the communities north of the diversion. At the same time, flows through the diversion and the additional marsh created or sustained by the diversion are expected to somewhat accelerate tidal flooding in communities up to 20 miles south of the diversion that remain outside of levee protection (from Myrtle Grove south to Grand Bayou). During the first several decades of operations, these communities could experience increases in the intensity and duration of flooding impacts; however, within 50 years, sea level rise and subsidence would overtake the effects of the diversion and return as the primary forces driving flooding in these communities. Also, the additional marsh created or sustained by the diversion is expected to somewhat increase storm surge in communities south of the diversion.

The different large-scale diversion alternatives evaluated in this Final RP #3.2 and Final EIS result in different levels of impacts and benefits. After considering these impacts and benefits, the Louisiana TIG selected as their preferred alternative a diversion with a maximum capacity of 75,000 cfs (with the actual flow through the diversion dependent on the flow of the Mississippi River). The Louisiana TIG fully evaluated a smaller-capacity diversion with a maximum capacity of 50,000 cfs and found that such a diversion would provide substantially less benefit in marsh preservation and restoration and correspondingly less associated benefits to nearshore marine ecosystems, water column resources (including fish and shellfish), birds and terrestrial wildlife, recreational use, and offshore ecosystems. Not only would the smaller 50,000 cfs diversion achieve substantially fewer benefits to the overall coastal ecosystem, it would do so with only a small reduction in collateral injury, impacts on public health and safety, and cost, making it overall a less environmentally preferable alternative to the Louisiana TIG.

The Louisiana TIG also fully evaluated a larger-capacity diversion with a maximum capacity of 150,000 cfs. While the marsh creation benefits of such a large diversion would be significantly greater than the 75,000 cfs alternative, the projected adverse injuries and impacts to public health and safety would also increase to levels unacceptable to the Trustees. Although a larger diversion (150,000 cfs) would result in the greatest degree of benefit, it would also result in the greatest degree of adverse impact, particularly to the Barrier Island stratum of BBES bottlenose dolphins. It would preclude the establishment of public oyster seed grounds in the Barataria. It would not sufficiently support a diverse ecosystem as desired and supported by the Project’s purpose and need. For these reasons, the larger diversion (150,000 cfs) is not the environmentally preferable alternative.

The Louisiana TIG also considered three additional alternatives that consisted of diversions with capacities of 75,000 cfs, 50,000 cfs, and 150,000 cfs with marsh terraces in the outfall area to potentially enhance wetland creation. However, marsh terraces are anticipated to provide little additional benefit to resources, would not reduce any of the anticipated adverse impacts, and would result in increased costs, and thus are not considered environmentally preferable over alternatives without marsh terraces.

Under a No Action alternative, the Project would not be implemented by the Louisiana TIG. The environmental consequences, both adverse and beneficial, would not occur. Existing projects and operations around the Project area would be expected to continue, including coastal restoration and hurricane risk reduction projects. Implementation of other future restoration projects would be expected to continue. Existing agricultural, industrial, and commercial land use trends would continue in the location of the proposed diversion complex. However, without implementation of the Project, the loss of deltaic processes in the Barataria Basin will be expected to result in a steady decline in the health of natural resources, including plant health, high rates of erosion, and further increases in salinity. Coastal habitats of the northern Gulf of Mexico which support resources throughout the Gulf will be compromised. The ongoing coastal land loss in the Barataria Basin would be expected to continue. The submergence of wetlands in coastal Louisiana has been measured to be one of the highest rates world-wide. In the absence of intervention, coastal land loss in the Barataria Basin would continue and is expected to increase. Due to this anticipated extensive land loss, Louisiana would continue to face increased and widespread storm damage and storm-related economic disruptions, with associated direct and indirect impacts on public health and safety.

Given the fewer benefits to the overall ecosystem from the smaller-scale, 50,000 cfs capacity alternative, and the projected additional adverse impacts from the larger-scale, 150,000 cfs capacity alternative, and the expected ongoing coastal land, ecosystem, and economic losses that could be expected from the No Action alternative, the Louisiana TIG determined that the preferred alternative (Alternative 1, 75,000 cfs capacity) to be the environmentally preferable alternative.

5.3 Environmental Review of Mitigation and Stewardship Measures

The mitigation and stewardship measures set forth in the Mitigation Plan, the MAM Plan, the Endangered Species Act (ESA) reasonable and prudent measures and terms and conditions, the EFH recommendations, and the FWCA recommendations are summarized in the Final MBSD EIS Appendix R-1 and R-2. The Final MBSD EIS also evaluated the environmental impacts associated with implementation of these measures. The Summary Table in Final EIS Appendix R3 identifies the relevant measure, the environmental resource categories potentially affected by the measure, and the environmental review completed as part of the Final MBSD EIS for each measure.

As explained in Final EIS Appendix R4, some measures have no or negligible environmental impact and therefore do not require additional review. Other measures involve actions that are consistent with the range of environmental impacts fully evaluated in the Final EIS and as such no additional review is necessary. Final EIS Appendix R4 provides evaluation of those measures with definable environmental impacts not otherwise evaluated within the Final EIS. Some measures include components that could not be fully analyzed as part of the Final MBSD EIS because the scope, scale, and/or location of the actions are not fully known at this time. The need for future environmental analyses prior to implementation will be assessed when relevant details are available and conducted as needed. All applicable consultations and regulatory compliance activities required to implement conditions of Project approval will be completed before funds from the Louisiana TIG are used to implement those measures.

5.4 Selected Alternative and Rationale for Decision

This ROD provides a comprehensive explanation of the information, analyses and factors that the Louisiana TIG relied on in making its decision to select Alternative 1 for implementation and funding. Consistent with 40 CFR 1505.2(b), this section summarizes the factors and considerations balanced by the Louisiana TIG in making this decision. The OPA analysis and evaluation set forth in the Final RP #3.2, the NEPA analysis and evaluation in the Final MBSD EIS, and inclusion of the mitigation and stewardship and monitoring and adaptive management measures set forth in the Mitigation Plan, the MAM Plan, and the Dolphin Intervention Plan, were instrumental to inform the Louisiana TIG's decision to fund and implement Alternative 1, a large-scale, 75,000 cfs sediment diversion. As described herein, a range of factors contributed to this decision. Through its participation in development and thorough evaluation of these documents as well as extensive public input, each agency applied its individual technical expertise to evaluate the alternatives, taking into consideration agency statutory missions and consistency with other regional restoration planning efforts. A critical factor in determining the best alternative for implementation rests on the ability to reestablish historic deltaic processes through the delivery of sediment, freshwater, and nutrients to the Barataria Basin while providing system-wide benefits to achieve and maintain a diverse estuarine ecosystem. The MBSD Project best achieves this goal.

The Louisiana TIG relied on the best available scientific information to inform its decision. The potential benefits and impacts from the Project that are evaluated in the Final RP #3.2 and the Final MBSD EIS present a robust statement of the science underpinning the Trustees' selection allowing the Trustees to fully and fairly evaluate the Project and provide the foundation for sound approaches to managing and mitigating impacts from the Project. These analyses were conducted using the best information and data available, including peer-reviewed literature, subject matter expertise, and computer modeling which simulates future conditions. For example, the Delft3D Basinwide model was used to simulate changes in hydrodynamics, sediment transport, water quality and vegetation within the Mississippi River Delta and its estuaries to project impacts and benefits of the different project alternatives. The model included observed large-scale processes, including subsidence and sea level rise, and smaller-scale processes, such as tidal fluctuations, atmospheric and wind forcing, and rainfall. The Ecopath with Ecosim (EwE) and the Comprehensive Aquatic Systems Model (CASM) were used to inform the food web connection between resources, and Habitat Suitability Indices were used to project the response of higher trophic levels to project alternatives and inform the Project and adaptive management. The Advanced CIRCulation (ADCIRC) and Simulating Waves Nearshore (SWAN) high fidelity models were used to quantify coastal storm hazards (surge and wave height magnitude) in the Project area. The input-output model (IMPLAN) for the State of Louisiana was used to develop estimations of the benefits and impacts of project alternatives on human systems. These data were used to inform the final decision before the Louisiana TIG.

The Project would result in impacts on the general character of the Barataria Basin, including, but not limited to, salinity, temperature, land accretion, tidal flooding, storm hazards, and water quality. These impacts would generally be either adverse or beneficial depending on habitat tolerances of area plants, animals, and people, with moderate to major adverse impacts anticipated to occur only on those plants and animals that are unable to tolerate the modified habitat, and subsequently to the people that rely on the area plants and animals for economic, recreational, or other purposes. In many cases, impacts to the Barataria Basin resources would be higher near the diversion outfall, where land building/sedimentation, salinity, and water level impacts would be greatest, and would decrease with distance from the outfall.

On balance, the long-term outcomes of the Project for natural resource restoration were critical to the Trustee's in selecting Alternative 1. Over the long-term, operation of Alternative 1 would re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, fresh water, and nutrients. These longer-term processes would allow the continued existence of a projected 26,000 acres of marsh in the Barataria Basin that would otherwise be lost. Although operation of Alternative 1 would result in long-term decreases in populations for certain key species (such as oysters and brown shrimp), as well as marine mammals, the long-term productivity of aquatic life as a whole in the Barataria Basin, compared to the No Action alternative, would increase through nutrient input and the maintenance of habitat that provides nursery and juvenile habitat for several key finfish and shellfish species, such as red drum and white shrimp.

The Trustee's decision was also influenced by the development of a comprehensive, science-based planning framework to mitigate, monitor and adaptively manage impacts from Project funding and implementation. A comprehensive MAM Plan to evaluate the Project's benefits and impacts on the Barataria Basin and consider how the management of the diversion may be adapted to best meet project goals is a critical element for assessing progress toward this Project's goals, minimizing risk, and addressing uncertainties on an ongoing basis. During and after implementation of Alternative 1, the Louisiana TIG will apply the MAM Plan to review monitoring data to inform how it is meeting Project objectives and to support adaptive management of this Project. A Mitigation Plan was also developed to demonstrate how adverse impacts of the Project will be avoided, minimized, or mitigated. The Mitigation Plan also identifies: (1) conservation measures to avoid and minimize potential effects to species listed as threatened or endangered under the ESA; (2) conservation recommendations provided by the National Marine Fisheries Service (NMFS); (3) recommendations provided by the FWS under the FWCA; and (4) stewardship measures to address Project-related changes to the environment. The Louisiana TIG determined that this suite of activities (mitigation, stewardship, monitoring and adaptive management) represented the best option for avoiding, minimizing and mitigating the effects of the Project consistent with the Project's purpose and need. The Mitigation Plan, the MAM Plan, and the Dolphin Intervention Plan are key components of the MBSD, and the Louisiana TIG is committed to implementation of these plans.

The Trustees have determined that, as with many environmental restoration projects, there would be ecological tradeoffs associated with any of the large-scale sediment diversion alternatives. The benefits would be significant and would primarily derive from the reconnection of the Mississippi River to support wetland and aquatic ecosystems that would be sustained over decades even in the face of rising sea levels, coastal erosion, and climate change. After 50 years of operation of the MBSD, over 20 percent of the marsh in the Barataria Basin is projected to have been created or sustained by the Project. The Trustees believe that a sediment diversion is the only way to achieve a self-sustaining marsh ecosystem in the Barataria Basin.

6. Compliance with Relevant Environmental Laws, Regulations, and Executive Orders

Before selecting the Preferred Alternative, the Louisiana TIG reviewed the proposed action to ensure that taking such action would be consistent with relevant federal laws, regulations, and Executive Orders (EOs). Section 4 of the Final RP #3.2 and Section 5.1 of the Final MBSD EIS detail the compliance process.

Federal environmental compliance responsibilities and procedures follow the "Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon Oil Spill" (2021), which are laid out in Section 9.4.6 of that document and described in the Environmental Compliance Manual Appendix (DWH Trustees, 2021). Following these SOPs, the implementing Trustee for each project ensures that the status of environmental compliance (e.g., completed versus in progress) is tracked through the Restoration Portal. Implementing Trustees keep a record of compliance documents (e.g., ESA biological opinions, USACE permits) and ensure that they are submitted for inclusion to the Administrative Record.

In addition to OPA and NEPA requirements, requirements of other federal laws may apply to the proposed action. The Louisiana TIG considered relevant laws, regulations, and EOs with respect to the Project. Federal laws reviewed as part of the OPA/NEPA process include: the ESA; the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA); the Marine Mammal Protection Act (MMPA); the Coastal Zone Management Act (CZMA); the National Historic Preservation Act (NHPA); the Coastal Barrier Resources Act; the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA); the Clean Air Act; the CWA; the RHA; the Marine Protection, Research and Sanctuaries Act; the Archaeological Resource Protection Act; and the Land and Water Conservation Fund. The Final MBSD EIS and the USACE RODs evaluate the impacts of the alternatives and compliance with the following EOs: EO 11988: Floodplain Management; EO 11990: Protection of Wetlands; EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low- Income Populations; EO 13112: Invasive Species; EO 13175: Consultation and Coordination with Indian Tribal Governments; EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds; and EO 13693: Planning for Federal Sustainability in the Next Decade.

At the time this ROD is approved, all applicable consultations and regulatory compliance activities required to commence construction of the Project have been completed and appropriately documented (Attachment 9; Attachment 10). The Louisiana TIG Trustees agree that all applicable consultations and regulatory compliance activities required to implement any conditions of Project approval (i.e., mitigation and stewardship measures) must be completed prior to utilizing Louisiana TIG funds to construct or implement those measures. The terms and conditions of all federal, state, and local permits must be complied with in the course of implementing the Project. Further information on these processes can be found in Chapter 4 of the Final RP #3.2 and Chapter 5 of the Final MBSD EIS.

7. Public Notice, Review, and Comment

OPA and NEPA require the Louisiana TIG to engage the public and to consider public comments throughout the DWH restoration planning process. Public outreach and involvement have been an integral part of restoration planning in the Louisiana Restoration Area since 2010. Section 1.8 of the Final RP #3.2 explains the extensive public outreach and comment process undertaken by the Louisiana TIG in developing the Final PDARP/PEIS, SRP/EA#3, and the Final RP #3.2.

The Draft RP #3.2 and the Draft MBSD EIS were subject to a concurrent 90-day review and comment period (March 5, 2021, 86 FR 12915). Since its issuance, the Draft RP #3.2 and supporting documents have been available at: https://www.gulfspillrestoration.noaa.gov/restoration-areas/louisiana. Similarly, since its issuance, the Draft MBSD EIS and supporting documents have been available for public review on the USACE Project website at: http://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-BaratariaSediment-Diversion-EIS/, or upon request. Printed copies of the Draft RP #3.2 and the Draft MBSD EIS were provided for public review at eight public libraries in Belle Chasse, Buras, Cut Off, Harvey, Lafitte, New Orleans, Paradis, and Port Sulphur. At these same locations, the Executive Summary for both the Draft RP #3.2 and the Draft MBSD EIS summarizing the details of the documents into a concise, easy-to-read, document were available in English, Spanish, and Vietnamese. The Louisiana TIG also distributed hard copies of the Draft RP #3.2 and Executive Summary in Vietnamese and Spanish, as well as USB drives with these same documents on them, to additional repositories listed in Section 8 of Draft RP #3.2. Individuals wishing to view hard copies of the Draft MBSD EIS and Draft RP #3.2 were advised to contact the locations regarding viewing hours and COVID-19 restrictions.

Following the comment period, the 40,699 comment submissions received on the Draft RP #3.2 and Draft MBSD EIS were reviewed by the Louisiana TIG and taken into consideration in the preparation of the Final RP #3.2. The Final RP #3.2, Appendix E, includes a summary of the comments received and responses to those comments.

7.1 Comments Received Following Release of the Final Restoration Plan and Final EIS

The Final RP #3.2 and Final MBSD EIS were completed and released to the public on September 21, 2022. USACE CEMVN held a 30-day wait period on the Final EIS between September 23 and October 23, 2022. During that 30-day period, additional public input was received on both the Final RP #3.2 and the Final MBSD EIS (12 and 150 correspondences, respectively). The majority of the input received reiterated comments previously received during public review of the Draft RP #3.2 and Draft MBSD EIS. Commenters noted continued support for the Project given the benefits that it would provide and importance of the Project for sustaining and conserving coastal ecosystems. Other commenters continued to note concerns about the potential impacts of the Project on bottlenose dolphins, commercial fisheries, and communities, and the adequacy of the mitigation. The substance of these concerns has been previously addressed and responded to in Section 5 and Appendix E of the Final RP #3.2 and Appendix

B2 of the Final MBSD EIS.[5] The Louisiana TIG is not required to consider additional comments submitted after publication of the Final MBSD RP #3.2; however, the Louisiana TIG took all input received into consideration prior to reaching its decision reflected in this ROD.

The USACE responded to the comments received regarding the Final MBSD EIS in the USACE CWA ROD (https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/). The Louisiana TIG has reviewed those responses and concluded that those responses, together with the responses provided with the Final RP 3.2 (Appendix E to the Final RP and Appendix B2 to Final MBSD EIS), sufficiently respond to any issues raised regarding the Final MBSD EIS and Final RP #3.2. An exception to this concerns the USACE's responses to comments related to the MBSD's mitigation and stewardship measures wherein the USACE noted uncertainty regarding the adequacy and implementation of the mitigation and stewardship measures set forth in the Mitigation Plan. As explained in Section 3.2.1 above, the Louisiana TIG has made implementation of the Mitigation Plan, MAM Plan and Dolphin Intervention Plan a condition of its funding approval for the Project. In so doing, the Louisiana TIG has responded to CEMVN's uncertainty about the implementation of these measures.

8. MBSD Project Funding Agreement

In light of anticipated total Project costs, most MBSD funding will be provided by the Louisiana TIG (up to a funding cap of $2,260,000,000), with CPRA providing funding for all costs exceeding that $2,260,000,000 cap. The terms of this funding arrangement are set out in the Louisiana Trustee Implementation Group Project Funding Agreement at Attachment 11. This ROD contemplates that the Project Funding Agreement will be executed on or after signature of the ROD and prior to adoption by the Louisiana TIG of a resolution authorizing disbursement of Louisiana TIG funds for the MBSD Project. Execution of the Project Funding Agreement will ensure that all MBSD Project components are fully funded, including all Project components required to comply with permit conditions.

9. Funding Plan for Implementation

Each component of the Mitigation Plan, the MAM Plan, and the Dolphin Intervention Plan will be funded as part of the Louisiana TIG's funding decision. For additional information regarding the availability and schedule of TIG fundings for the Project, including mitigation, stewardship, and MAM measures, see the Implementation Plan, Attachment 4.

Estimated project costs associated with all alternatives were included in the Draft MBSD RP #3.2 (2020). Actual costs are likely to exceed those estimates due to substantial increases in the general inflation rate as well as corresponding increases in most components of the Project since the publication of the Draft RP #3.2. CPRA will not know the amount of the cost increase for the MBSD Project until it completes negotiations for a Guaranteed Maximum Price for Project construction with the CMAR contractor. Those negotiations will not be completed until after this decision on the Final RP #3.2. In light of this uncertainty as to total project costs, the Louisiana TIG is limiting its contribution to the overall project

[5] Since issuance of the Final RP #3.2 and Final EIS, an additional publication, Coastal wetland area change for two freshwater diversions in the Mississippi River Delta, prepared by John R. White, Brady Couvillion, and John Day, has been published providing further information regarding the effects of freshwater diversions on wetland loss in coastal Louisiana. This article published in *Ecological Engineering*, (White et al., 2023), is added to the record as part of the response to Concern Statement ID 62665 and 63015 published with the Final MBSD EIS and Final RP #3.2.

costs to $2,260,000,000. This will help ensure that DWH settlement funding is available to construct all projects selected or currently under consideration, as well as for future large-scale wetlands, coastal, and nearshore habitat restoration projects not yet proposed. The cap would also ensure that planned DWH payments to the Louisiana TIG would be sufficient to cover MBSD project costs as it continues to be designed and implemented. To ensure the MBSD MAM Plan and Mitigation Plan are fully funded, the Louisiana TIG's contribution will cover the majority of MAM associated costs (a NRDA investment of up to $148,800,000, including contingency funding) and the MBSD mitigation and stewardship costs (currently estimated at $378,000,000, including contingency funding). A portion of the E&D costs has been paid by the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund. The remaining Louisiana TIG contribution would be applied toward other project cost categories. CPRA has committed to providing funding for all costs that exceed the Louisiana TIG's funding cap of $2,260,000,000.

Project costs will include the acquisition of property interests from landowners within the construction footprint of the proposed diversion, as well as the acquisition of property interests for implementation of the tidal flooding mitigation measures. Property acquisition would preferably be achieved through a negotiated sale, where CPRA would pay a negotiated amount of compensation to landowners in exchange for the property interests needed for the MBSD. However, if this is not possible, CPRA may, in appropriate circumstances, exercise the state's eminent domain authority to acquire the needed real estate interests. Consistent with applicable law, the landowner would be paid just compensation for any real estate interest acquired to enable the implementation of Alternative 1. Real estate acquisition by CPRA is governed generally by state law in accordance with La. Const. Article 1, Section 4(F), La. R.S. 49:214.1 et seq., La. R.S. 49:214.5.6, and La. R.S. 49:214.6.1(A)(1).

10. Conclusions and Rationale for Decision

10.1 OPA Conclusion and Rationale for Decision

Through the Final RP #3.2, and as documented in this ROD, the Louisiana TIG completed an OPA evaluation of a reasonable range of restoration alternatives, as well as a natural recovery alternative. The Louisiana TIG has reviewed the injury to natural resources in the Louisiana Restoration Area, analyzed restoration alternatives to address those injuries to wetlands, coastal, and nearshore habitats within the Barataria Basin in the Louisiana Restoration Area as determined by the Final PDARP/PEIS, and considered the objectives of the proposed restoration actions. The Louisiana TIG has also considered public and agency comments received during the public review periods. Further, in balancing the analysis and public interest, the Louisiana TIG has decided to select for implementation the MBSD /Alternative 1.

The Project (75,000 cfs) is selected for implementation because it was most favorably evaluated when integrating across all of the OPA NRDA evaluation criteria. The Louisiana TIG anticipates that the MBSD will meet the Project's goals and objectives – creating marsh and shallow-water habitats that provide ecosystem-level benefits to nearshore marine ecosystems, water column resources (including fish and shellfish), birds and terrestrial wildlife, and recreational uses that were injured in the Incident. Alternative 1 will also balance meeting Louisiana TIG goals and objectives for the project while reducing the extent of collateral injury to resources, such as brown shrimp, oysters, and dolphins, compared to larger-capacity alternatives. Given the necessary tradeoffs between benefits and collateral injury, the Louisiana TIG found that Alternative 1 strikes the best balance between providing benefits that restore natural resources and reducing collateral injury.

10.2 NEPA Conclusion and Rationale for Decision

Through the Final MBSD EIS, and as documented in this ROD, the federal trustees of the Louisiana TIG have considered restoration alternatives to address those injuries to wetlands, coastal, and nearshore habitats in the Barataria Basin within the Louisiana Restoration Area as determined by the Final PDARP/PEIS. The federal Trustees of the Louisiana TIG have analyzed alternatives, environmental impacts associated with those alternatives and the extent to which any adverse impacts could be mitigated. The federal Trustees of the Louisiana TIG have also considered public and agency comments received during the public review periods. In balancing the analysis and public interest, the Louisiana TIG has decided to select and implement their preferred alternative (Alternative 1) for the Final RP #3.2. Further, the Louisiana TIG has concluded that with implementation of the measures in the Mitigation Plan, MAM Plan and Dolphin Intervention Plan, all practical means to avoid, minimize, or compensate for environmental harm from the action consistent with the purpose and need have been adopted. *See also* the discussion in Section 5.4 above.

11. Point of Contact

Further information concerning this ROD, the associated Final RP #3.2 and the Final MBSD EIS authorized under this decision may be obtained by contacting:

National Marine Fisheries Service
Office of Habitat Conservation
1315 East-West Hwy
Silver Spring, MD 20910
gulfspill.restoration@noaa.gov

12. Effective Date

This ROD for the Final RP #3.2 and Final MBSD EIS will be effective for all Trustees when each signatory has signed.

FOR THE STATE OF LOUISIANA:

January 19, 2023
Date

KYLE "CHIP" KLINE
Representative for Louisiana

FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION:

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Date

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TONY PENN
Chief
Assessment and Restoration Division
National Ocean Service

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Date

Christopher Doley

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Date: 2023.01.31 12:39:53 -05'00'

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CHRISTOPHER D. DOLEY
Principal Representative
National Oceanic and Atmospheric Administration

FOR THE DEPARTMENT OF THE INTERIOR:

January 30, 2023
Date

Mary Josie Blanchard

MARY JOSIE BLANCHARD
Principal Representative
Department of the Interior

FOR THE U.S. DEPARTMENT OF AGRICULTURE:

January 26, 2023
Date

Ronald Howard

RONALD HOWARD
Alternate to Principal Representative
U.S. Department of Agriculture

FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

January 26, 2023
Date

Mary K Lynch
MARY KAY LYNCH
Alternate to Principal Representative
U.S. Environmental Protection Agency

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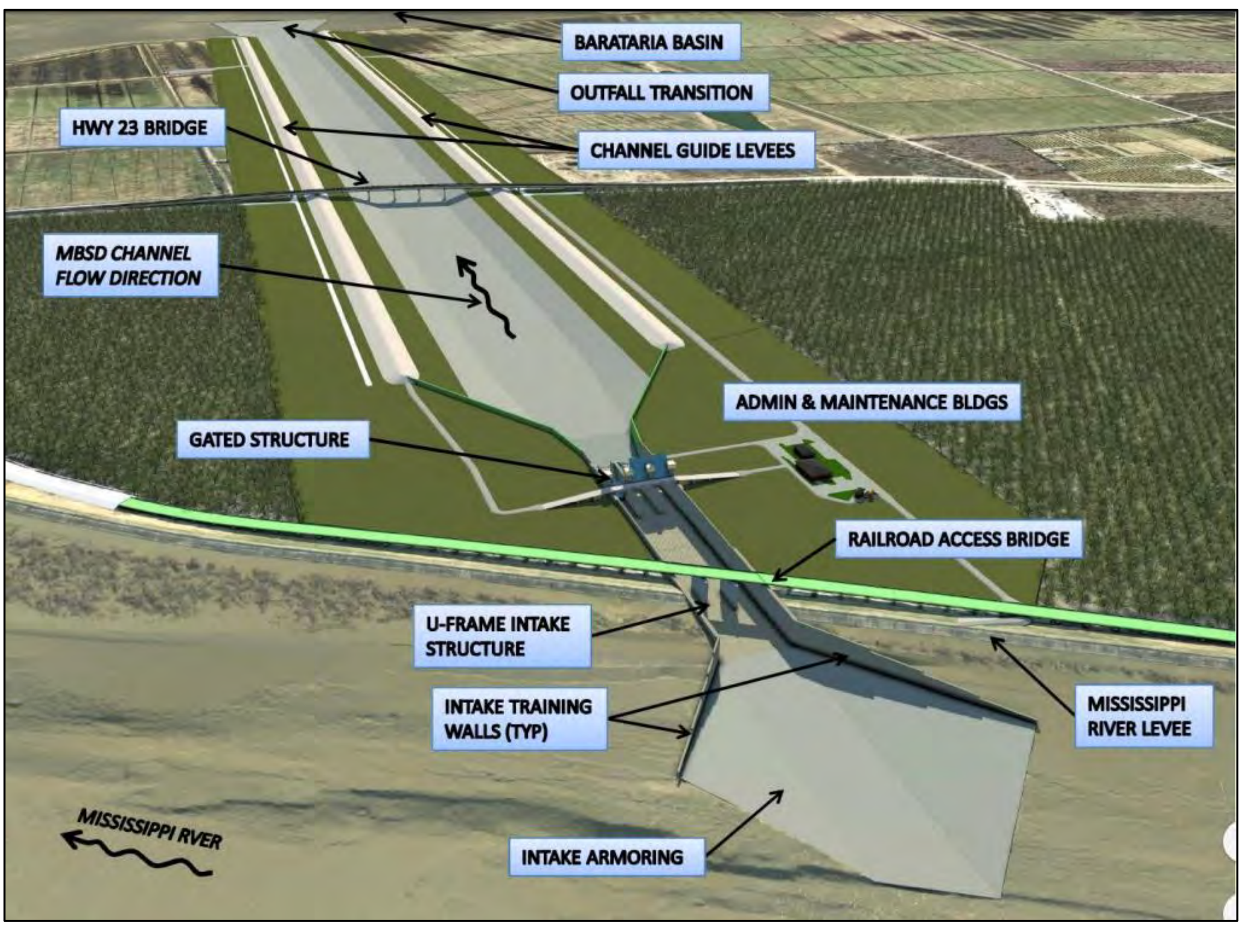
Attachment 1: Monitoring and Adaptive Management Plan for the Proposed MBSD Project

Note: The Monitoring and Adaptive Management Plan for the Proposed MBSD Project is a living document and is expected to be revised over time based on the outcome of Project operations and monitoring. The most up to date version of the Monitoring and Adaptive Management Plan can be found on the Louisiana CPRA Mid-Basin Sediment Diversion Program webpage at https://cims.coastal.la.gov/.

MONITORING AND ADAPTIVE MANAGEMENT PLAN
FOR THE
MID-BARATARIA SEDIMENT DIVERSION PROJECT
(CPRA PROJECT NUMBER BA-0153)



5 July 2022

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LIST OF ACRONYMS

Acronym	Description	Page First Used
ADCIRC	Advanced Circulation Model	13
ADCP	Acoustic Doppler Current Profiler	31
AM	Adaptive Management	1
AMO	Atlantic Multi-decadal Oscillation	7
AMT	Adaptive Management Team	15
APA	Applicant's Preferred Alternative	24
BACI	Before-After-Control-Impact (Study)	23
BBES	Barataria Bay Estuarine Stock	64
BICM	Barrier Island Comprehensive Monitoring	26
CASM	Comprehensive Aquatic Systems Model	13
CEM	Conceptual Ecological Model	5
cfs	Cubic Feet per Second	24
Chl	Chlorophyll	9
CIMS	Coastal Information Management System	107
CMP	Coastal Master Plan	2
CMR	Capture Mark Recapture	65
CoC	Contaminant of Concern	74
CoNED	Coastal National Elevation Database	39
CPRA	Coastal Protection and Restoration Authority	1
CRHA	Capture Release Health Assessment	65
CRMS	Coastwide Reference Monitoring System	23
CTD	Conductivity/Temperature/Depth	34
DIVER	Data Integration, Visualization, Exploration, and Reporting	108
DMT	Data Management Team	102
DWH	Deepwater Horizon	1
DO	Dissolved Oxygen	9
DRT	Dolphin Resource Team	64
E&D	Engineering and Design	11
eDNA	Environmental DNA	65
ENSO	El Niño Southern Oscillation	7
EwE	Ecopath with Ecosim (and Ecospace) Model	13
FEIS	Final Environmental Impact Statement	1

LIST OF ACRONYMS (*continued*)

Acronym	Description	Page First Used
FEMA	Federal Emergency Management Agency	76
FIMP	Fisheries-independent Monitoring Program	24
FRP	Final Restoration Plan	1
FWOP	Future Without Project	13
FWP	Future With Project	13
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness	76
GRSLR	Gulf-regional Sea Level Rise	7
HABFB	Harmful Algal Bloom Forecasting Branch	54
HCAB	Harmful Cyanobacterial and/or Algal Bloom	55
HSI	Habitat Suitability Index	12
IMPLAN	Impact Analysis for Planning	14
LA TIG	Louisiana Trustee Implementation Group	1
LCA	Louisiana Coastal Area (Ecosystem Restoration Study)	13
LDEQ	Louisiana Department of Environmental Quality	21
LDH	Louisiana Department of Health	21
LDWF	Louisiana Department of Wildlife and Fisheries	21
LiDAR	Light Detection and Ranging	39
LMRFC	Lower Mississippi River Forecasting Center	31
LOI	Loss on Ignition	45
MAM	Monitoring and Adaptive Management	1
MMSN	Marine Mammal Stranding Network	67
MR	Mississippi River	4
MR&T	Mississippi Rivers & Tributaries Project	7
MRHDMS	Mississippi River Hydrodynamic and Delta Management Feasibility Study	13
N	Nitrogen	34
NFWF	National Fish and Wildlife Foundation	2
NMFS	National Marine Fisheries Service	77
NOAA	National Oceanic and Atmospheric Administration	27
NRDA	Natural Resource Damage Assessment	1
OM&M	Operations, Maintenance and Monitoring	101

LIST OF ACRONYMS (*continued*)

Acronym	Description	Page First Used
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation	1
OMT	Operations Management Team	19
P	Phosphorus	34
PDARP	Programmatic Damage Assessment and Restoration Plan	1
PDDA	Project Delta Development Area	24
PDT	Project Design Team	13
PEIS	Programmatic Environmental Impact Statement	1
PIA	Project Influence Area	24
PRD	Protected Resources Division	77
QA/QC	Quality Assurance/Quality Control	20
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act	2
RM	River Mile	38
RPM	Reasonable and Prudent Measure	77
RSET	Rod Sediment Erosion Table	47
RSLR	Relative Sea Level Rise	7
S	Sulfur	34
SAV	Submerged Aquatic Vegetation	9
SEFSC	Southeast Fisheries Science Center	78
SERO	Southeast Regional Office	78
SLR	Sea Level Rise	2
SME	Subject Matter Expert	21
SOP	Standard Operational Procedure	107
SWAMP	System Wide Assessment and Monitoring Program	23
TC	Total Carbon	46
TN	Total Nitrogen	46
TP	Total Phosphorus	46
TSS	Total Suspended Sediments	9
TWIG	The Water Institute of the Gulf	2
UAS	Unmanned Aircraft System	66
USACE	United States Army Corps of Engineers	2

LIST OF ACRONYMS (*continued*)

Acronym	Description	Page First Used
USDA	US Department of Agriculture	76
USFWS	United States Fish and Wildlife Service	74
USGS	United States Geological Survey	31
WY	Water Year	101

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1. INTRODUCTION

1.1. Purpose of the Project Monitoring and Adaptive Management Plan

Following the 2010 Deepwater Horizon (DWH) explosion and oil spill, the Natural Resource Damage Assessment (NRDA) Trustees identified implementation of monitoring and adaptive management (MAM) as one of the NRDA programmatic goals in the Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (PDARP/PEIS; DWH Trustees, 2016). As described therein, the MAM Framework provides a flexible, science-based approach to implement effective and efficient restoration over several decades and to provide long-term benefits to the resources and services injured by the DWH oil spill. This MAM plan for the Mid-Barataria Sediment Diversion Project (the Louisiana Coastal Protection and Restoration Authority's (CPRA's) Project Number BA-0153; hereafter 'the Project'), has been drafted by the State and federal Project partners on the Louisiana Trustee Implementation Group (LA TIG).

This MAM plan serves as a companion to the Project Final Phase II Restoration Plan (FRP); the Project Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) Plan; and the Project Mitigation Plan prepared for the Project's Final Environmental Impact Statement (FEIS). This MAM plan provides a framework for adaptive management (AM) decision-making and implementation that:

- Discusses the basics of MAM and presents a conceptual understanding of a sediment diversion of Mississippi River water into the Barataria Basin that underpins the selection of key monitoring variables for the Project, and identifies key uncertainties that may affect the ability of the Project to achieve its restoration objectives (Section 1).
- Outlines the structure for governance of Project operations and AM, including specifying the roles and responsibilities of State and federal partners (Section 2).
- Identifies monitoring needs and the key performance measures associated with each objective that the State and the LA TIG will use to evaluate progress towards meeting the Project restoration objectives and to inform AM (Section 3). This includes describing assess progress toward meeting the restoration objectives as described in the FRP. This also includes the methods for specific types of monitoring and a discussion of the spatial and temporal extent of pre-operations baseline monitoring that will be conducted before, and post-construction monitoring that will be conducted after, the Project begins operating.
- Describes the framework for assessing Project success based on performance measures and potential AM actions, including potential operational shifts to minimize Project impacts if practicable given the Project's goals, objectives, and success criteria (Section 4), and the schedule for evaluating data that could lead to changes in management actions (Section 5).
- Discusses the above information in relation to the concurrent development of State and LA TIG programmatic adaptive management as outlined in the *Louisiana Adaptive Management Status and Improvement Report: Vision and Recommendations* (The Water Institute of the Gulf 2020), including data management (Section 6), and reporting (Section 7); and
- Establishes the basis for an estimated budget for Project-specific MAM (Section 8).

MAM Plans are by nature living documents and never "final". This Plan will be "draft" at least until if, and if so when, the US Army Corps of Engineers (USACE) New Orleans District issues approval and issuance of the permits and authorizations required for the Project. CPRA at that point will then add any Compliance Monitoring requirements contained in those permits to this Plan.

1.1.1. Purpose of Adaptive Management

A distinctive feature of coastal Louisiana is that its industry, natural resources, communities, and culture are intricately linked to, and reliant on, its wetland environment. Individually managing each of these systems is difficult due to their inherently uncertain and highly dynamic nature and the high level of integration between the systems. Predicting the effects of coastal Louisiana's restoration projects with complete certainty is impossible due to

- shifting ecological baselines associated with continued, ongoing land loss, including sea level rise (SLR), subsidence, water cycles, tropical storms and hurricanes;
- incomplete understandings of ecosystem structure and function; and
- imprecise and complex relationships between project features and corresponding outcomes.

Adaptive management is a form of structured decision-making applied to the management of natural resources in the face of uncertainty (Pastorok et al. 1997; Williams 2011). The primary incentive for implementing AM is to increase the likelihood of achieving desired project outcomes given the identified uncertainties. It is an iterative process that integrates monitoring and evaluation of ecosystem variables in response to management actions with flexible decision-making, where management approaches are adjusted based on observed outcomes (NRC 2004). Adaptive management provides an organized, coherent, and documented process for promoting learning that will improve decision-making. Within the context of DWH NRDA restoration, AM includes informing the selection, design, and implementation of restoration projects; implementing corrective actions, when necessary, to projects that are not trending toward established performance criteria; and making adjustments over time to projects that require recurrent or ongoing decision making.

1.1.2. Overview of CPRA Programmatic Adaptive Management

The State of Louisiana has long recognized the importance of utilizing AM to improve its coastal program, and has conducted specific AM activities for implemented projects. Adaptive Management has been a key feature of Louisiana's Coastal Master Plan since 2012, thus allowing for flexibility in program implementation as conditions change, resolution of uncertainties to improve future decision-making, and modification of constructed projects while informing the development of future projects. Indeed, the Louisiana Legislature's mandate for CPRA to update Louisiana's Coastal Master Plan (CMP) every six years to account for changes in information, tools, and on-the-ground situations, is an example of, and a mandate for, AM.

In March 2018, the LA TIG funded a project focused on formalizing programmatic AM for restoration in coastal LA by describing the status of, and identifying opportunities for, institutionalizing AM within CPRA and the LA TIG. That work, conducted in partnership with The Water Institute of the Gulf (TWIG), was intended to integrate across the multiple implementing mechanisms (e.g., CPRA, LA TIG, the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE) Program, National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefits Fund) (The Water Institute of the Gulf, 2020). CPRA's programmatic AM will create a structure and process for building institutional knowledge, iteratively incorporating new information that continually improves our system understanding, facilitating informed adjustment of management actions, and improving decision-making to help achieve the long-term sustainability of our coast, and will build the knowledge base by engaging stakeholders and through internal and external communication. The goal of CPRA programmatic AM is to maximize the success of the coastal protection and restoration program by utilizing robust decision-making.

1.1.3. Project-Level Adaptive Management

Project AM is particularly important because of its scale and scope. Project-level AM focuses on identifying project uncertainties (Section 1.4) and, where feasible reducing those uncertainties through project design, scientific analysis, or monitoring to inform management actions (Section 4 and Table 4.1-4). Conceptual (Section 1.3) and numerical modeling (Section 1.5) provides the expectations against which MAM Plan monitoring (Section 3) and evaluation (Section 4) has been developed, both with regards to anticipated Project effects and the constantly changing baseline. As outlined in Section 4, monitoring data and associated assessments will inform AM evaluations, decisions, and actions. Sometimes the ten steps in the iterative project-level AM cycle developed for the Louisiana TIG (Figure 1.1-1; The Water Institute of the Gulf, 2020) do not occur sequentially; it may be necessary to move forward or backward through the cycle or to repeat certain steps.

1.2. Restoration Type Goals, Project Purpose and Need, and Project Restoration Objectives

The DWH oil spill caused extensive impacts to marsh habitats and species in Louisiana. These habitats have a critical role in the overall productivity of the northern Gulf of Mexico. In DWH Trustees (2016), the DWH Trustees found that coastal and nearshore habitat restoration is the most appropriate and practicable mechanism for restoring the ecosystem-level linkages disrupted by this spill. Nearshore habitats provide food, shelter, and nursery grounds for numerous ecologically and economically important species, including fish, shrimp, crabs, sea turtles, birds, and mammals.

The overall programmatic goal for the Project is to Restore and Conserve Habitat. The Restoration Type is Wetlands, Coastal, and Nearshore Habitats Restoration. The goals of this Restoration Type, outlined in Section 5.5.2.1 of the PDARP/PEIS (DWH Trustees, 2016) are to:

- Restore a variety of interspersed and ecologically-connected coastal habitats in each of the five Gulf states to maintain ecosystem diversity, with particular focus on maximizing ecological functions for the range of resources injured by the spill, such as oysters, estuarine-dependent fish species, birds, marine mammals, and nearshore benthic communities.
- Restore for injuries to habitats in the geographic areas where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- While acknowledging the existing distribution of habitats throughout the Gulf of Mexico, restore habitats in appropriate combinations for any given geographic area. Consider design factors, such as connectivity, size, and distance between projects, to address injuries to the associated living coastal and marine resources and restore the ecological functions provided by those habitats.

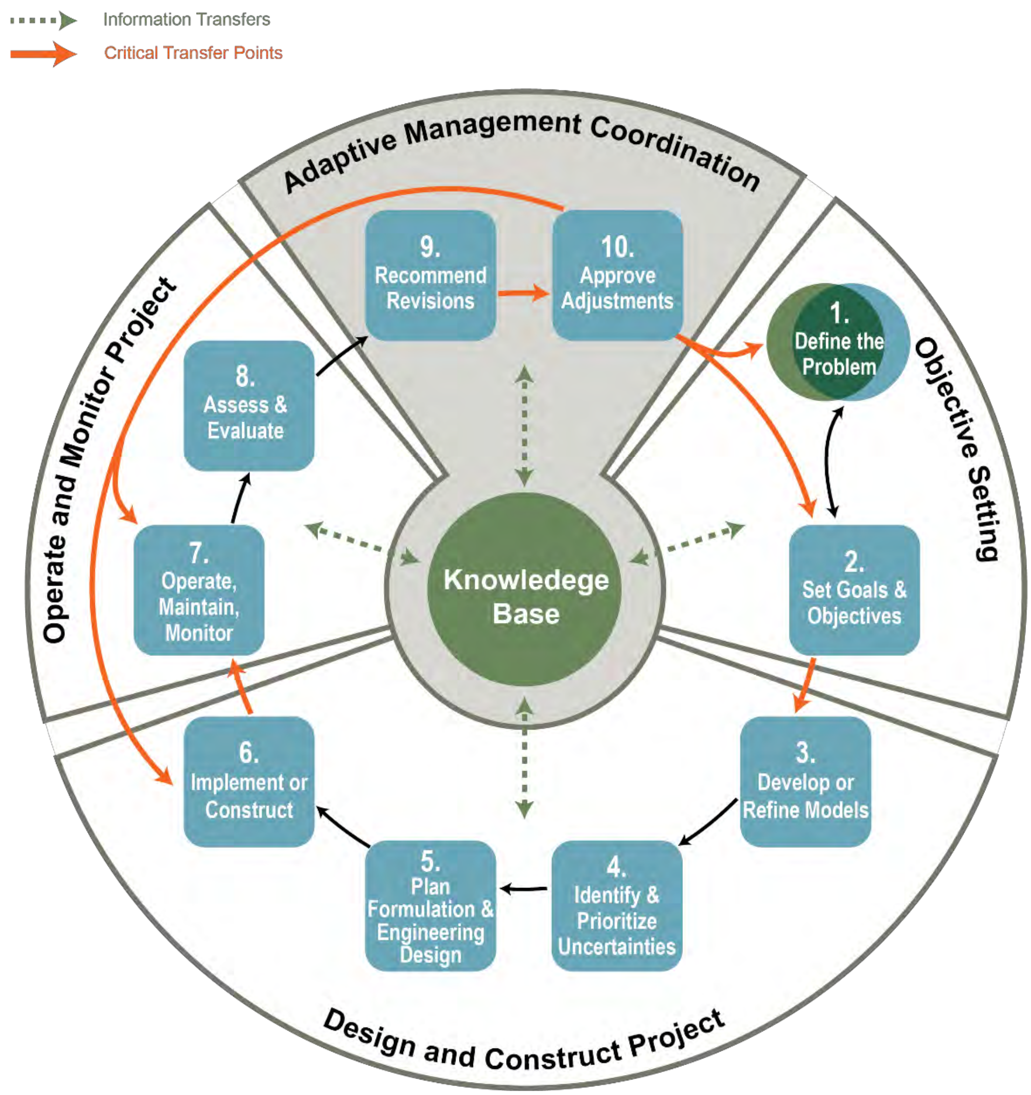

Figure 1.1-1. The four phases of a project-- Objective Setting, Design and Construct Project, Operate and Monitor Project, and Adaptive Management Coordination—each connect to the steps of the adaptive management cycle. All four phases include information capture and transfer to the knowledge base (e.g., annual reporting). Critical transfer points provide opportunities for increased information capture and transfer. Figure from The Water Institute of the Gulf (2020).

The Project's purpose and need, as articulated in the FEIS, is:

> "… to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion in the Barataria Basin that will reconnect and re-establish sustainable deltaic processes between the Mississippi River [MR] and the Barataria Basin through the delivery of sediment, freshwater, and nutrients to support the long-term viability of existing and planned coastal restoration efforts. The proposed Project is needed to help restore habitat and ecosystem services injured in the northern Gulf of Mexico as a result of the DWH oil spill."

Specific restoration objectives for the Project are to

- Deliver freshwater, sediment, and nutrients to Barataria Bay through a large-scale sediment diversion from the MR;
- Reconnect and re-establish sustainable deltaic processes between the MR and the Barataria Basin (e.g., sediment retention and accumulation, new delta formation); and
- Create, restore, and sustain wetlands and other deltaic habitats and associated ecosystem services.

Section 2.3.3 of the OMRR&R Plan and Section 1.5 of the FRP both describe operational features of the proposed Project.

1.3. Conceptual Ecological Model

1.3.1. Purpose of the Conceptual Ecological Model

Conceptual ecological models (CEM) are simplified, qualitative illustrations of the general relationships among the essential components of the ecosystem. CEMs help build understanding and consensus regarding the set of working hypotheses that explain the current natural system and the potential effects of the project on that system. The development of the CEM also helps to identify critical uncertainties and potential options to reduce these uncertainties. However, there are several types of CEMs, and the relative utility of each type depends on the management purpose (Fischenich 2008).

For the development of the Project CEM, a large number of models that were developed for other restoration projects and programs in Louisiana and the other Gulf states were reviewed. Relevant components from those past efforts were incorporated into a new Project-specific CEM to portray the status of knowledge about the Barataria Basin ecosystem and determine the components of the ecosystem that are most critical to monitor. The spatial scale of the Project CEM is the Barataria Basin, and the temporal scale is a 50-year Project timeframe and planning horizon.

The Project CEM starts with the idea that historical hydrologic alterations underlie the impaired status of the ecosystem. The CEM represents the current condition where levees and other anthropogenic alterations, sea level rise and climate change combine to create a dysfunctional system compared to pre-European settlement. The model can also represent the potential for a sediment diversion project to address some of those hydrologic alterations and associated impacts.

1.3.2. Components of the Conceptual Ecological Model

To inform this Plan, the Project partners developed a driver-stressor type of CEM (Fischenich 2008) that generally follows the top-down hierarchy similar to CEMs developed for Louisiana Coastal Area Program projects (e.g., CPRA and USACE, 2010, 2011). This CEM (Figure 1.3-1) identifies specific external *Drivers* and *Stressors* on the existing Barataria Basin, the *Effects* of those drivers, or processes occurring within the ecosystem, and the physical, chemical, biological, and/or ecological *Attributes* that can best serve as indicators of ecosystem condition. In doing so, the CEM helps identify the specific parameters to monitor to assess ecosystem change (both benefits and impacts) resulting from the proposed actions.

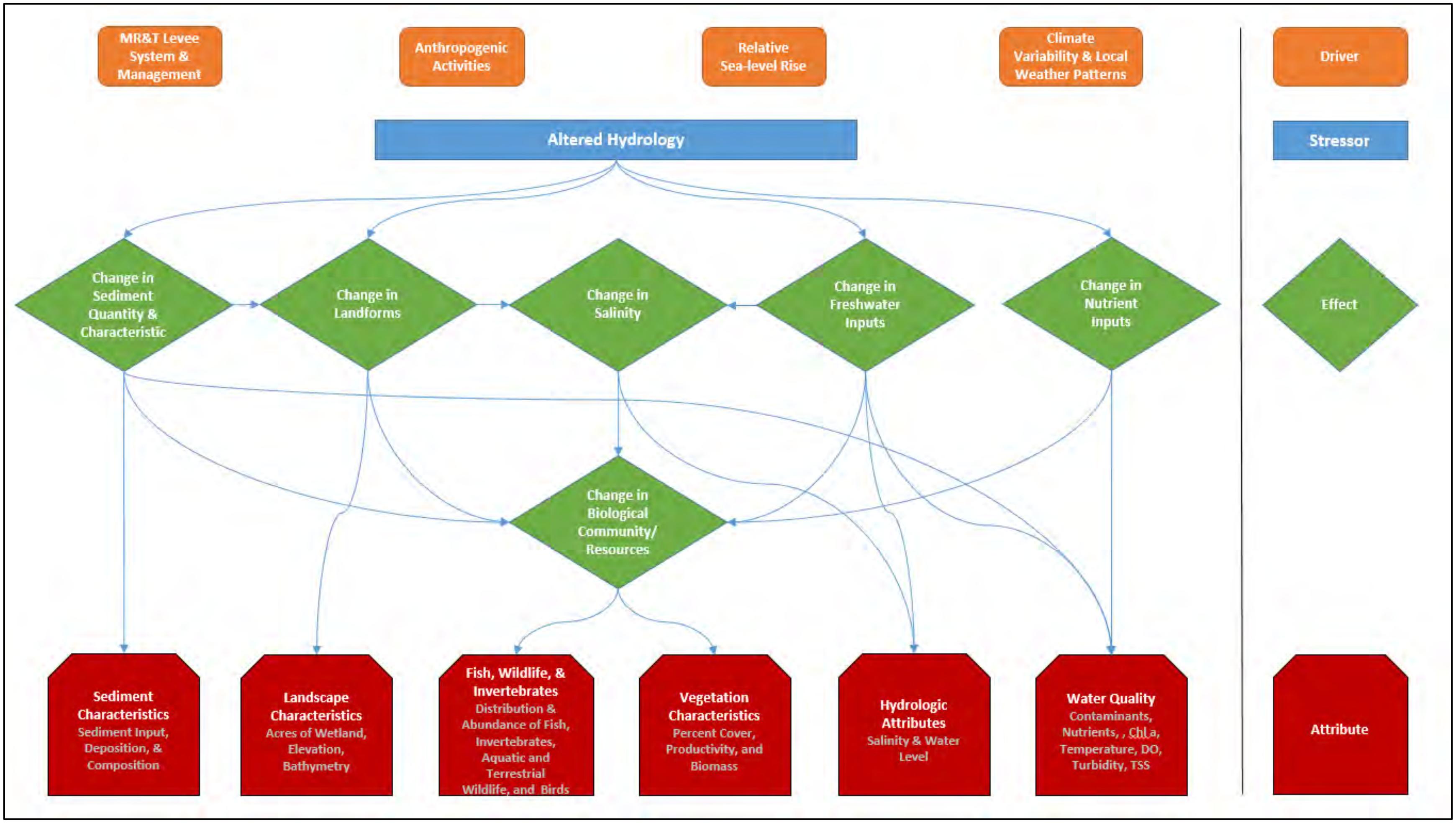

Figure 1.3-1. Conceptual Ecological Model for the Barataria Basin Sediment Diversion project developed by the Trustee Implementation Group's Monitoring and Adaptive Management Team. The Attributes listed are a subset or examples of the full set of monitoring parameters proposed in Section 3.

1.3.2.1. Drivers

Drivers are the major, natural and/or anthropogenic external forces that influence and govern system outcomes. The drivers that were identified as the major influences on the Project are

- The Mississippi Rivers and Tributaries (MR&T) Levee System and Management: Land loss in the Mississippi River Delta has been primarily attributed to levee system construction limiting the flow of sediment and water into embayments and surrounding wetlands.
- Anthropogenic Activities: Additional alterations to the Barataria Basin landscape besides the construction of levees have further altered hydrologic patterns. Land loss within the basin has been exacerbated by canal construction; conversion of natural habitat to agricultural, industrial, and other suburban and urban uses; and catastrophic events like the DWH oil spill.
- Relative sea level rise (RSLR), which refers to local perceived rates of SLR once Gulf-regional SLR (GRSLR) is combined with either uplifting or subsiding vertical land motions. Local rates of RSLR may be lesser or greater than regional SLR depending on the nature and magnitude of those land motions. For project-effects modeling associated with the 2017 CMP, 2015-2065 GRSLR scenarios varied between 0.43 and 0.83 m (Pahl, 2017). Plausible subsidence across southeastern Louisiana varies substantially (Figure 1.3-2).
- Climate Variability and Local Weather Patterns: Climate has been described as “what you expect” and weather as “what you get.” Specific forces that result in changes in local weather patterns drive climate and climate change. The primary driving force of annual climate cycles is the sun, while longer and more aperiodic climate cycles like the Atlantic Multi-decadal Oscillation (AMO) and El Nino-Southern Oscillation (ENSO) influence hurricane activity and rainfall patterns and intensity. Climate change is affecting these patterns by the heating of the ocean, causing a rise in sea-surface water temperature and thermal expansion affecting SLR. Local weather patterns affect rainfall, evapotranspiration, wind, and temperature. Rainfall and evapotranspiration affect the amount of freshwater within Barataria Basin through direct effects on the basin and driving sources of freshwater (surface and groundwater) entering the system, influencing local salinities both seasonally and between years. Wind can drive substantial fluxes of water into and out of estuarine systems. North winds can force water out of estuaries and south winds can raise water levels by up to 0.5 meters (Reed et al., 1995). Wind-driven tides can override lunar tidal cycles. Wind-driven waves can cause marsh erosion and re-suspend sediment (Allison et al., 2017). As described above, temperature affects climate cycles; on the local level, temperature is an important factor controlling the productivity, biomass and composition of phytoplankton, vegetation, and faunal species (Nuttle et al., 2008).

1.3.2.2. Stressors

Stressors are natural systems physical or chemical changes produced or affected by drivers, and are directly responsible for significant changes in biological components, patterns, and relationships in natural systems. Altered hydrology is the primary stressor manifested in Barataria Basin because of the interactions between the aforementioned drivers, and that describes the intended effects of the Project. The Project would construct a controlled breach in the levee system, resulting in the reconnection of the MR to the Barataria Basin and re-establishment of sustainable deltaic processes within the Basin.

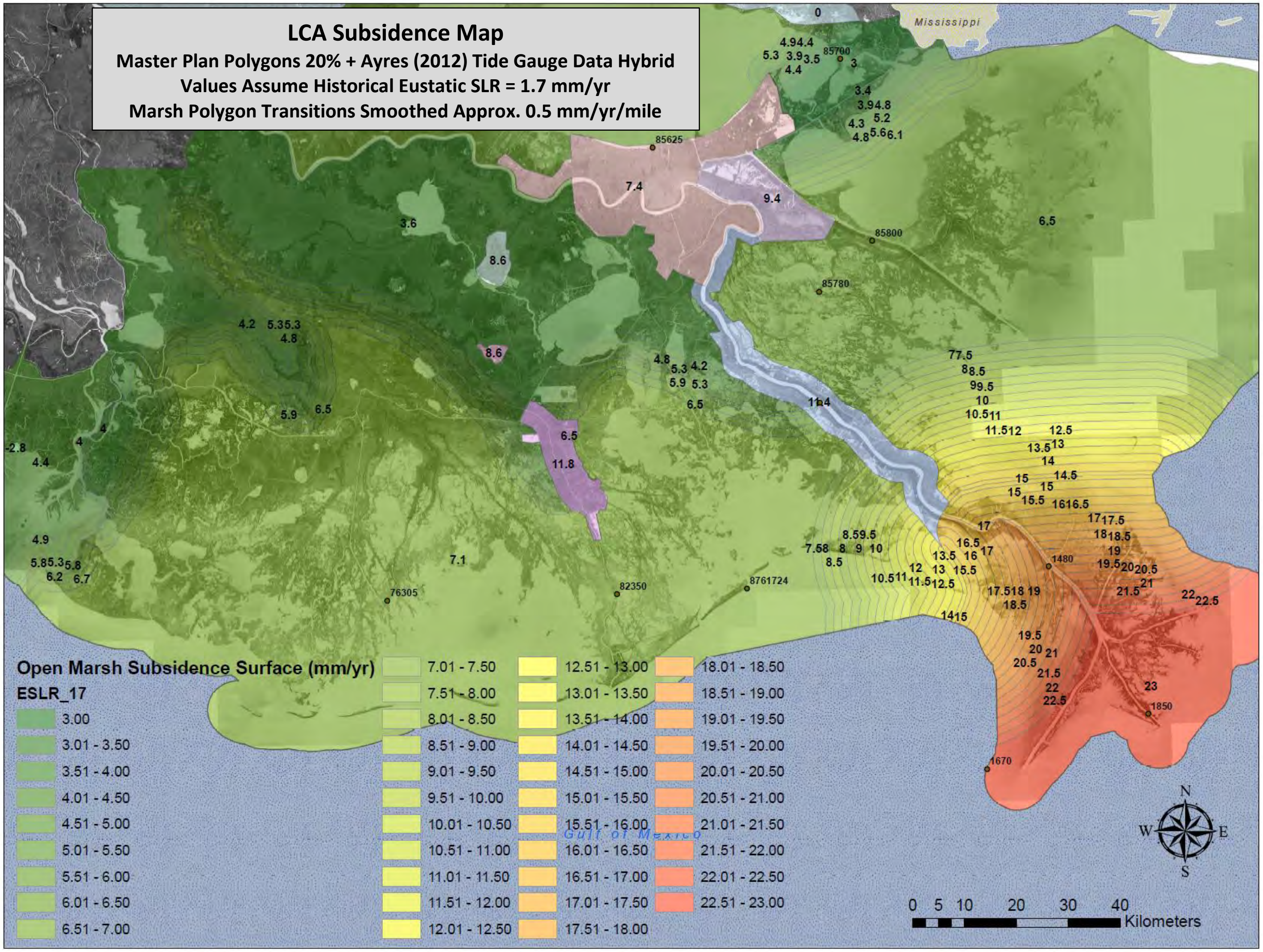

Figure 1.3-2. Estimates of plausible, spatially-variable subsidence developed for the Louisiana Coastal Area Program Delta Management Feasibility Study investigations were used as inputs for the Delft3D Basin-wide Model-based Project alternatives analysis.

1.3.2.3. Effects

Effects are biological, physical, or chemical responses within the natural system that are produced or affected by Stressors. The Effects listed in Figure 1.3-1 represent those physical and ecological phenomena whose patterns of occurrence are potentially attributable to alterations in Barataria Basin hydrology. The processes that are initially affected by changes in hydrology would be the amount of sediment, freshwater, and nutrients entering Barataria Basin. Altering sediment delivery through diversion operation would change Basin landforms, beginning with delta formation at the outfall. Altering freshwater inflow would change the salinity in parts of the Basin, especially in the outfall area. These alterations along with changes in nutrient inputs would affect Basin flora and fauna.

1.3.2.4. Attributes and Relevant Monitoring Parameters

Attributes are a representative subset of all potential elements or components of natural systems. Attributes may include populations, species, communities, or chemical processes. Changes in the processes have effects on the attributes of Barataria Basin, including the landscape, sediment, fauna, flora, water quality, and hydrology. The specific parameters that will be assayed to define and describe these attributes are discussed in more detail in Section 3, and include

- Landscape Characteristics
    - Acres of Wetland, by type (freshwater swamp; fresh + intermediate, brackish, and salt marsh; submerged aquatic vegetation (SAV), etc.)
    - Wetland Surface Elevation
    - Estuarine Open Waterbody Bathymetry
- Sediment Characteristics
    - Sediment Input
    - Organic Matter Composition
    - Mineral Sediment Composition
- Fish, Wildlife & Invertebrates
    - Distribution and Abundance of Fish, Invertebrates, Aquatic and Terrestrial Wildlife (including dolphin health), and Birds
    - Alligator Nest Success
- Vegetation Characteristics
    - Percent Cover
    - Productivity
    - Biomass
- Hydrologic Attributes
    - Salinity
    - Water Level
- Water Quality
    - Contaminants
    - Nutrients
    - Chlorophyll (Chl) a
    - Temperature
    - Dissolved Oxygen (DO) Content
    - Turbidity
    - Total Suspended Sediments (TSS)

1.3.2.5. Use of the Conceptual Ecological Model

Tracing any single path in Figure 1.3-1 from Drivers through Attributes represents an individual logic flow through the CEM. A survey of each unique logic flow through the model by members of the LA TIG MAM Working Group found that some flows are more certain than are others. Other logic flows are burdened by a rapid accrual of uncertainty from top to bottom; especially longer logic flow paths and those flows that rely on processes or attributes that are driven by multiple variables.

For example, consider the relatively short logic flow through the model that states

> "Levees may lead to
> →Altered Hydrology, which may result in a
> →Change in Freshwater Inputs, which can be monitored through
> →Hydrologic Attributes."

This is one of the shortest logic flows in the model (three steps from top to bottom) and is one that the LA TIG MAM Working Group associated with a relatively low level of uncertainty. Contrast that to the logic flow that states

> "Climate Change may lead to
> →Altered Hydrology, which may result in a
> →Change in Sediment Quantity & Characteristic, which may result in a
> →Change in Landforms, which may result in a
> →Change in Salinity, which may lead to a
> →Change in Biological Community and/or Resources, which can be monitored through
> →Vegetation Characteristics."

This is one of the longest logic flows in the model (six steps from top to bottom). It also involves three processes (Change in Landform, Change in Salinity, and Change in Biological Community/Resources) that have multiple influencing variables, any one of which is providing only a partial influence on the Process in question. The Working Group associated longer, more complex logic flows with more uncertainty.

The LA TIG MAM Working Group generally agreed it would not be appropriate to focus adaptive management decision making for the Project strictly around the logic flows in the model, since the CEM does not explicitly identify uncertainties, particularly human system uncertainties. Instead, the group decided that the value in the CEM is as a broader and more general representation of the potential influences of Altered Hydrology on the monitoring parameters chosen to represent specific ecosystem Attributes.

1.4. Sources of Critical Uncertainty

The CEM represents a simplification of many phenomena that will be occurring in and interacting with the landscape through time. While information flow through the CEM may appear deterministic and predictable, it is only so within the confines of the current state of the science regarding each of the Drivers, Stressors, Effects, and Attributes represented in Figure 1.3-1. In reality, uncertainty exists around every individual factor and process represented in the CEM. While the Project partners strove to account for those uncertainties, they do remain, and constrain both the conceptual and numerical modeling frameworks.

1.4.1. Environmental Driver Uncertainties

Each of the drivers in the CEM has a certain level of uncertainty both as to how that driver will change in the future and as to how the diversion will interact to bring any change in that driver. For example, the purpose of the MR levee system and management is to prevent flooding. Much work is occurring during Project Engineering and Design (E&D) to ensure that neither construction nor operations of the Project will compromise that purpose. The levees, however, resulted in channelizing flow within the MR&T Project system rather than allowing flow into the estuaries via overbank flooding and crevasses, thereby limiting the delta-building process. More natural delta building has continued where the MR&T levees have been degraded (Bohemia Spillway) or absent (in the modern Balize Delta lobe downriver of Venice, LA). However, at present the mouth of the primary river distributaries in the Balize Delta (Pass a Loutre, South Pass, Southwest Pass) are on the edge of the continental shelf near the transition to the continental slope, which constrains further lateral expansion of subaerial wetlands.

Relative sea level rise, climate change, and local weather patterns likewise have substantial residual uncertainties. The 2017 CMP reviewed and used the most recent projections of GRSLR (Pahl 2017) and developed a lower and upper bound scenario for sensitivity and modeling. Reed and Yuill (2017) also developed Moderate and Less Optimistic Scenarios for subsidence by region. However, while the plausible outcomes of GRSLR and subsidence are projections informed by the current scientific literature, the actual Gulf-regional and relative SLR rates that the Deltaic Plain will experience over the next 50 years are uncertain.

The MR watershed encompasses 40% of the contiguous U.S., which means that the climate and weather patterns that affect the diversion include those in the central U.S. The seasonality of weather produces generally-known temperature and weather patterns, including the generally-predictable hydrograph of the MR flow that will be used in the operation of the diversion. There is also a general predictability in the seasonality of extreme events such as winter fronts and hurricanes. Longer-term intensity and location of impact of those events is less predictable, as is how climate change may affect precipitation patterns within the MR basin, frequency of high flow events.

Climate patterns provide some level of predictability of effect, although specific recurrence intervals are more correctly defined as temporally aperiodic. On short timescales, the ENSO has a predictable effect on temperature and rainfall in regions of the U.S. On longer timescales, the North Atlantic Oscillation and AMO influence temperature and precipitation, as well as extreme events, on what are broadly ±30-year cycles. Over the longer term, gradual but persistent warming from climate change has the potential to alter current climate patterns. The annual cycle of Project operation planning provides the opportunity to identify shifts in patterns of climate and weather, and to incorporate new scientific knowledge, to plan for operations in the next year.

1.4.2. Uncertainty in the Degree of Altered Hydrology (Stressor)

Leveeing of the Mississippi River altered natural hydrology by hydrologically isolating the Barataria Basin from the river. To reverse that alteration, the proposed Project structure design relies on the difference between the stage of the MR and that of the Barataria Basin receiving waters (head differential) to facilitate the diversion of river water and the sediments and nutrients therein. As such, the most important assumption governing Project structure operations, in that it drives the presumed head differential, is the MR hydropattern. For the alternatives analyses in support of the FEIS, the historical 1964-2013 Mississippi River hydrograph was put into the Basin-wide Model as the MR condition for the 2020-2070 Project analysis period. It is highly likely, if not a near certainty, that the 1964-2013 hydrograph will not be the actual river condition during the first 50 years of Project operations. Thus, the actual schedule of opening and closing the diversion beyond the base flow remains highly uncertain because it will depend on actual MR stages throughout the Project's operational life.

1.4.3. Uncertainties in Responses of Environmental Resources to Project Inputs

There is a substantial amount of uncertainty surrounding individual physical and ecological phenomena represented in the CEM. Uncertainties of environmental resource response predominantly lie within the effectiveness of the diversion in transporting riverine sediment, freshwater, and nutrients into the receiving basin. Uncertainties associated with the calculations of critical model variables and how they influence key model outputs remain. The actual balance between land building and water quality impacts is also uncertain. Continued baseline and future effectiveness monitoring (Section 3) will improve the predictability of resource response. Future marsh experiments in controlled environments and in greenhouses, such as those conducted in the past by Graham and Mendelssohn (2014) and Poormahdi et al. (2018), can lead to a better understanding and predictability of how forming delta marshes incorporate the sediment and nutrients from the diversion. For now, uncertainties will be cataloged by the Project AM team (Section 12) for determination of priority and source of funding. Uncertainties are described in more detail in Section 4, and a learning strategy to address each uncertainty is identified in Table 4.1-4.

1.4.4. Uncertainties in Human Systems Response

Human community or socio-economic attributes (also known as human dimensions data) are priority datasets for management decision-making. However, the complexity in meaningfully collecting sociological data and the substantial uncertainty in either conceptual or numerical models has generally limited their formal inclusion in AM schemes.

Outputs from the Habitat Suitability Index (HSI) models, and even some of the Delft model outputs, are generally incompatible with available human system models, which ideally would be used to project catch or some other measure of resource exploitation based on population size, on which to underpin subsequent socioeconomic effects. As well, there is, in general, a very high degree of uncertainty in trying to model human response to projected biophysical and resource changes in either individuals or communities. Critical to this uncertainty is the ability or willingness to adapt, both of which can vary widely between communities, and even between individuals within a particular community.

1.5. Use of Numerical Models within Project Adaptive Management

1.5.1. Numerical Models Used in Project Planning

Project alternatives analysis was largely (but not solely) based on comparing the results of a suite of numerical models, within which ecosystem responses to proposed Project alternatives were analyzed. Numerical models were also used to inform Project E&D and MAM Plan monitoring and evaluation. The

Project modeling suite contained the following specific numerical models.

- Version 3 of the Delft3D Basin-wide Model, developed by TWIG, simulated morphological changes and water quality-related dynamics in the Mississippi River, the Barataria and Breton Sound basins and the Balize Delta (Sadid et al., 2018). The Delft3D model is a modeling suite developed by Deltares (2014) and designed to model "hydrodynamics, sediment transport and morphology and water quality for riverine, estuarine, and coastal environments" (Sadid et al., 2018). The Basin-wide Model integrates hydrological, morphological, nutrient, and vegetation dynamics. Vegetation dynamics were modeled using two specific Louisiana vegetation models to simulate the spatial distribution of wetland vegetation and allocate above- and below-ground biomass.

  The Louisiana Coastal Area (LCA) Ecosystem Restoration Study's Mississippi River Hydrodynamic and Delta Management Feasibility Study (MRHDMS) originally developed the Basin-wide Model. Alternatives evaluations for the Project's EIS were informed by projections of how conditions would change over 50 years, expressed as the difference between a "future with project" (FWP) and "future without project" (FWOP) scenario, where each of the proposed alternatives were modeled as separate FWP scenarios.

- A Delft3D-based Diversion Outfall Model, first developed by TWIG and subsequently adapted by the Project Design Team (PDT, specifically Baird Engineering, Inc.), predicted input of river flows at the discharge location, suspended sediment flow rate and duration, and sand and silt volumes conveyed into the basin for land building. The spatial domain of the Diversion Outfall Model is smaller geographically but higher in resolution than the Basin-wide Model, allowing for model use for Project E&D.

- The Advanced Circulation Model (ADCIRC) estimated the wave environment and propagation of storm surges in Barataria Basin resulting from landscape changes projected to result from the Project alternatives. Originally developed by Drs. Rick Luettich and Joannes Westerink, "ADCIRC is a system of computer programs for solving time dependent, free surface circulation and transport ..." (https://adcirc.org/). ARCADIS runs ADCIRC for the Project partners.

- HSIs for a set of 11 aquatic and four terrestrial species or species groups project the response of higher trophic levels to proposed Project alternatives, and inform both the Project EIS and adaptive management. Some of the HSIs originated with the Department of Interior in the mid-1980s, while others were developed and updated to inform the State of Louisiana's Coastal Master Plan. Inherent to the nature of HSIs is that they only predict the suitability of a habitat, not actual habitat occupation by organisms, organismal populations or species biomass. As well, many of the available HSIs for commercially-valuable fish and shellfish species only provide suitability projections for certain life-history stages, such as larvae and/or juveniles, and not for the adults that are generally the targeted resources in coastal fisheries.

- Two Barataria Basin-specific ecosystem response models, the Comprehensive Aquatic Systems Model (CASM) and Ecopath with Ecosim (and with Ecospace; EwE), were originally developed for the LCA MRHDMS, and are being used to inform the Project EIS. Given the current predictive limitations of each model (Ainsworth et al., 2018), they were used to characterize the existing food web structure of the estuary. This helped understand potential pathways for change and informed the monitoring component of this plan.

- The Project Socio-Economic Working Group utilized the IMPLAN Company's Impact Analysis for Planning (IMPLAN) software to develop estimations of the benefits and impacts of Project alternatives on human systems. IMPLAN uses output datasets from the Basin-wide Model, ADCIRC, and the HSIs as input datasets for its calculations, as well as additional socio-economic data developed specifically for the Barataria Basin.

The uncertainty structure around the model suite was a factor of

1. Uncertainty associated with empirical datasets that served as inputs to each model. For example, there was uncertainty associated with the water level and salinity datasets (measurement error) used to initialize the Basin-wide Model; and
2. Uncertainty associated with the ability of any one individual model to predict the response of a specific parameter. For example, we have already clarified that the uncertainty of Delft Basin-wide Model estimates of salinity at a particular space and time was on average +/- 3.5 parts per thousand. This uncertainty then defined the uncertainty of a specific output dataset, which then served as an input dataset to the next subsequent model in the chain.

Uncertainties associated with any one model in the modeling suite perpetuate with information exchange with the next subsequent model, and so the total uncertainty compounded for any one alternative was evaluated through the sequence of models. Evaluations of the results of individual models without the acknowledged compounding uncertainty from previous models risk subsequent false assumptions of model output precision.

In the case of alternatives modeling for the Project EIS, there were uncertainties in the input datasets feeding the Basin-wide Model, and inherent limitations in the model to predict salinities, water levels, land building, and other outcomes. Model outputs should therefore be considered projections, not predictions, because they represent *what would have happened* had the set of conditions in the model been in place at the onset of a particular model production run, rather than a guarantee of *what will happen*. Accordingly, alternatives analysis was, for the most part, limited to the comparison between alternatives, e.g., FWP vs. FWOP, or FWP alternative A vs. FWP alternative B.

CPRA therefore prefers that the numerical modeling conducted for the FEIS not be used directly or solely to establish specific temporal benchmarks of project performance upon which the Project MAM plan will be based. These projections better serve as order-of-magnitude comparative benchmarks for a constrained set of biophysical parameters (e.g., amount of sediment transported through the Project structure), with perhaps some adjustment to acknowledge the model uncertainties.

1.5.2. Use of Data and Numerical Models to Inform Project Monitoring and Adaptive Management

Complex models such as the CASM and EwE ecosystem models listed above are also useful for identifying proxy variables for monitoring when the specific metric of interest cannot feasibly or effectively be monitored directly. For example, the EwE and CASM models will be used to identify additional future monitoring parameters, locations, and frequency (e.g., long-term biomass monitoring, lower trophic level organisms, detritus) to evaluate the Project's influence on food web dynamics. Those additional monitoring parameters may be incorporated into this MAM plan.

Numerical considerations of the data for monitoring parameters binned as Range variables in Section 4 could also be informed by historical data from within the Barataria Basin, although Project operations may lead to data values in time and space outside the available historical ranges. For the remainder of the objectives-related monitoring parameters outlined in Section 3, trends from the modeling are likely more appropriate points of comparison. Operational planning will occur on an annual cycle, allowing an AM approach to test and understand the most effective actual operation of the diversion, considering the uncertainties of annual river flow and how the climate and weather patterns drive basin hydrology.

Throughout the operational life of the diversion, CPRA will periodically utilize numerical modeling to better examine system responses, confirm project performance assumptions that are not directly measurable, and test the potential effects of adaptive operational modifications. The schedule for that modeling will depend on the frequency of Project operations and evaluations of the supporting monitoring data (Section 4).

The Project Adaptive Management Team (AMT) will utilize the most appropriate modeling tools to address AM-related questions. Currently, the CASM and EwE models are being used to assess baseline condition and, in the future, may be used to assess project-driven effects such as potential changes to aquatic biodiversity, trophic linkages and pathways, and overall assemblage structure. Additional refinements may be made to make the models more suitable for evaluating potential adaptive management actions. To accomplish this, additional modifications to the current ecosystem modeling tools must be accomplished to determine model predictive ability to examine potential adaptive management options. Initially, the AMT will focus on the EwE and CASM models used in project planning. In the future, the team may evaluate additional models for use in adaptive management.

To address the use of the models to predict changes under with-project conditions the EwE and CASM models will undergo sensitivity analyses to analyze response of the modeled food web to changes in salinity. A specific series of steps for a multi-model analysis will be identified to improve predictive capabilities and enable bracketing of the uncertainty associated with model projections. For example, two benthic-to-pelagic metrics, biomass and productivity, will be added as output to the two models and examined as time-series outputs including inter-annual and seasonal variability, to understand whether the metrics are sensitive to year-specific conditions or instead are very consistent between years and therefore unlikely to vary in the future. The variability in these metrics will then undergo a statistical analysis to relate them to the environmental conditions used as input to the models. New simulations will be performed by varying environmental conditions in a systematic way to attribute responses of the food web to changes in salinity.

The EwE and CASM models described above will be periodically updated with data collected during pre-operations and post-construction of the Project. Pre-operations data will be used to refine responses of the individual components to environmental drivers. Post-construction monitoring data will be incorporated into model refinement to test, predict, and evaluate responses under with-project conditions.

Periodic evaluations of the models listed in Section 1.5.1, updates to working models including incorporation of new data, the state of the science regarding new models that may be developed over the Project life, and the appropriate use of those existing or new models, will be planned and led by the AMT.

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2. PROJECT OPERATIONAL AND ADAPTIVE MANAGEMENT GOVERNANCE

2.1. Description and Scope

This section outlines the makeup, roles, and responsibilities of the State of Louisiana (CPRA) as the NRDA Implementing Trustee responsible for the governance of the Project, as well as the non-State entities that will inform the implementation of this plan. Figure 2.1-1 shows the general relationship between CPRA as the Implementing Trustee and the LA TIG. CPRA will have responsibility for the operation of the Project, within the limits of the permits and permissions granted to the Project and within the Project purpose, as found in the PDARP (DWH Trustees, 2016), and subsequent Restoration Plans that examine and authorize the Project. Proposals for operations or adaptive management decisions that would be outside the Project purpose or permitted constraints would require consultation with the LA TIG Agencies and Regulatory authorities.

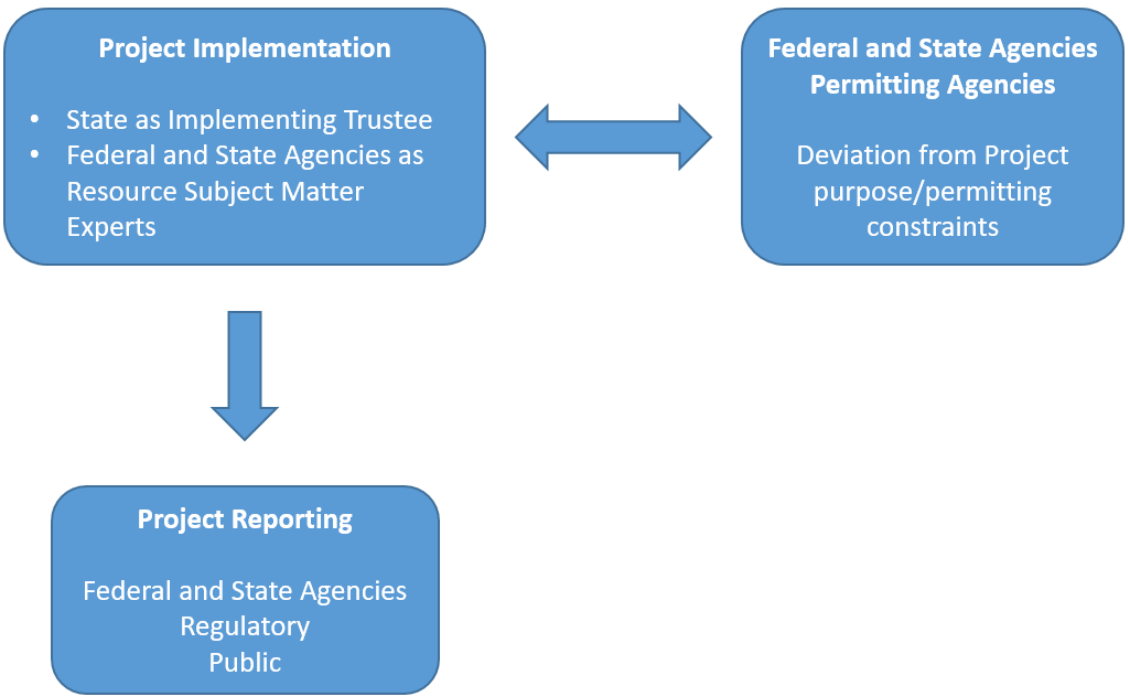


Figure 2.1-1. Relationship between the State of Louisiana and Federal Agencies regarding governance of Project operations and adaptive management decision making. Section 7 contains information on Project Reporting.

In the context of the Project, governance refers to how CPRA, with input from other stakeholders, will make decisions over the life of the Project (Figure 2.1-2). Decisions will include, but not be limited to, continuation of and changes to Project operations, riverside management, monitoring, maintenance, and adaptive management actions.

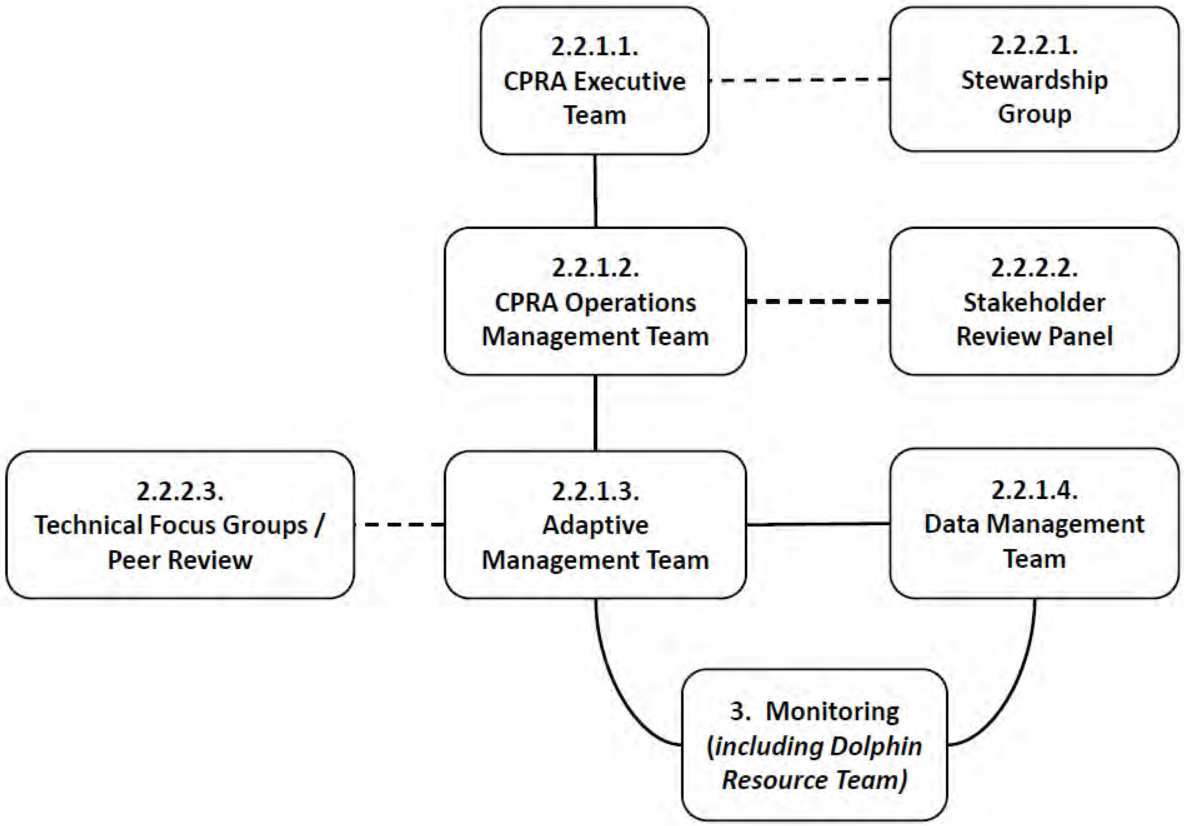


Figure 2.1-2. Information flow between the Project governance elements outlined in this section. Numbers refer to sections of text that further describe each governance element or activity. Solid lines indicate information flow underpinning CPRA Project operations and adaptive management decision making. Dashed lines indicate advisory opportunities from outside CPRA.

2.2. Governance Structure

2.2.1. Project Implementation Teams

2.2.1.1. CPRA Executive Team

2.2.1.1.1. Membership

- Executive Director
- Deputy Executive Director
- Engineering Division Chief
- Operations Division Chief
- Planning & Research Division Chief
- Project Management Division Chief

2.2.1.1.2. Responsibilities

- Approve overall recommendations and annual plan from the Operations Management Team (OMT) and AMT for Project operations; consider adaptive management actions on an event, annual, and multi-year timeline (see Section 5 for additional detail).
- Adopts the Project Annual Operations Plan into the larger CPRA Annual Plan to authorize action and funding
- Interacts with CPRA Board and State Legislature
- Interacts with Stewardship / Associated Actions Group
- Chairs and hosts the public meetings of the Stakeholder Review Panel

2.2.1.2. Operations Management Team

2.2.1.2.1. Membership

- CPRA Operations Division/Diversion Program Assistant Administrator
- CPRA Project Engineer
- Additional State Agency support as needed

2.2.1.2.2. Responsibilities

- Operates structure in accordance with the water control plan: works on day-to-day issues of diversion operation.
- Works with AMT team on efficiency and project performance issues.
- Conducts public and stakeholder review panel meetings.
- Receives information from data team, public information/comments from panel (described below), recommendations from panel
- Develops draft and final annual operations plans, maintain decision log, outfacing data reports, assessment.
- Considers AMT event-based and annual recommendations; implements directly or further discusses recommendations with the CPRA Executive Team.
- Maintains the Project Decision Tracker, which will be a living document, available for public view, that tracks and documents potential management decisions, outcomes, and rationales. This tracker will include all suggestions and comments from public input, and document how each was addressed by CPRA

2.2.1.3. Adaptive Management Team

2.2.1.3.1. Membership

- CPRA Adaptive Management Lead and team
- CPRA Executive Division Senior Scientist
- CPRA Operations Division Monitoring Manager and Project Team
- CPRA Planning & Research Division Senior Scientists
- CPRA Planning & Research Division Liaison
- State and Federal Agency Technical Representatives for Aquatic Resources

2.2.1.3.2. Responsibilities

- Focuses on the long-term achievement of the Project's performance and reducing Critical Uncertainties through Learning Strategies.
- Develops and submits event-based and annual recommendations, such as changes to operations, data collection, or other adaptive modifications, including MAM Plan revision, to the OMT.
- Manages the models and outputs. In addition, they may be called upon to evaluate questions and/or issues that arise during operational periods.
- Authors the periodic Adaptive Management Report that provides a longer-term view for planning purposes, including model outputs and evaluations of potential project features, alternate operations regimes, etc. The AMT may engage Technical Focus Groups (2.3.2.3.) to provide input and/or review of the report. See Section 5.2.3 for the planned reporting schedule.
- Directly authors and/or manages development of issue-specific reports to address questions and concerns that arise from stakeholders. The AMT may convene Technical Focus Groups (2.3.2.3) to assist in evaluation and reporting as needed.
- Coordinates with overall Coastal Program Project Planning.

2.2.1.4. Data Management Team

2.2.1.4.1. Membership

- CPRA Planning & Research Division/Research Section Data Manager
- Additional State Agency support

2.2.1.4.2. Responsibilities

- Manages (collate, host and archive) project monitoring data.
- Manages and/or directly conducts Project data Quality Assurance/Quality Control (QA/QC).
- Works with the OMT and AMT to develop data reports and data interpretations and assessments.
- Works with the AMT, Technical Focus Groups and/or the External Peer Reviewers (2.3.2.3).

2.2.2. Other Teams

2.2.2.1. Stewardship Group

2.2.2.1.1. Membership

- State and Federal agency representatives engaged in implementation of stewardship measures.

2.2.2.1.2. Responsibilities

- Provides insight, comments, and guidance on the Annual Operations Plan is at relates to the effective implantation of Project stewardship measures.

2.2.2.2. Stakeholder Review Panel

2.2.2.2.1. Membership

- CPRA Executive Director or designee (*Chair*);
- Barataria-Terrebonne National Estuarine Program;
- Louisiana Mid-Continental Oil & Gas Association;
- Commercial fisheries:
    - Crab fisheries;
    - Finfish fisheries;
    - Oyster fisheries;
    - Shrimp fisheries;
- Federal agencies;
- Marsh property owners;
- Navigation;
- Parish governments:
    - Jefferson Parish;
    - Lafourche Parish;
    - Plaquemines Parish;
    - St. Charles Parish;
- Protected property owners;
- Recreational fisheries;
- State agencies:
    - Louisiana Department of Environmental Quality (LDEQ);
    - Louisiana Department of Health (LDH);
    - Louisiana Department of Natural Resources;
    - Louisiana Department of Wildlife and Fisheries (LDWF).

2.2.2.2.2. Responsibilities

- Provide insight and comment on a draft Annual Operations Plan
- Share expertise and perspectives on short-term issues
- Disseminate information to other stakeholders / public (each group's representative will report back to their respective group as they see fit)

2.2.2.3. Technical Focus Group(s) / Peer Review

2.2.2.3.1. Membership

- Federal Subject Matter Experts (SMEs)
- State SMEs
- Non-agency (e.g., academic, non-governmental, private sector) SMEs

2.2.2.3.2. Responsibilities

- Provide technical support and use in long-term project planning.
- Assist in the evaluation and interpretation of project monitoring

- External peer review of the Multi-year Monitoring and Adaptive Management Report, outside of the Technical Focus Groups, may be needed or desired
- Groups will be constituted and convened on an as-needed basis.
- Evaluate the state of science concerning adaptive management and tools for adaptive management

2.3. Data and Information Requirements

It is important that project decisions are transparent and data and science-based to the extent possible. This will require:

- A Monitoring Plan that outlines monitoring for sediment delivery efficiency and both ecological and sociological response.
- Data Analysis: The AMT (2.3.1.3) will analyze the Project data. A data analysis plan that provides details on when, where, and how data will be analyzed and what will be produced as a result of the assessment(s).
- Project-specific recommendations for adaptive management actions based on the data assessments, with input from the Technical Focus Groups (2.3.2.3) as needed. Draft recommendations will be assembled into a draft operations plan. It will be important to address and incorporate, to the extent practicable, public input into the operation plan early in the process.

A Data Management Plan to describe how Project-specific data need to be managed to facilitate analysis (Section 7 of this Plan).

3. PROJECT MONITORING PLAN

3.1. Monitoring Plan Development

This section describes the plans to collect pre-operations and post-construction data. With collaboration with the partner resource agencies, CPRA, as the Implementing Trustee, has developed the draft plan with guidance from the Monitoring and Adaptive Management Procedures and Guidelines Manual (DWH Natural Resource Damage Assessment Trustees 2017). The plan describes the types of sampling, methods, and other data that will be used to evaluate Project performance and natural system change and inform AM decision making (Section 4). Monitoring variables were selected to evaluate Project performance in meeting objectives, inform modeling and projection, and conform to accepted measurement techniques.

The pre-operations and post-construction monitoring plans have the following goals:

1. Outline the early deployment of monitoring equipment and sites to ensure the pre-operations conditions are adequately characterized prior to Project implementation;
2. Identify essential variables for evaluating progress towards meeting Project restoration objectives, detecting system change and improving analytical tools over time; and
3. Ensure the update or development of standard operating procedures and quality plans.

3.2. Baseline and Project Monitoring Approach

Pre-operations baseline data collection defines current conditions and trends to compare against observed changes in the system that will occur following initiation of operations. The 'Before-After-Control-Impact' (BACI; Underwood 1992, Smith et al. 1993) monitoring approach in areas anticipated to change is commonly applied with ecosystem restoration projects, and will be used to evaluate parameter data as they pertain to the Project objectives (see Section 4). The long-standing network of existing gauges and sample locations across the Barataria Basin will enable a robust baseline for the Project, against which to compare post-construction data. Additionally, the network of Coastwide Reference Monitoring System (CRMS)-*Wetlands* and System-wide Assessment and Monitoring Plan (SWAMP) sites across coastal Louisiana will be used to understand broader regional drivers and ecosystem trends that may be separate from Project effects. As described in detail below, some of the CRMS-*Wetlands* and SWAMP sites, together with to-be-constructed sites dedicated to Project effects monitoring, will also provide direct observations of Project effects.

3.3. Monitoring and Assessment Design

The sampling design for SWAMP and the additional project-specific sampling proposed herein meets requirements for assessment and AM in the following ways:

- The design provides the basis to reduce uncertainty, improve analytical solutions, and support effective decisions that meet the infrastructure, resource, and social requirements.
- The system variables are measured at frequencies and spatial scales to support evaluation of Project performance.

- Consistency with existing long-term data collection facilitates multiple comparisons (e.g., BACI, baseline, gradient) of Project data. Long-term sampling such as CRMS and the LDWF fisheries-independent monitoring program (FIMP) will provide a solid baseline that can be followed and estimated through the Project life.
- The SWAMP coast-wide spatial coverage increasingly will help separate otherwise potentially confounding regional processes (e.g., RSLR, temperature), event perturbations (e.g., storms, drought,) and climate cycles from real Project effects

The locations, types of data collected, and frequency of post-construction data collection will be reviewed and refined during the Project lifespan to improve operations (e.g., sediment capture from the river and sediment retention in the basin). Monitoring design refinement may involve

- identifying and addressing spatial or temporal data gaps,
- adding or modifying parameters (e.g., physical, biological, chemical, geologic),
- changing, adding and/or removing data collection station locations, and
- undertaking special research or studies (e.g., landscape hydraulic studies; habitat mapping).

3.3.1. Sampling Stratification

A stratified sampling approach will

- structure sampling based on known landscape or population (fish and wildlife, human) attributes,
- improve sampling efficiency and thereby reduce monitoring effort and costs, and
- reduce the uncertainty of population estimates within each stratum, which could reduce the number of plot measurements.

Given the dynamic nature of the environment and Project, fixed sampling locations may need to be changed before and after the onset of Project operations. Thus, re-stratification may be necessary over the life of the Project. Examples of habitat strata (Figure 3.3-1) could include, but are not limited to, created and natural wetlands, marsh type, and land/terrestrial vs. open water/aquatic.

3.3.2. Estimation of Project Delta Development and Project Influence Areas

The proposed Project would introduce sediment, freshwater, nutrients and flows into the Barataria Basin, beyond that already provided by the Davis Pond Freshwater Diversion Project and the Naomi and West Point a la Hache siphons. Operational histories of those other projects will need to be examined to be able to parse out Project effects from those other structures. The extent of the area of influence will be different for specific system resources.

To guide selection of locations for pre-operations monitoring where potential data gaps may occur, two areas of projected Project effects were defined. A smaller Project Delta Development Area (PDDA; Figure 3.3-2) was defined as the spatial extent that the Delft Basin-wide Model projected bed elevation differences would occur between the FWOP and the FWP alternative corresponding to the Applicant's Preferred Alternative (FWP/APA) of a 75,000 cubic feet per second (cfs)-capable diversion structure without associated terraces. A slightly larger Project Influence Area (PIA; Figures 3.3-3 and 3.3-4) was defined that approximates the geographical extent that the Basin-wide Model projected water level differences between the FWOP and the FWP/APA.

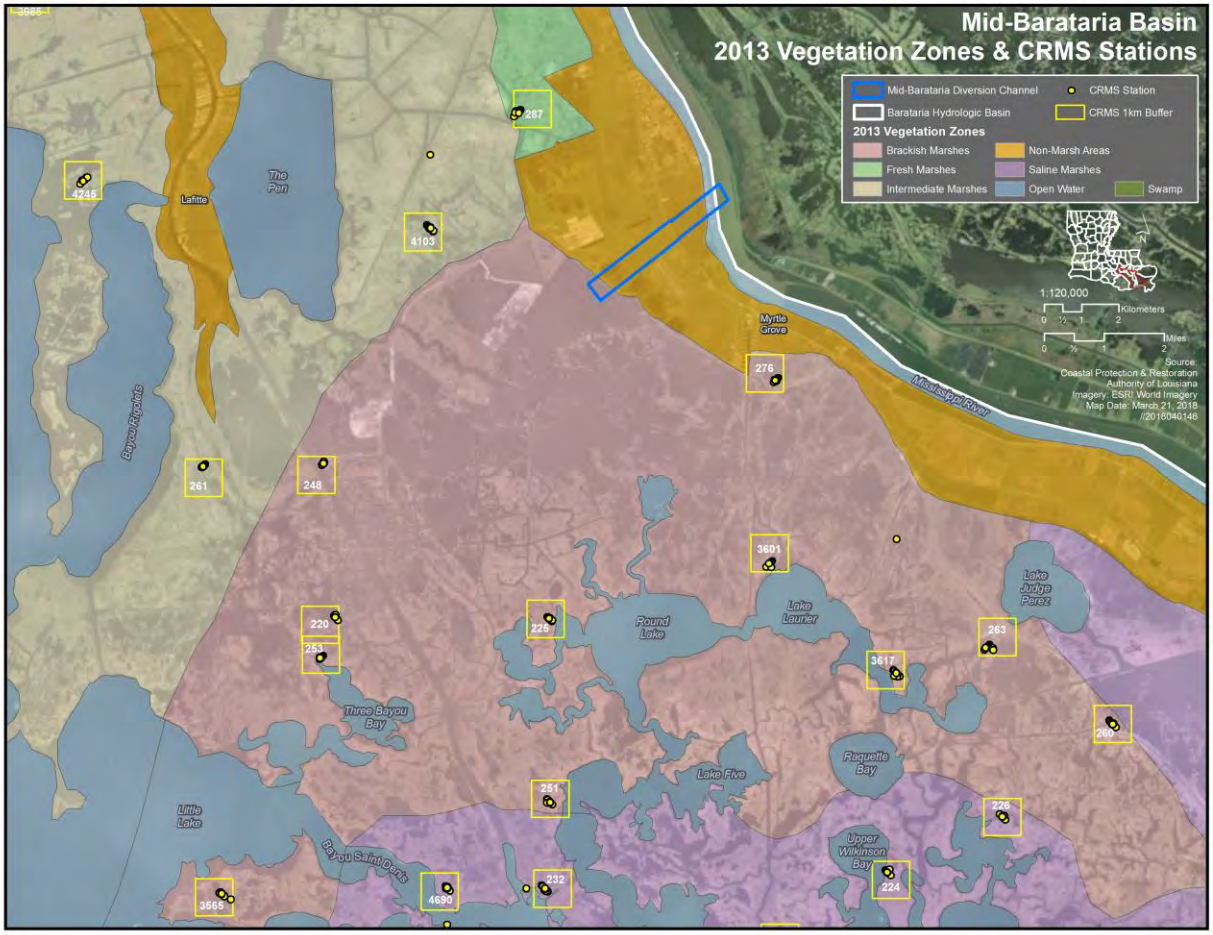


Figure 3.3-1. Example of supporting data to inform stratification and potential selection of additional sites based on vegetation community type from CRMS-*Wetlands* sites and other survey data in the diversion primary influence area. The blue polygon shows the location and orientation of the proposed Project conveyance channel.

While the geographic scope of the monitoring plan is therefore focused on the middle portion of Barataria Basin, it does include the entire basin. Additionally, the PDT is developing riverside monitoring. The Plan was developed with existing monitoring locations and expert knowledge, and is partially informed by statistical analyses completed coast-wide and for Barataria Basin (Hijuelos and Hemmerling 2016).

The monitoring plan includes continuous and discrete sampling of natural system variables, collecting and analyzing remotely-captured data (satellite, aerial), and periodic large-scale surveys. Continuous monitoring refers to the collection of data using automated data recording systems that are permanently deployed with constant and evenly-spaced sampling intervals (e.g., hourly). Discrete monitoring refers to on-the-ground collection usually conducted between longer intervals. Continuous sampling satisfies needs for rich temporal data, while discrete sampling allows for greater spatial information.

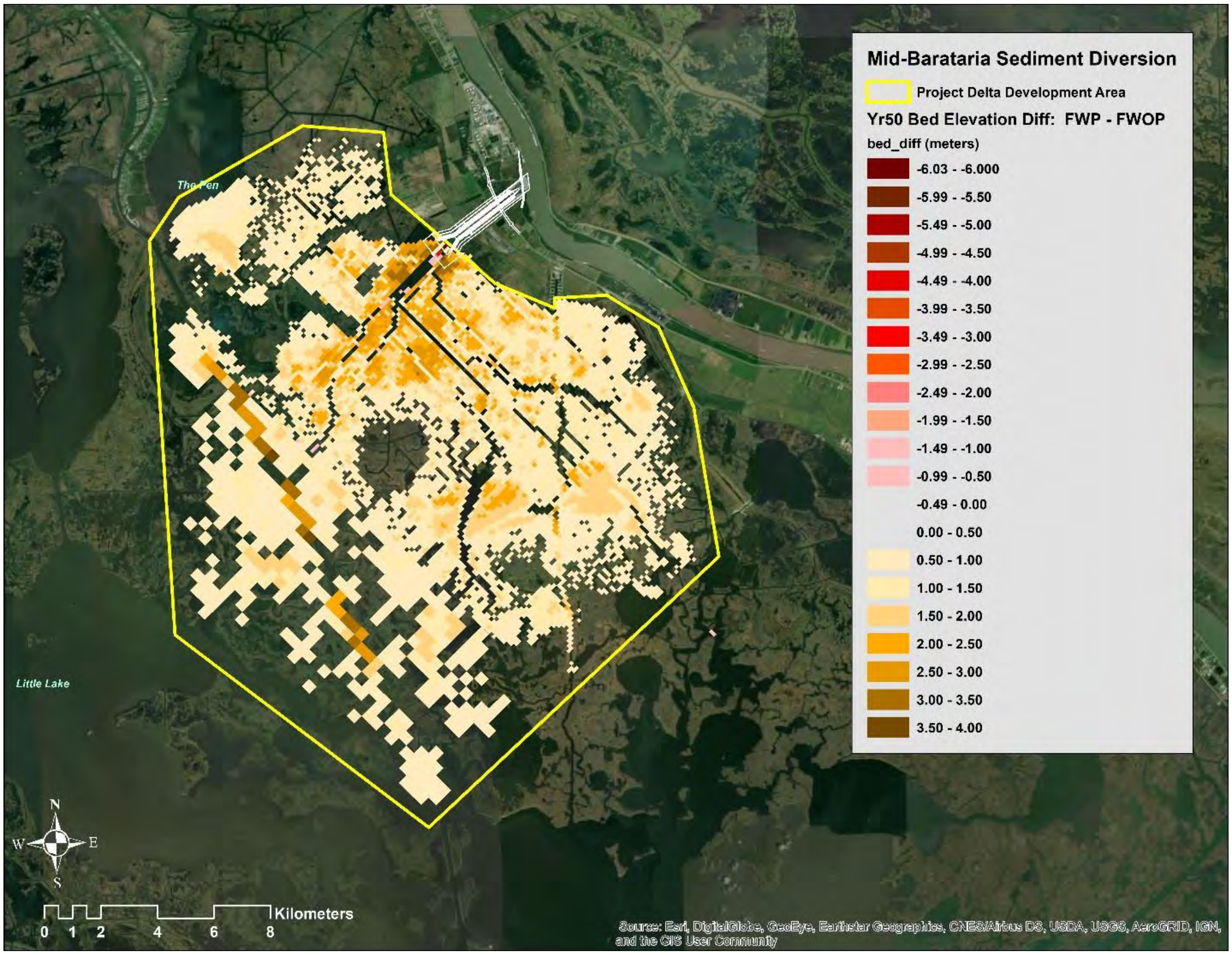


Figure 3.3-2. A Project Delta Development Area (yellow polygon) was defined around the Project outfall as the extent of the area where the Delft Basin-wide Model projected bed elevation differences greater than 0.5 meters between the Future without Project and the Future with Project for the 75,000-cfs Project alternative without terraces after 50-years of Project-effects modeling.

Project alternatives numerical modeling suggested that Project operations may have effects on ecosystem resources in the lower Breton Sound Basin and Mississippi River Balize Delta. Current plans are to rely on the existing SWAMP network sites to continue characterizing the status of those basins.

3.4. Data Sources

The field data to support assessment of baseline and project conditions for the Project have long-standing historic value and are expertise-driven.

3.4.1. CPRA-Coordinated Monitoring Data

CPRA, cooperating State and federal agencies, and TWIG have contributed to the development and ongoing implementation of SWAMP, which is being implemented throughout the Louisiana coastal zone as a long-term monitoring program to ensure a comprehensive network of data collection activities is in place to support the development, implementation, and AM of restoration and risk-reduction projects. While the Barrier Island Comprehensive Monitoring (BICM) and CRMS-*Wetlands* programs have been well established, SWAMP has also deployed monitoring stations in the bays, lakes, and bayous of the Barataria Basin to provide a more extensive spatial and temporal capacity to detect change and system function. The SWAMP monitoring design provides the framework upon which additional Project-specific locations and variables will be needed to evaluate Project effects.

Fig. 3.3-3. A Project Influence Area (magenta polygon) was defined around the Project outfall as the maximum extent of the area where the Delft Basin-wide Model projected water level differences of at least 0.5 meters (white lines) between the Future without Project and the 75,000-cfs Applicant's Preferred Alternative without terraces. The water level differences shown are specifically for the third week of May during the first decade modeled, using a 2011 Mississippi River hydrograph.

3.4.2. Other Monitoring and Survey Data

There are numerous historic and ongoing data collection efforts in Barataria Basin that will provide data for baseline and project assessments of system resources and change (Hijuelos and Hemmerling 2016). CPRA is coordinating with other State and federal agencies to supplement and maintain quality long-term data collection efforts in the basin (e.g., LDWF fish and invertebrate sampling programs; LDEQ water quality sampling; repeated National Oceanic and Atmospheric Administration (NOAA)/DWH-funded marine mammal surveys). Monitoring of previously-constructed restoration projects in the Project area (Figure 3.4-1) and Barataria Basin will provide valuable data to define historic and current trends, and thus clarify Project effects and potential synergistic or antagonistic responses from those of other restoration and risk reduction efforts in the basin. CPRA will continue to evaluate other sources of research, surveying, and monitoring data that are acceptable for Project use to reduce monitoring costs.

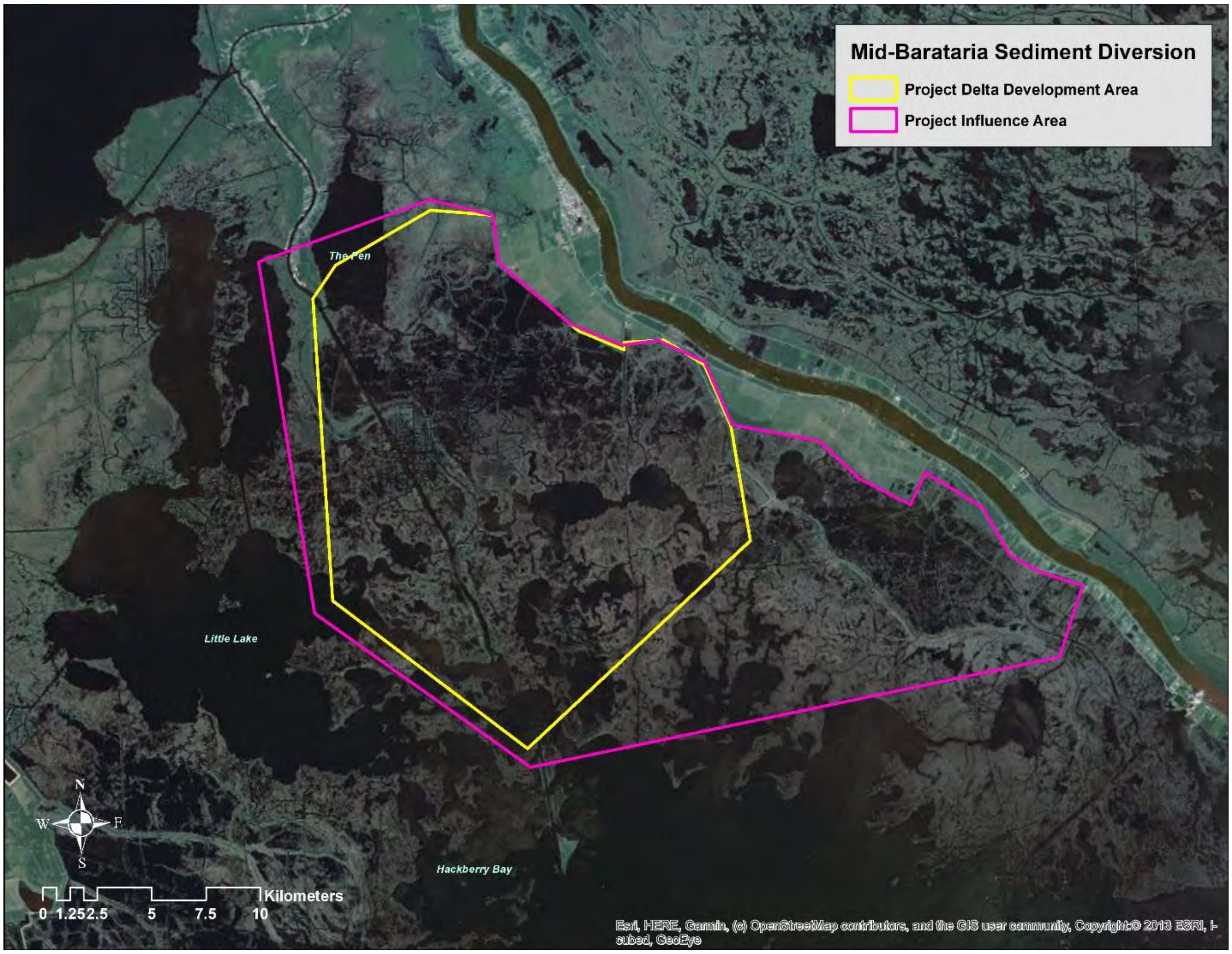


Figure 3.3-4. Comparison of the spatial extent of the Project Delta Development Area (yellow polygon) and the Project Influence Area (magenta polygon).

3.5. Pre-Operations (Baseline) Monitoring

To establish baseline conditions in the main stem of the MR and in the Barataria Basin, data will be collected prior to the onset of Project operations upriver of the diversion structure, from the Alliance South lateral sandbar in front of the eventual diversion structure, from near the planned structure intake, and from environmental gradients radiating from the outfall into Barataria Basin and from existing SWAMP monitoring stations in the Breton Sound Basin and the modern Balize Delta. In addition to the existing SWAMP monitoring locations, monitoring plans will evolve as needed to include additional variables and/or locations where data collection will be required to evaluate system change and Project performance. For example, the types and locations of river monitoring to inform operations will progressively be elaborated upon with progress on the design of the intake and conveyance structure and physical modeling.

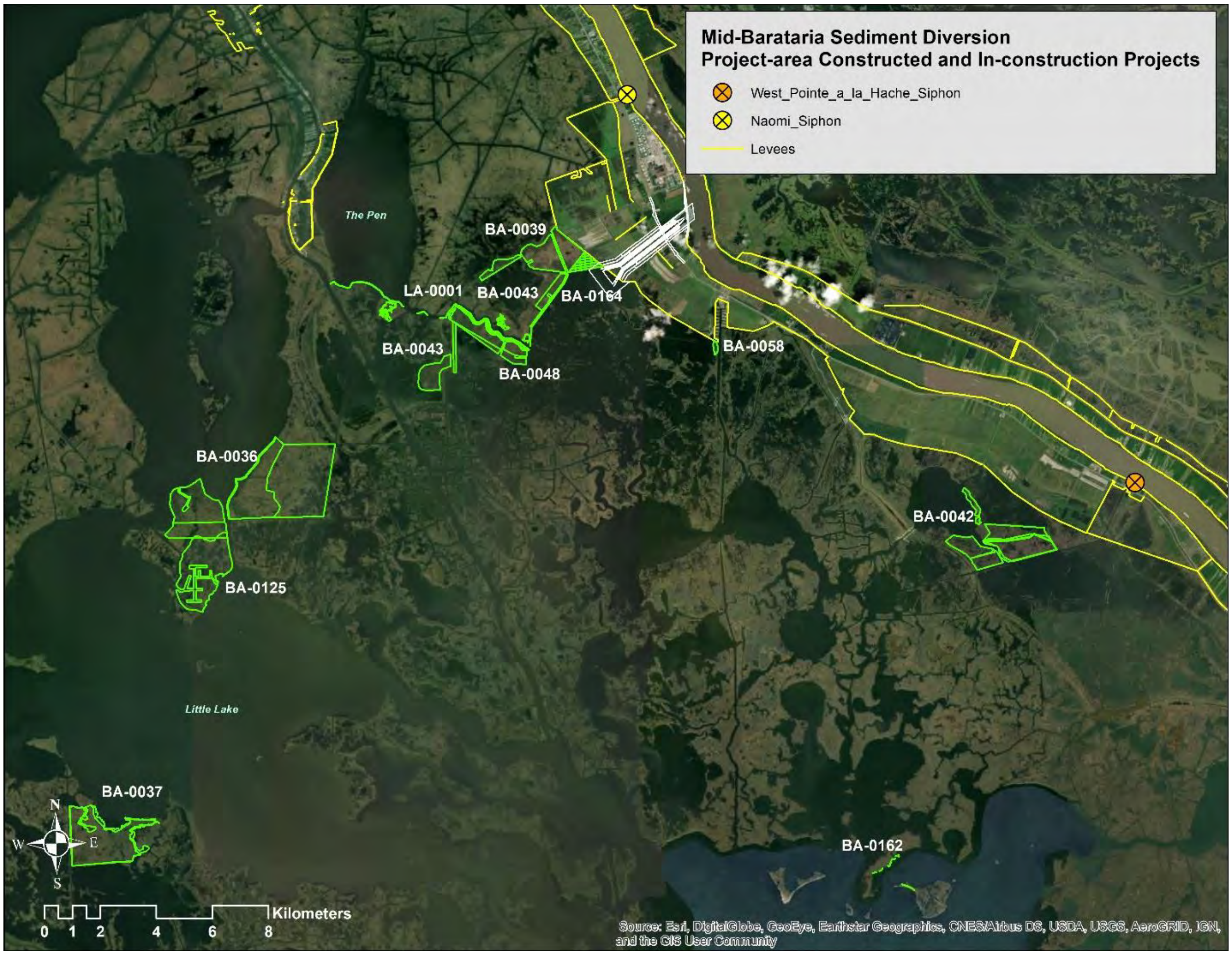


Figure 3.4-1. Previous restoration projects in the Project region are shown with the green polygons, and in relation to the locations of the existing freshwater siphon projects in the area. The white polygon shows the location and orientation of the proposed Project conveyance channel. Yellow polygons indicate levees.

Components of SWAMP monitoring in Barataria Basin are operational and others are in development, consistent with the SWAMP implementation strategy for the basin (Hijuelos and Hemmerling, 2016). Additional Project-specific monitoring sites (such as hydrographic and water quality data collection platforms) will be established to better inform Project effects. Specific locations for some additional monitoring sites have been identified, while decisions on others are still pending. While Project-specific baseline data will be collected for a minimum of three years prior to the onset of Project operations, the Plan will further describe other relevant long-term data that will be used to strengthen baseline trends assessment. For example, wetland condition variables and process rates have been monitored extensively in Barataria Basin at 65 CRMS-*Wetlands* sites for more than 10 years. In addition, there are numerous CPRA-coordinated project data sets and other long-term natural systems data that have been collected by researchers and both State and federal agencies that support comprehensive ecosystem and project-scale assessment (Hijuelos and Hemmerling 2016).

3.6. Post-Construction (Operations) Monitoring

Following the onset of Project operations, data collection will continue as discussed in Section 3.5 above, and from within the diversion conveyance channel. Post-construction, hydrographic stations in the MR will be real-time and accessible from satellite networks to enable forecasting water and sediment arrival. Along the gradient from the MR through the diversion and into the basin, CPRA is planning for the use of real-time data for key hydrographic variables (turbidity, stage, velocity, and water quality). CPRA will also monitor structural and operational features of the Project structure (see the OMRR&R Plan for those details).

3.7. Parameters for Evaluating Project Effectiveness and Ecosystem Response

Effectiveness monitoring provides the basis for determining whether the Project objectives outlined in Section 1.2 will be met. Those restated objectives (below) frame the structure and activities of the detailed pre-operations and post-construction monitoring plans that follow. The empirical parameters and any secondary calculations based on those parameters are outlined below relevant to each of the three Project objectives.

3.7.1. Objective #1: Deliver freshwater, sediment, and nutrients to Barataria Bay through a large-scale sediment diversion from the Mississippi River

Objective 1 reflects the primary operational goal of the Project and rationale behind the construction of a large sediment diversion, which is that operation of a diversion structure is the most efficient, effective and sustainable mechanism for moving large amounts of MR sand-size suspended sediments into the middle region of the Barataria Basin.

Many of the monitoring parameters and resulting calculations listed below will be limited to post-construction monitoring because they will involve monitoring aspects of the constructed Project structure. However, some in-river monitoring components will be developed for pre-operations monitoring to establish baselines of MR resource status and variability and to evaluate potential impacts in the MR and the Basin.

3.7.1.1. Empirical Monitoring Parameters in Support of Objective 1

3.7.1.1.1. Mississippi River water discharge

- Rationale: As proposed in the Project permit request, expectations for an MR discharge of 450,000 cfs on a rising limb at Belle Chasse will trigger Project operations beyond a base flow of up to 5,000 cfs. Sand-size sediment does not typically start mobilizing from lateral bars until the MR flow is at 600,000 cfs (Allison et al., 2012), but the first flush of fine sediments typically occurs at lower discharges. Mississippi River water discharge is thus fundamental to monitor throughout the Project life.

- Schedule: Real-time measurements planned currently for the entirety of both pre-operations and the 50 years of post-construction monitoring. Event-based transect monitoring will occur during the first five years of Project operations to confirm real-time estimates.

- Locations: Multiple upstream gauging stations will be monitored for different purposes. The U.S. Geological Survey's (USGS) Mississippi River at Memphis, Tennessee, gauge (#07032000) will be used to initiate planning for Project operations, given that typical water velocities in the MR mean that discharge at Memphis is a three-week lead-in to flows reaching the Project location. This data will be evaluated in concert with MR discharge forecasts provided daily by the National Weather Service's Lower Mississippi River Forecasting Center (LMRFC). Current plans are for observations at the USGS Mississippi River at Belle Chasse, LA gauge (#07374525), which is not included in LMRFC discharge forecasts to govern Project operations. Several years of anticipated pre-operations monitoring will allow for the confirmation of the mathematical relationship between Belle Chasse and the other gauges mentioned.

  The USGS Mississippi River at Baton Rouge, LA (#07374000) and the aforementioned Mississippi River at Belle Chasse, LA gauges will also be monitored to support continued estimations of coarse and fine suspended sediment load, as was done for the Delft Basin-wide Project modeling. This data will help verify past model estimates and support future modeling.

  The PDT has proposed that anticipated MR discharges at Belle Chasse of 450,000 cfs should initiate empirical, boat-based data collection of MR discharge at a cross-river transect (Table 3.7-1 and Figure 3.7-1) used during pre-operations to support E&D activities. The "2018 Reference Section" transect was used during the 2018 MR data collection.

Table 3.7-1. Endpoint coordinates of Mississippi River Project cross sections used for preliminary E&D. All coordinates are in UTM 15N meters NAD83. Transect locations are shown in Figure 3.7-1.

Location	Right Water Edge/ Right Descending Bank (Northing, Easting)	Left Water Edge/ Left Descending Bank (Northing, Easting)
Primary Reference Section	3286460.680, 793822.861	3286655.441, 794486.710
2018 Reference Section	3285238.719, 793987.484	3285299.128, 794737.097

- Methodology:
  - Continuous estimated MR discharge is provided in real time by USGS at the Baton Rouge and Belle Chasse gauge locations referenced above.
  - Direct empirical estimations of velocity will be made during operational events using Acoustic Doppler Current Profilers (ADCPs; see Oberg et al. 2005 for discussion of the methodology). Measured concurrently with bathymetric measurements of the cross-sectional area of flow, these data allow an estimation of MR discharge via Equation 1.

Discharge (cfs) = Cross-sectional area of flow (square feet) x velocity (f/s) ***Eqn. 1***

- Parties Responsible for Data Collection
  - Continuous discharge estimations at Mississippi River Memphis, Baton Rouge and Belle Chasse gauges: USGS
  - Boat-based direct empirical discharge estimations: CPRA contractor.

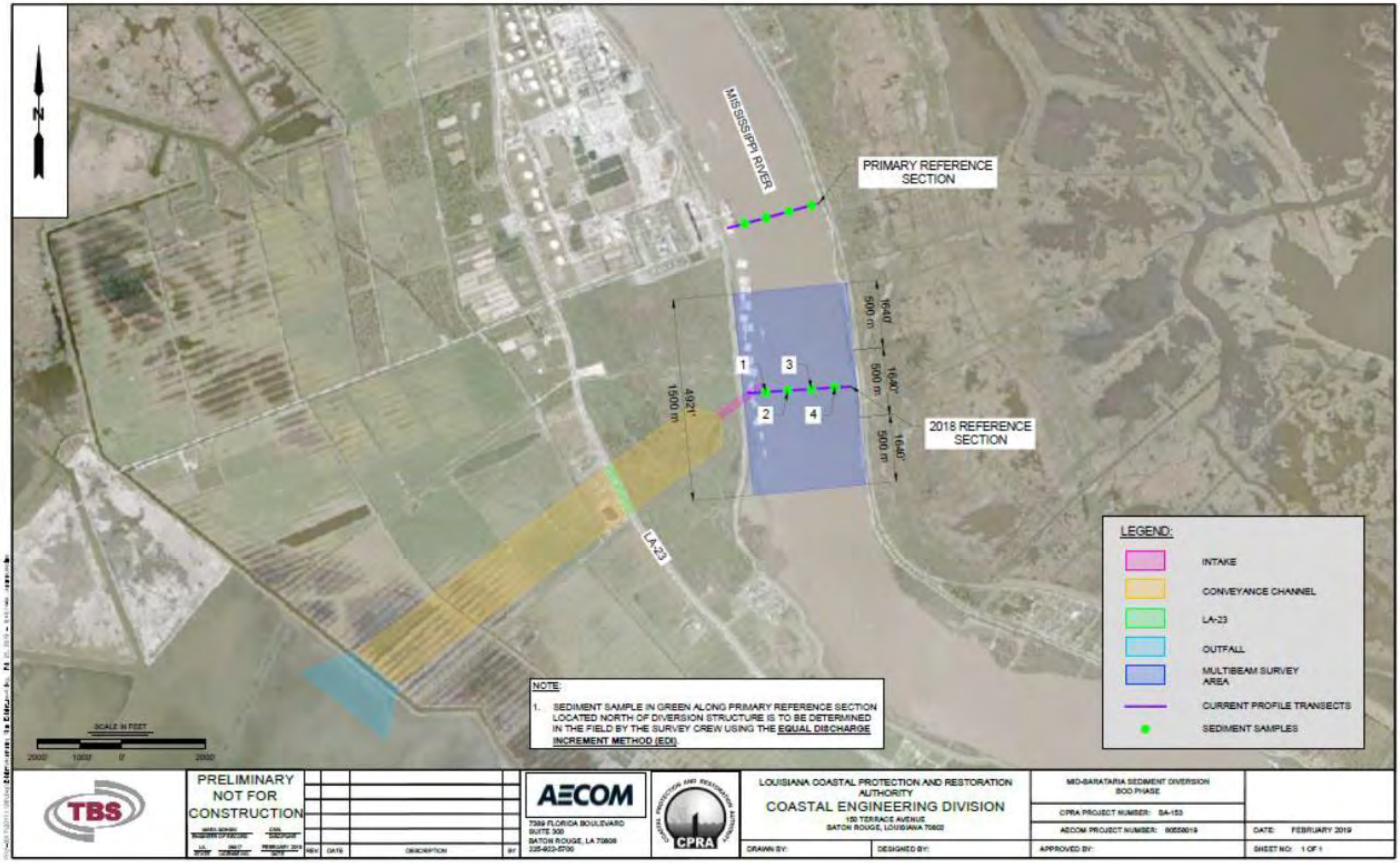


Figure 3.7-1. Location of the Mississippi River near the Mid-Barataria Sediment Diversion, showing transects and sampling points currently being studied for E&D purposes. The sampling points (green squares) on the two transects (purple lines) are shown in relation to the Project construction footprint, just south of the Alliance refinery.

3.7.1.1.2. Mississippi River suspended sediment concentrations

- Rationale: River suspended sediment measurements will provide estimations of the inorganic sediment load characteristic of the MR and the sediment load anticipated for the Project, analyzed on an event-by-event basis. Sediment characteristics in each flood event are dependent on weather and associated erosion within the entire MR watershed. As such, while each independent flood event may be similar to historical flood events, each event will be unique in the flow rates, wash load, duration, and ability to initiate bed load transport and suspension of sand within the diversion.

- Schedule: Real-time measurements are currently planned for the entirety of both pre-operations and the 50 years of post-construction monitoring at the USGS Baton Rouge and Belle Chasse gauges discussed for monitoring of *Mississippi River water discharge* (3.7.1.1.1). The PDT estimates five years of additional boat-based data collection at the Belle Chasse gauge and at or nearer the Project structure to refine sediment availability estimates.

- Locations: Suspended sediments will continue to be monitored at the USGS Baton Rouge and Belle Chasse stations to identify the sediment availability for the proposed diversions dependent on the characteristics of each individual flood event.

  The E&D activities are designed to investigate suspended sediment load at transects and sample points described in Table 3.7-1 and Figure 3.7-1 and those to be defined for the Project operational phase. Sediment concentration samples will be collected at four locations (vertical stations; Table 3.7-2) along each cross-section and at five depths at each of the vertical stations.

  Table 3.7-2. Coordinates of sampling points on 2018 Mississippi River cross-section. Points correspond to those shown in Figure 3.7-1.

Point	Northing	Easting
1	3285250	794121
2	3285260	794280
3	3285280	794453
4	3285300	794622

- Methodology:

  USGS currently monitors turbidity at the Baton Rouge and Belle Chasse gauges via continuously-recording turbidity probes. However, USGS does not regularly collect physical samples of suspended sediments for laboratory analysis of grain size, nor to support estimates of sediment load at Belle Chasse. Data and samples collected from October 2012 through May 2016 do show a strong direct relationship between turbidity and both total suspended sediment concentration (USGS P80154; $R^2 = 0.8262$; n = 55) and estimated total suspended sediment discharge (USGS P80155; $R^2 = 0.5699$; n = 55) at the site.

  There were direct relationships between turbidity and the percent of suspended sediments smaller than 0.0625 mm ($R^2 = 0.4961$) and smaller than 0.125 mm ($R^2 = 0.5278$) for December 2015 - June 2016 samples collected at Belle Chasse, but the number of observations were small (n = 7 and 6, respectively), and the data reflect only a single MR flood season.

Observed gauge height did provide some predictability with suspended sediment mass for data and samples collected at Belle Chasse from December 2018 through January 2020. The direct relationship between gauge height and mass of suspended sediments larger than 0.063 mm (i.e., sand; USGS P91159) was strong (R^2 = 0.5636; n = 16), while the relationship between observed gauge height and the mass of suspended sediments smaller than 0.063 mm (i.e., silts and clays; USGS P91158) was weaker (R^2 = 0.2363; n = 16).

The USGS Mississippi River at Belle Chasse, LA gauge is roughly 13 miles north of the Project site. If used for the continuous monitoring of turbidity, discrete sampling of suspended sediments would be required at that site to establish the regression model needed to use turbidity as a surrogate for suspended sediments. Prior to selecting this site as the permanent continuous monitoring location for turbidity, suspended sediments sampling at the Project site may also be required to determine if there is a significant difference in turbidity between the two locations.

Sediment concentration samples at the reference and Project cross-sections will be taken using a P-6_200 isokinetic sampler. TSS and concentrations of sand (> 63 micron) and silt/clay (≤63 micron) will be determined using methods similar to the 2008-2011 (Allison, 2011) and 2018 (Allison et al., 2018) studies.

Replicate sediment concentration measurements will be made at the two most westward vertical stations at 70 and 90% water depth, to provide sufficient sand sample volume for sieve analysis. Conductivity/temperature/depth (CTD) casts will be made at the same time as the sediment concentration measurements at each vertical station to help calibrate measurements.

ADCP data will be collected during every isokinetic suspended sediment collection activity and the start and ending ensemble should be separately noted for the duration of each point collection (i.e., the interval between each bottle opening and closing). This data will be used to correlate the backscatter data to the sediment concertation data from the isokinetic sampling.

Sediment concentration samples will be collected at four locations (vertical stations) along each cross-section and at five depths at each of the vertical stations. The depths are 10, 30, 50, 70 and 90 percent of the local water depth. At each cross section, the Equal Discharge Increment method should be used in the field to determine the four vertical stations. The four vertical stations that were sampled at the 2018 cross section are located at coordinates in Table 3.7-2.

- Parties Responsible for Data Collection
    - Continuous turbidity and discrete suspended sediment load estimations at Mississippi River Baton Rouge and Belle Chasse gauges: USGS
    - Boat-based direct empirical suspended sediment load estimations: CPRA contractor.

3.7.1.1.3. Mississippi River nutrient concentrations

- Rationale: Nutrients in Mississippi River water, primarily nitrogen (N), phosphorus (P) and sulfur (S), are necessary for phytoplankton and emergent vegetation growth in estuarine ecosystems. While those resources in Barataria may benefit from diverted MR water, there are concerns that nutrient delivery in excess of the needs of primary producers could lead to phytoplankton blooms in the open estuary, growth alterations to emergent vegetation, and increases in the rate of bacterially-mediated soil organic carbon decomposition. Measuring nutrient concentrations entering the diversion discharge will support the calculation of *Nutrient loads conveyed into Barataria Basin* (3.7.1.2.4).

- Schedule: Planned to occur once monthly for the first three years of Project operations to confirm relationships between the USGS regular monitoring at the Belle Chasse gauge. After that, the Project team plans to rely on ongoing USGS monitoring.

- Locations: Currently the USGS estimates MR (nitrate + nitrite)-N concentrations at the Mississippi River at Baton Rouge, LA gauge (#07374000) using a continuously-reading sensor. USGS periodically collects and analyses grab samples of river water at Baton Rouge for several chemical species of N, P and S.

- Methodology:

  USGS measures (nitrate + nitrite)-nitrogen at the Baton Rouge gauge using a continuously-reading sensor. USGS periodically collects and analyses grab samples of river water at both Baton Rouge and Belle Chasse for (nitrate + nitrite)-N (USGS P00631), (ammonia + ammonium)-N (USGS P00608, total Kjeldahl N (ammonia + organic N; USGS P00623), and total N (USGS P00602).

  Dissolved orthophosphate (PO_4^{3-}-P) is typically determined through wet chemistry of grab samples (USGS P00671), as is total P (USGS P00666). However, newer sensors that can detect orthophosphate may be installed at Baton Rouge and/or Belle Chasse. However, because orthophosphate adsorbs to clay particles in riverine water, it is necessary to use an acid digestion to free orthophosphate from suspended sediments to better characterize concentrations in the river. As well, total P in a sample of river water can be determined through similar laboratory analyses.

  Dissolved sulfate is likewise analyzed by USGS at the Baton Rouge gauge using the same grab samples and respective analytical chemical methods (USGS P00945).

- Parties Responsible for Data Collection

  Continuous sensor-based and discrete nutrient concentration sampling and analysis at the Mississippi River Baton Rouge and Belle Chasse gauges: USGS and/or CPRA contractor.

3.7.1.1.4. Bathymetry of the Alliance South sand bar

- Rationale: Multi-beam bathymetric measurements will support estimations of sediment consumption and replenishment, and thus the productivity and sustainability of the Alliance South lateral sandbar as a sediment source for the project through calculations of the change in volume of the Alliance South sand bar. The multi-beam bathymetry will also record the morphology of the lateral bar and provide a calibration data source for the Deltf3D Outfall Management Model.

- Schedule: Planned annually during the pre-operations period and both before and after each Project operational event for the first five years of post-construction monitoring. The Project Operations Team will evaluate then what frequency of operations will be maintained.

- Locations: The Alliance South sandbar (Figure 3.7-2; will be monitored routinely with high-resolution velocity and bathymetric surveys along transects that were established for design data collection and earlier studies. Transects were arranged to capture upstream and downstream bar morphology changes. The monitoring of the bar dynamics during and after annual operations will be essential to understanding stability of the sand-size sediment supply through both diversion and replenishment of the lateral bar.

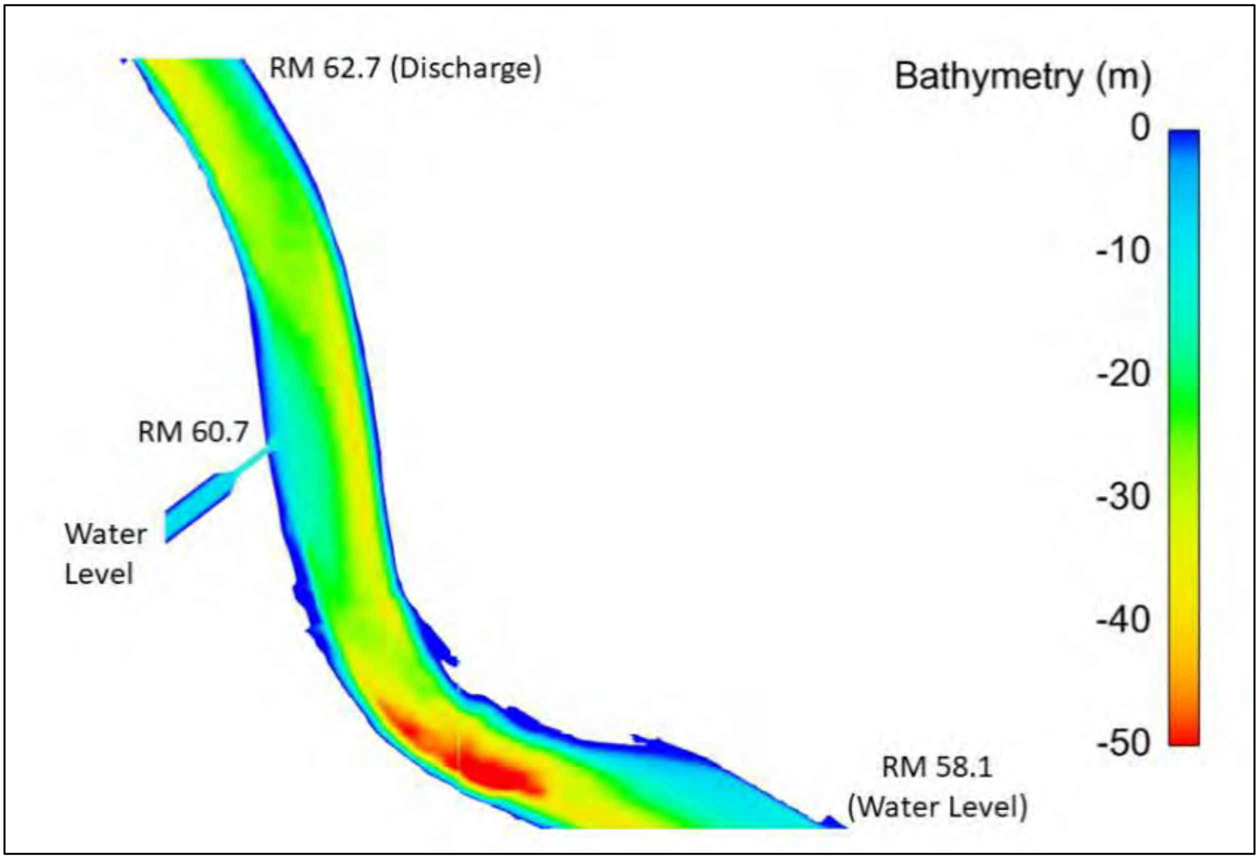


Figure 3.7-2. The lateral bar near the River Mile 60.7 diversion intake (area of shallow bathymetry in front of the diversion structure) will be monitored routinely with high-resolution velocity and bathymetric surveys along transects that have been established for design data collection and earlier studies. Figure from (Moffat & Nichol, 2012)

- Methodology: During Project E&D, the multi-beam surveys will be conducted during two discharge events and both before and after the flood season. The surveys during the flood event should be coordinated with the cross-section sampling, which will occur when the discharge at Belle Chasse is at least above 600,000 cfs. The PDT prefers that the other event survey occurs near 1,000,000 cfs or at the flood event peak, and then on the falling limb at 850,000 cfs or 600,000 cfs, depending on the flood event and the data needs for calibration/validation of the Delft Outfall Management Model.

The flood season survey should be made before the rising limb of the first event reaches 450,000 cfs at Belle Chasse and one during a falling limb of the river discharge at the end of the flood season, also below 450,000 cfs. These surveys should be carefully coordinated between CPRA, USGS and the sediment and water quality testing laboratories and monitoring teams.

The pre- and post-season surveys will cover the entire lateral bar, while the during-event surveys will be concentrated within 750 meters upstream and 750 meters downstream of the diversion sampling location. The event surveys will include the entire width of the river and be centered on the monitoring cross-section station. These during event surveys are required for tracking bed form movement and associated bed load transport. The bed load surveys shall be taken in 500-meter sections within the river to ensure an area is collected within an approximated 2-hour period. A 25-meter overlap between each 500-meter section is planned to provide adequate linkage of the survey transects. At each sampling station survey, there should be two surveys – one taken at the time of initial sediment sampling and the second survey should be taken within approximately 24 hours.

The rate and magnitude of change in the volume of the Alliance South sand bar will be calculated as

$$\textit{Rate of change} = \frac{(\textit{Volume of the Alliance South sand bar at time } x+1) - (\textit{Volume of the Alliance South sand bar at time } x)}{\textit{Time between measurements.}} \qquad \textbf{Eqn. 2}$$

$$\textit{Magnitude of change} = (\textit{Volume of the Alliance South sand bar at time } x+1) - (\textit{Volume of the Alliance South sand bar at time } x) \qquad \textbf{Eqn. 3}$$

- Parties Responsible for Data Collection
  - Repeated channel conditions surveys: USACE
  - Pre- and post-season surveys for at least the first five years of operations: CPRA contractor

3.7.1.1.5. Sedimentology of the Alliance South sand bar

- Rationale: Sediment sampling of the Alliance sand bar will support estimations of the sustainability of the sand bar as a coarse-grained sediment source for the project.

- Schedule: See discussion of schedule under *3.7.1.1.2. Mississippi River suspended sediment concentrations* (sampling will be coincident for both parameters).

- Locations: Sedimentology samples will be collected coincident with the *Bathymetry of the Alliance South sand bar* (3.7.1.1.4).

- Methodology: Bed samples will be taken at each vertical station using a BM-54 sampler (https://water.usgs.gov/fisp/products/4103004.html). These should be taken at the same time as the sediment concentration samples and CTD casts. The BM54 sampler will typically take a sample 3 inches deep into the sediment. Samples will be transported to the testing laboratory where the grain size of the sediment and sand- and silt-size sediment volumes will be determined. The PDT has coordinated with Mead Allison, who will be conducting a similar data collection for the Mid-Breton Project, to assure that they will take a similar depth sample with the Shipek sampler (*sensu* Ramirez and Allison 2013) and thus provide consistency in measurements.

- Parties Responsible for Data Collection: CPRA contractor

3.7.1.1.6. River bathymetry at and around the Project structure inlet

- Rationale: Repeated bathymetric surveys of the MR and the Project structure inlet are necessary to support calculations of the rate and magnitude of change in river bathymetry at the Project structure inlet to determine if bed scour/erosion or shoaling are occurring. Both siltation and scour would limit Project operations and would form the basis for AM actions. Erosion has been seen at the mouth of the West Bay Sediment Diversion where it penetrates the right descending bank of the river downstream of Venice, Louisiana (Brown et al., 2009), and in the batture in front of Mardi Gras Pass on the left descending bank downstream of the terminus of the MR&T levee (Lopez et al., 2014).

  Calculation of the rate and extent of change in the elevation of the MR bottom at the Project inlet structure inlet will indicate if siltation or scour is occurring.

- Schedule: See discussion under *3.7.1.1.4. Bathymetry of the Alliance South sand bar*. Surveys will be coincident for the two variables.

- Locations: Specifics will be coordinated with the event surveys – standard and reference cross sections.

- Methodology: Boat-based multi-beam bathymetry on 50-foot centers at the structure inlet and for 1,500 feet both upstream and downstream of the structure. Exact methodologies are expected to be similar to those used by the USACE New Orleans District when they conducted a multi-beam bathymetric survey from Mississippi River Mile (RM) 0 – 324 during July 2011 – June 2013. Data are available at https://www.mvn.usace.army.mil/Missions/Engineering/Channel-Improvement-and-Stabilization-Program/2013MBMR/.

  The rate and magnitude of change in river bathymetry will be calculated as

$$\begin{aligned} Change\ rate = {} & ((River\ bathymetry\ at\ the\ Project\ structure\ inlet\ at\ time\ x+1) \\ & - (River\ bathymetry\ at\ the\ Project\ structure\ inlet\ at\ time\ x)) \\ & /(Time\ between\ measurements) \end{aligned}$$

Eqn. 4

$$\begin{aligned} & Change\ magnitude \\ & \quad = (River\ bathymetry\ at\ the\ Project\ structure\ inlet\ at\ time\ x+1) \\ & \quad - (River\ bathymetry\ at\ the\ Project\ structure\ inlet\ at\ time\ x) \end{aligned}$$

Eqn. 5

- Parties Responsible for Data Collection: CPRA contractor

3.7.1.1.7. Topography/bathymetry of the Project Influence Area

- Rationale: Repeated topographical/bathymetrical monitoring of the Project Influence Area will support calculations of the rate and magnitude of change in topography/bathymetry of the Project outfall area and ensure the viability of the Project to convey river water, sediment and nutrients into Barataria Basin. Calculation of the rate and magnitude of change in landscape elevations (topography and bathymetry) of the PIA will indicate if siltation or scour is occurring.

- Schedule: Planned for both pre-operations and post-construction monitoring. Topography and bathymetry will be assayed once prior to the onset of Project operations, annually for years 1-5 after the onset of Project operations, and then at years 10, 15, 20, 30, 40 and 50. Light Detection and Ranging (LiDAR) surveys will be scheduled preferentially in winter to survey as much as possible a "leaf off" environment, but that may not always be possible.

- Locations: The Basin-wide Model projected the extent of the PIA as shown in Figure 3.3-3. The actual extent of detailed receiving basin topographical and bathymetric monitoring may be modified as required based on the first five years of surveys.

  Elevation surveys may also need to be conducted up to two times at up to two additional wetland areas. A conventionally restored wetland and an unrestored wetland, as described in Section 4.1.3, may be used to assess the relative performance of different marsh restoration treatments.

- Methodology: Subaerial elevation surveys will require LiDAR and processing to reduce error associated with plant canopy. The bathymetric surveys may include traditional point survey and other instruments (fathometer, multi-beam) depending on the water depth and vertical/horizontal resolution required. CPRA expects that data collection will be similar to that used by USGS during collection of northern Gulf of Mexico combined bathymetric and topographic data within its Coastal National Elevation Database (CoNED), accessible at https://www.usgs.gov/land-resources/eros/coned

  The rate and magnitude of change in topography/bathymetry of the Project delta development area will be calculated as

  Rate of change = ((Topography/bathymetry of the Project delta development area at time x+1) – (Topography/bathymetry of the Project delta development area at time x)) / (Time between measurements)

  Eqn. 6

  Magnitude of change = ((Topography/bathymetry of the Project delta development area at time x+1) – (Topography/bathymetry of the Project delta development area at time x)

  Eqn. 7

- Parties Responsible for Data Collection: CPRA contractor

3.7.1.1.8. Water volume conveyed into Barataria Basin

- Rationale: Measuring the discharge of water through the diversion structure will provide direct estimates of riverine freshwater transfer into Barataria Basin and support estimations of *Sediment:water in the flows conveyed into Barataria Basin* (3.7.1.2.2), *Sediment volume conveyed into Barataria Basin* (3.7.1.2.3), and *Nutrient loads conveyed into Barataria Basin* (3.7.1.2.4). As per the Project permit request submitted to USACE, Project discharge will be capped at 75,000 cfs at *Mississippi River water discharges* (3.7.1.1.1) greater than or equal to 1,000,000 cfs.

- Schedule: Planned only for post-construction monitoring during the entire flood season each year for the life of the Project.

- Locations: Specifics locations within the conveyance channel will be identified by CPRA.

- Methodology: At the entrance of the intake and the bar area, it is anticipated that an array of velocity and turbidity instrumentation will be deployed. It is uncertain if sediment, water, and nutrient capture is best monitored in the conveyance channel. The most advantageous locations are under consideration by the PDT.

- Parties Responsible for Data Collection: CPRA contractor

3.7.1.1.9. Sediment concentrations in the flows conveyed into Barataria Basin

- Rationale: Measuring inorganic sediment concentrations in the diversion discharge will support the calculation of *Sediment:water in the flows conveyed into Barataria Basin* (3.7.1.2.2) and *Sediment volume conveyed into Barataria Basin* (3.7.1.2.3).

- Schedule: Planned only for post-construction monitoring during the entire flood season each year for the life of the Project.

- Locations: Sample locations will be the same as those developed for *Water volume conveyed into Barataria Basin* (3.7.1.1.8).

- Methodology: See discussion under *Water volume conveyed into Barataria Basin* (3.7.1.1.8). Analyses of sediment samples taken from the conveyance channel, including calculations of Sediment:water *in the flows conveyed into Barataria Basin* (3.7.1.2.2) and *Sediment volume conveyed into Barataria Basin* (3.7.1.2.3), will include measurement by primary grain size (sand/silt/clay).

- Parties Responsible for Data Collection: CPRA contractor

3.7.1.2. Multi-Parameter Calculations in Support of Objective 1

3.7.1.2.1. Mississippi River sediment load

- Rationale: The intent of the Project is to capture a substantial portion of the Mississippi River's sediment load for transport through the Project structure and into the receiving basin.

- Schedule: Planned for both pre-operations and post-construction monitoring.

- Locations: Sample locations will be the same as those developed for *Mississippi River water discharge (3.7.1.1.1)* and *Mississippi River suspended sediment concentrations (3.7.1.1.2)*.
- Methodology:

Mississippi River sediment load = Mississippi River water discharge (3.7.1.1.1) x
Mississippi River suspended sediment concentrations (3.7.1.1.2)

Eqn. 8

3.7.1.2.2. Sediment:water in the flows conveyed into Barataria Basin

- Rationale: Based on extensive empirical data collection and numerical modeling, the Project is being designed to optimize the delivery of sediment into the Barataria Basin. Calculation of cumulative inorganic sediment:water is the fundamental metric of the efficiency of diversion sediment transport. Estimating the actual Project sediment:water through the calculations below is needed to confirm those design assumptions, or it could suggest opportunities for additional operational modifications to achieve subsequent improvements in sediment:water. These estimations will also be needed for subsequent numerical model refinement.

- Schedule: Planned only for post-construction monitoring.

- Locations: Depends on the specific monitoring locations developed for *Water volume conveyed into Barataria Basin* (3.7.1.1.8) and *Sediment concentrations in the flows conveyed into Barataria Basin* (3.7.1.1.9)

- Methodology:

$$SWR = \frac{\left(\frac{Sediment\ Concentrations\ in\ the\ flows\ conveyed\ into\ Barataria\ Basin\ 3.7.1.1.9}{Mississippi\ River\ suspended\ sediment\ concentrations\ (3.7.1.1.2)}\right)}{\left(\frac{Water\ volume\ conveyed\ into\ Barataria\ Basin\ (3.7.1.1.8)}{Mississippi\ River\ water\ discharge\ (3.7.1.1.1)}\right)}$$

Eqn. 9

3.7.1.2.3. Sediment volume conveyed into Barataria Basin

- Rationale: This calculation will establish estimates of the amount of inorganic sediment transported by the structure.

- Schedule: Planned only for post-construction monitoring.

- Locations: Same sampling stations identified for *Water volume conveyed into Barataria Basin* (3.7.1.1.8), and *Sediment concentrations in the flows conveyed into Barataria Basin* (3.7.1.1.9)

- Methodology:

Sediment volume = *Water volume conveyed into Barataria Basin (3.7.1.1.8) * Sediment concentrations in the flows conveyed into Barataria Basin (3.7.1.1.9)*

Eqn. 10

3.7.1.2.4. Nutrient loads conveyed into Barataria Basin

- Rationale: Nitrogen and phosphorus are the primary inorganic nutrients that support primary production in the estuarine emergent wetlands and open water bodies. Concerns exist that excess nutrient delivery to Barataria Basin could lead to phytoplankton blooms (see Section 3.7.3.9), harmful algal blooms (3.7.3.10) and/or the development of low dissolved oxygen (see Section 3.7.3.7). This calculation will establish estimates of the amount of nutrients transported by the structure.

- Schedule: Planned only for post-construction monitoring.

- Locations: Same sampling stations identified for *Mississippi River nutrient concentrations (3.7.1.1.3)* and *Water volume conveyed into Barataria Basin* (3.7.1.1.8)

- Methodology:

N/P/S load = *Water volume conveyed into Barataria Basin (3.7.1.1.8) * Mississippi River nutrient concentrations (3.7.1.1.3)* **Eqn. 11**

3.7.2. Objective #2: Reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin

3.7.2.1. Empirical Monitoring Parameters in Support of Objective 2

3.7.2.1.1. Water velocities at multiple locations in the Barataria Basin

- Rationale: The fundamental objective of hydrography is to document changes to the horizontal and vertical movement of water within the Project area. This has bearing on changes to the physical environment as well as to the deposition of sediments and the zonation and persistence of wetland vegetation.

- Schedule: Planned for both pre-operations and post-construction monitoring.

- Locations: Two velocity meters are currently being installed in Barataria Basin (Figure 3.7-3), with another four proposed. Project-specific velocity meter locations are still being determined.

- Methodology: Use of real-time or continuous ADCPs to determine velocity of water movement, may be depth-averaged or point values

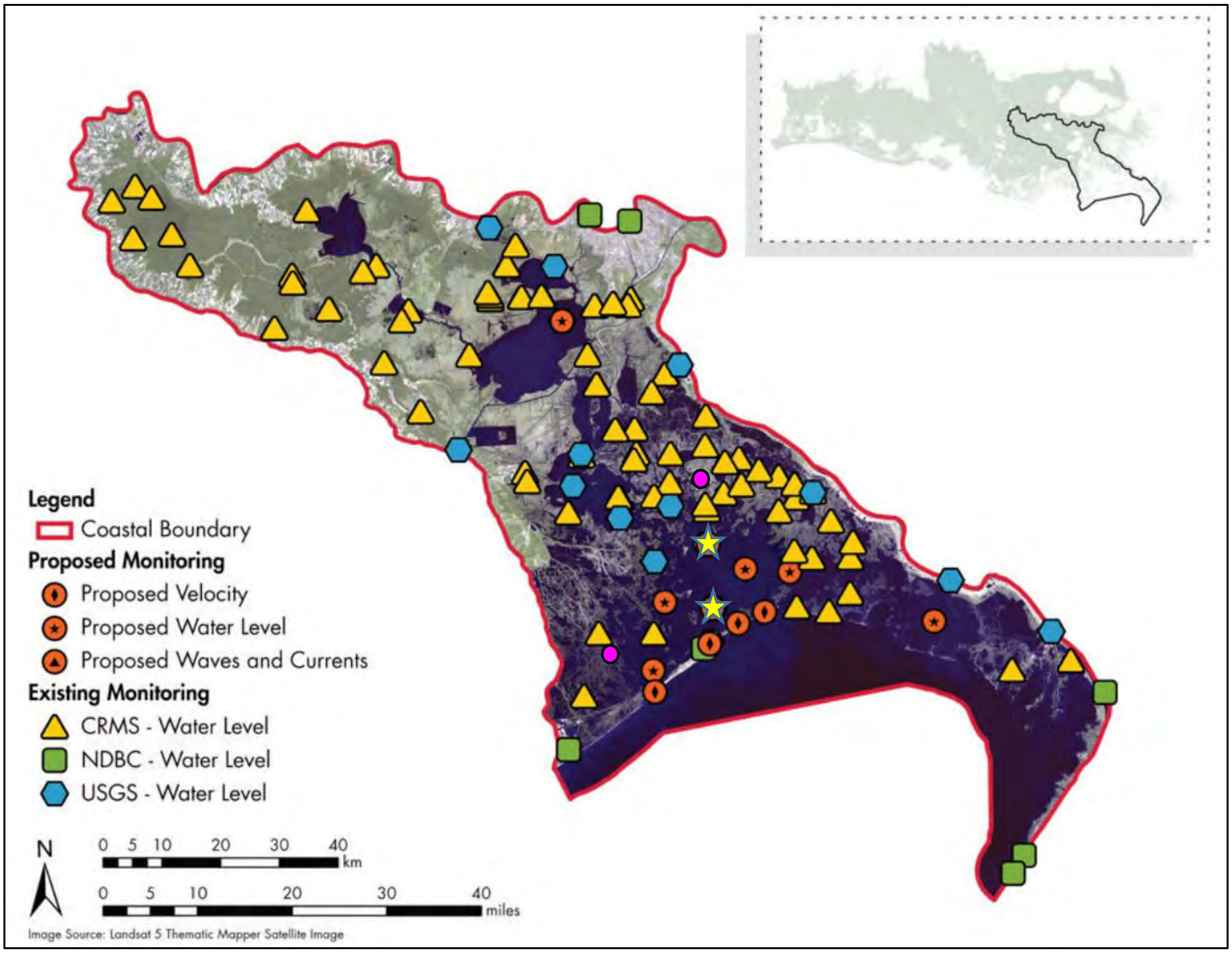


Figure 3.7-3. Existing hydrologic sampling stations within the Barataria Basin. The approximate location of two stations that CPRA contracted USGS to install are shown with magenta circles. Two ADCPs are currently being installed at the locations shown with the yellow stars.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.2. Frequency, depth and duration of inundation at multiple locations on the marsh in the Project Influence Area

- Rationale: Measure the variability and patterns of water movement within the Project Influence Area and suitability for different types of habitats and organisms. Coastal water levels are important to understanding short term, high-intensity events that regulate organism access and materials exchange to and from the wetland surface. Long-term trends of optimal or prolonged inundation influence wetland plant productivity.

- Schedule: Planned for continuous collection during both the pre-operations and post-construction monitoring phases.

- Locations: Currently there are 65 CRMS-*Wetlands* water level gauges (56 shown in Figure 3.7-3) and 15 data collection platforms in Barataria Basin. CPRA proposes to install five new CRMS-*Wetlands* stations in the basin, in the immediate outfall area. Up to three will be installed during pre-operations monitoring in existing PIA marshes, while up to two will be installed in the PIA after the onset of operations results in the subaerial development of new wetlands.

- Methodology: Empirical measurements of the height of the water level surface referenced to a geodetic or tidal datum will be made at the locations described above (Folse et al. 2020). Frequency, depth and duration of inundation will be calculated as

Frequency of inundation = Number of days annually where water level exceeds marsh surface elevation / 365 (366 for leap years)

Eqn. 12

Depth of inundation = Water depths at multiple locations on the marsh in the Project Influence Area – Marsh surface elevation

Eqn. 13

Duration of inundation = Number of consecutive days where water level exceeds marsh surface elevation

Eqn. 14

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.3. Soil bulk density

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties and sustainability in Barataria Basin. Soil bulk density is useful in understanding the relative exposure of an area to fluvial or marine sediment sources, and for a better understanding of the response of other soils parameters.

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils at existing CRMS-*Wetland* stations within Barataria Basin are sampled every 10 years. Soils from CRMS-*Wetlands* stations and new transect stations (below) in the PIA will be sampled shortly prior to the onset of Project operations, and every five years after the onset of Project operations.

  Locations: Existing and up to five new CRMS-*Wetlands* stations in the PIA (Figure 3.7-4). CPRA may augment that sampling with up to 15 points along three transects (five points per transect) radiating from the Project outfall to encompass the PIA, if the existing and new CRMS stations are judged to be insufficient. Exact transect locations will be determined by the Project AMT.

- Methodology: Soil cores will be obtained with a push corer (Folse et al. 2020). Bulk density will be determined for 4-cm depth increments within cores. Mass per unit volume of water and soil particles on a dry and wet basis will be calculated.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.4. Soil organic matter content

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties and sustainability in Barataria basin. Organic matter content of wetland soils is a key determinant of soil development and quantifies organic contributions to soil volume. Organic matter burial is especially important for maintaining soil elevation and positive feedback from plant productivity of existing wetlands. Carbon accumulation in emergent wetlands is also an important ecosystem service of these communities.

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils will be sampled shortly prior to the onset of Project operations, and every five years thereafter.

- Locations: Same sampling locations identified for *Soil bulk density* (3.7.2.1.3).

- Methodology: Soil cores will be obtained with a push corer. Organic matter content will be determined by loss on ignition (LOI), wherein a soil sample is combusted at a temperature that burns off organic matter and retains mineral content. LOI will be determined for 4-cm depth increments within cores as per the existing CRMS methodology (Folse et al. 2020).

- Parties Responsible for Data Collection: CPRA contractor.

Figure 3.7-4. Existing CRMS-*Wetlands* locations for vegetation community sampling in Barataria Basin.

3.7.2.1.5. Soil mineral matter grain size

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties and sustainability in Barataria Basin. Mineral content of wetland soils is a key determinants of soil development and are often used to describe the role of mineral contributions to soil volume.

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils will be sampled shortly prior to the onset of Project operations, and every five years thereafter.

- Locations: Same sampling locations identified for *Soil bulk density* (3.7.2.1.3).

- Methodology: Soil cores will be obtained with push corer. Grain size will be determined on residual mineral matter following *Soil organic matter content* (3.7.2.1.4) (Folse et al. 2020).

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.6. Soil total nutrients

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties and sustainability in Barataria Basin. The soil biogeochemical environment determines nutrient availability and the capacity for plants to uptake essential macro- and micro-nutrients for growth. Soil nutrition can provide an understanding of nutrient limitation to plant vigor. Measurements of soil total nutrients (i.e., TN, TP, TC), when coupled with other measures, can provide an understanding of what nutrients limit plant production and the burial rate of common limiting nutrients, such as nitrogen and phosphorus.

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils will be sampled shortly prior to the onset of Project operations, and every five years thereafter.

- Locations: Same sampling locations identified for *Soil bulk density* (3.7.2.1.3).

- Methodology: Soil cores will be obtained with a push corer. Soil total carbon is a direct measure of total carbon content with combustion and gas analysis. Indirectly, a conversion factor applied to the organic matter content can be used to determine soil carbon content based on literature or local relationships. Direct measure of total nitrogen with combustion and gas analysis. Direct measure of total phosphorus content with spectrophotometry following acid digestion.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.7. Rate of accretion above feldspar marker horizons

- Rationale: Understand the spatial extent and magnitude of effect of the Project on building and sustaining emergent wetland elevation.

- Schedule: Planned annually for both pre-operations and post-construction monitoring.

- Locations: Existing CRMS-*Wetland* stations within the Project Influence Area (Figure 3.7-4), plus five additional CRMS or CRMS-like stations installed within the Project outfall area.

- Methodology: Installation of feldspar marker horizons and determination of mass/volume of material deposited above the horizon will be as per the CRMS-*Wetlands* Standard Operating Procedures (Folse et al., 2020).

  Rate of accretion is determined as the slope of repeated measurements of accretion over time above feldspar marker horizons.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.8. Soil strength

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties and sustainability in Barataria basin and enable identification of changes and suitability for various types of habitats and organisms. Also, determine whether total organic matter changes following diversion operation. Measures of soil strength may be deemed important for understanding resistance to erosion.

- Schedule: Planned for both pre-operations and post-construction monitoring.

- Locations: See discussion of CRMS-*Wetland* and additional Project-specific stations under *Rate of accretion above feldspar marker horizons* (3.7.2.1.7).

- Methodology: Methodology for sampling soil strength will be identified after consultations with the academic community (see discussion in Jafari et al. (2019). Both *in-situ* and laboratory instruments are available for measuring the shear failure or ‘strength’ of soils, depending on depth and soil type.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.1.9. Marsh surface elevation change rate in the Project Influence Area

- Rationale: Understand trends of vertical soil elevation change rates within the project area in relation to measured geodetic datums. Rod sediment erosion table (RSET) pin heights form the basis for calculations of marsh surface elevation change.

- Schedule: Planned for both pre-operations and post-construction monitoring. Marsh surface elevation change will be calculated semi-annually, consistent with existing CRMS-*Wetlands* protocols.

- Locations: See discussion of CRMS-*Wetland* and additional Project-specific stations under *Rate of accretion above feldspar marker horizons* (3.7.2.1.7).

- Methodology: Installation of RSETs and measurement of average elevation of the marsh surface will be as per the CRMS-*Wetlands* Standard Operating Procedures (Folse et al., 2020). The rate of change of marsh surface elevation is determined as the slope of repeated measurements over time of RSET pin heights.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.2. Calculations in Support of Objective 2

3.7.2.2.1. Sediment dispersal and retention on the emergent marsh surface

- Rationale: Estimate the amount of sediment retained in geographic areas of the project area.

- Schedule: Planned for both pre-operations and post-construction monitoring. Sampling sites will be visited twice annually. Calculations will be made annually.

- Locations: See discussion of CRMS-*Wetland* and additional Project-specific stations under *Rate of accretion above feldspar marker horizons* (3.7.2.1.7).

- Methodology: Mineral sediment content in the material accreting on the marsh surface will be determined following collection of *Rate of accretion above feldspar marker horizons* (3.7.2.1.7) and S*oil organic matter content* (3.7.2.1.4).

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.2.2. Soil organic matter density

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties in Barataria basin

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils will be sampled shortly prior to the onset of Project operations, and every ten years thereafter.

- Locations: Same sampling locations identified for *Soil bulk density* (3.7.2.1.3).

- Methodology: Conversion: soil organic matter percent is converted into a mass per unit volume

- Parties Responsible for Data Collection: CPRA contractor.

3.7.2.2.3. Soil mineral matter density

- Rationale: Understand the spatial extent and magnitude of effect of the Project on emergent wetland soil properties in the Barataria basin

- Schedule: Planned for both pre-operations and post-construction monitoring. Soils will be sampled shortly prior to the onset of Project operations, and every ten years thereafter.

- Locations: Same sampling locations identified for *Soil bulk density* (3.7.2.1.3).

- Methodology:

Mineral density = Soil bulk density (3.7.2.1.3) – *Soil organic matter density* (3.7.2.2.2) **Eqn. 15**

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3. Objective #3: Create, restore, and sustain wetlands and other deltaic habitats and associated ecosystem services

The objective of physical terrain measurements is to determine topographical and areal changes of natural or restored landscapes and built structures that are vulnerable to submergence. The physical terrain of the coastal environment in this context refers to natural land (e.g., wetlands, barrier islands, uplands, ridges). The coastal terrain serves a multitude of functions from buffering storms, filtering nutrients, pollutants, and sediments, and supporting a variety of flora and fauna. Land submergence threatens all aspects of the coastal ecosystem, from increasing fetch in open water bodies to reducing habitat for ecologically important fish and wildlife (Chesney et al., 2000; Fagherazzi & Wiberg, 2009).

3.7.3.1. Land and water extent / Area of new delta formation in the Project Influence Area

- Rationale: The Project is intended to build and more importantly sustain new emergent wetlands during 50 years of operations. Extent of land and water within the Barataria Basin is thus a fundamental metric for determining Project success. Periodic monitoring of land and water extent will allow for calculation of area of new delta formation.

- Schedule: Planned once pre-operations and every three years post-construction.

- Locations: Project Influence Area within the Barataria Basin (see Figure 3.3-3).

- Methodology: Remote sensing / satellite imagery will be used to determine the spatial extent of emergent wetland and open water areas within the basin, consistent with the methods used for the CRMS Program (Folse et al. 2020). The area of new delta formation is calculated as

Area of new delta formation = (Land and water extent within the Barataria Basin at time x) - (Land and water extent within the Barataria Basin prior to onset of operations) **Eqn. 16**

- Parties Responsible for Data Collection: USGS, possibly a CPRA contractor in the long-term.

3.7.3.2. Emergent wetland area

- Rationale: Measure changes in wetland spatial extent by traditional wetland type (fresh + intermediate, brackish, and salt marsh; to relate to Basin-wide Model projections) and by recent Louisiana Vegetation Class (*sensu* Snedden 2019) in the Project area.

- Schedule: See Schedule under *3.7.3.1. Land and water extent / Area of new delta formation in the Project Influence Area*. The data collection efforts for both parameters will be coincident.

- Locations: Project Delta Development Area within the Barataria Basin (see Figure 3.3-2).

- Methodology: Specification of some of the satellite-based data under *Land and water extent within the Barataria Basin* (3.7.2.1.3) to parse out vegetated emergent wetlands (i.e., will not include non-vegetated subaerial flats), as described in Folse et al. (2020).

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.3. *Vegetation Cover, Abundance, and Height*

- Rationale: Assess condition and changes in vegetation in the Basin. Data collected form the basis for assignment of *Emergent and submerged vegetation community type* (3.7.3.5) and detection of invasive species (e.g., hydrilla, water hyacinth, salvinia) presence and location as an indicator of ecosystem change and range shift.

- Schedule: Data are and will be collected annually both pre-operations and post-construction.

- Locations: 65 existing and five new Project-specific CRMS-*Wetlands* stations (Figure 3.7-4).

- Methodology: Permanent plots. Methods are detailed in Folse et al. (2020).

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.4. *Submerged aquatic vegetation area*

- Rationale: SAV provides fish and shellfish habitat, improves water quality, and contributes organic matter to the estuarine ecosystem. Measuring changes in SAV spatial extent in Barataria Basin is therefore important for multiple stakeholders. The objective of the Project to build emergent wetlands in existing open water bodies does imply localized losses of SAV, particularly close to the Project outfall. As well, SAV abundance and distribution is highly variable year to year, which will be necessary for Project partners to consider in data evaluation.

- Schedule: Planned twice pre-operations and once every five years post-construction.

- Locations: Barataria Basin

- Methodology: Boat-based transects or point observations in the PIA, and remote sensing-based analyses of SAV area for the full Barataria Basin, using algorithms for coverage developed by LSU and USGS. The boat-based information will be used to further develop the remote sensing-based estimates, and the Project partners anticipate that at some point the boat-based surveys in the PIA will be replaced by remote sensing analyses for the entire Basin, including the PIA.

- Parties Responsible for Data Collection:
    - Boat-based surveys: CPRA or CPRA contractor
    - Remote sensing: CPRA contractor

3.7.3.5. Emergent and submerged vegetation community type

- Rationale: Assess changes in vegetation structure in the Barataria Basin, including both the PIA and PDDA.

- Schedule: Planned annually for both pre-operations and post-construction monitoring. See Schedule under *3.7.3.1. Land and water extent / Area of new delta formation in the Project Influence Area*. The data collection efforts for both parameters will be coincident

- Locations: 65 CRMS-*Wetlands* and 5 new Project-specific stations (Figure 3.7-4)

  Methodology: Permanent plots, data collected at the end-of-season; visual estimate of the percentage cover by plant species; different canopy heights are measured (carpet, understory, overstory). Data document changes in the coverage of all species and note any presence of invasive species. Methods are detailed in Folse et al. (2020). Community type will also be determined for a broader area from aerial imagery.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.6. Emergent vegetation biomass in the Project area.

- Rationale: Assess changes in vegetation structure in the Project Influence Area.

- Schedule: Planned for both pre-operations and post-construction monitoring. The SWAMP Program is collecting both above- and below-ground biomass at a subset of CRMS-Wetlands stations coast-wide, and is currently planning on a 5-year return rotation for that sampling. CPRA will rely on that same return schedule, and conduct two pre-operation biomass samples and post-construction samples every five years throughout the 50-year Project study period.

  Locations: The SWAMP Program is augmenting the non-destructive *Vegetation Cover, Abundance, and Height* (3.8.3.3) at 25 of the 65 existing CRMS-*Wetlands* stations in Barataria with plots for the destructive sampling of aboveground and belowground biomass (Figure 3.7-10). Not all of the CRMS-Wetlands stations in the Project Influence Area have been identified for biomass collection (e.g., CRMS stations 225, 232, 253, 3617, and 4103). CPRA will extend biomass collection to those stations for purposes of supporting Project adaptive management, and will include biomass collection in the 3-5 new CRMS stations that will be established in the Project outfall area.

- Methodology: Direct measure of standing live and dead plant material that is destructively harvested for herbaceous wetlands. Live aboveground biomass will be separated and measured for each species in the harvest plot. Species-specific biomass data support an understanding of individual species tolerance and/or competitiveness with system change. The production of belowground biomass often exceeds that of aboveground biomass. The total live belowground biomass may complement measurements of soil strength. Disparities in root-to-shoot biomass may provide an indicator for plant health.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.7. Dissolved oxygen in Barataria Surface Waters

- Rationale: DO monitoring is necessary for understanding pelagic and benthic respiration (Kemp et al., 1992) and it affects the availability of nutrients (Valiela, 1995). Chronic or acute effects of low DO could cause displace organisms or change community structure of aquatic fauna.

- Schedule: Planned monthly at all stations listed below, for both pre-operations and post-construction monitoring.

- Locations: 23 SWAMP stations in the Barataria Basin, and 26 LDEQ stations in the Barataria and Mississippi River Delta Basins (Figure 3.7-5). For reference, seven of the SWAMP stations are also USGS *in situ* gages There is an additional station (USGS 07380255 Bayou DuPont), not shown in Figure 3.7-5, that also collects DO in the basin.

  Dissolved oxygen measurements in the Gulf of Mexico along Louisiana are not being collected as part of this MAM Plan. However, annual baseline data (1985-2021) are available and similar data collections to map Gulf are expected to continue (see www.gulfhypoxia.net). These data are relevant to the uncertainty around Project influence on the size, shape, and severity of the Gulf Hypoxic zone.

- Methodology: Concentration of oxygen dissolved in water or percentage saturation. Measured as mg oxygen per liter sampled discretely, or by *in situ* sonde.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.8. Salinity in Barataria Surface Waters

- Rationale: Estuarine salinity affects the distribution, growth, and productivity of nekton communities (Minello et al., 2003; Zimmerman et al., 2000), vegetation community composition (Pennings et al., 2005), and ultimately the functions and services that wetlands provide (Odum, 1988).

- Schedule: Continuous monitoring planned for both pre-operations and post-construction monitoring.

- Locations: 77 stations currently monitored continuously in Barataria Basin: 65 CRMS-Wetlands stations and 12 SWAMP stations. See Figure 3.7-6.

- Methodology: Concentration of dissolved ions or salts in water typically measured with conductivity probes and may be reported in practical salinity units (PSU) or other (reference SWAMP)

- Parties Responsible for Data Collection: CPRA contractor.

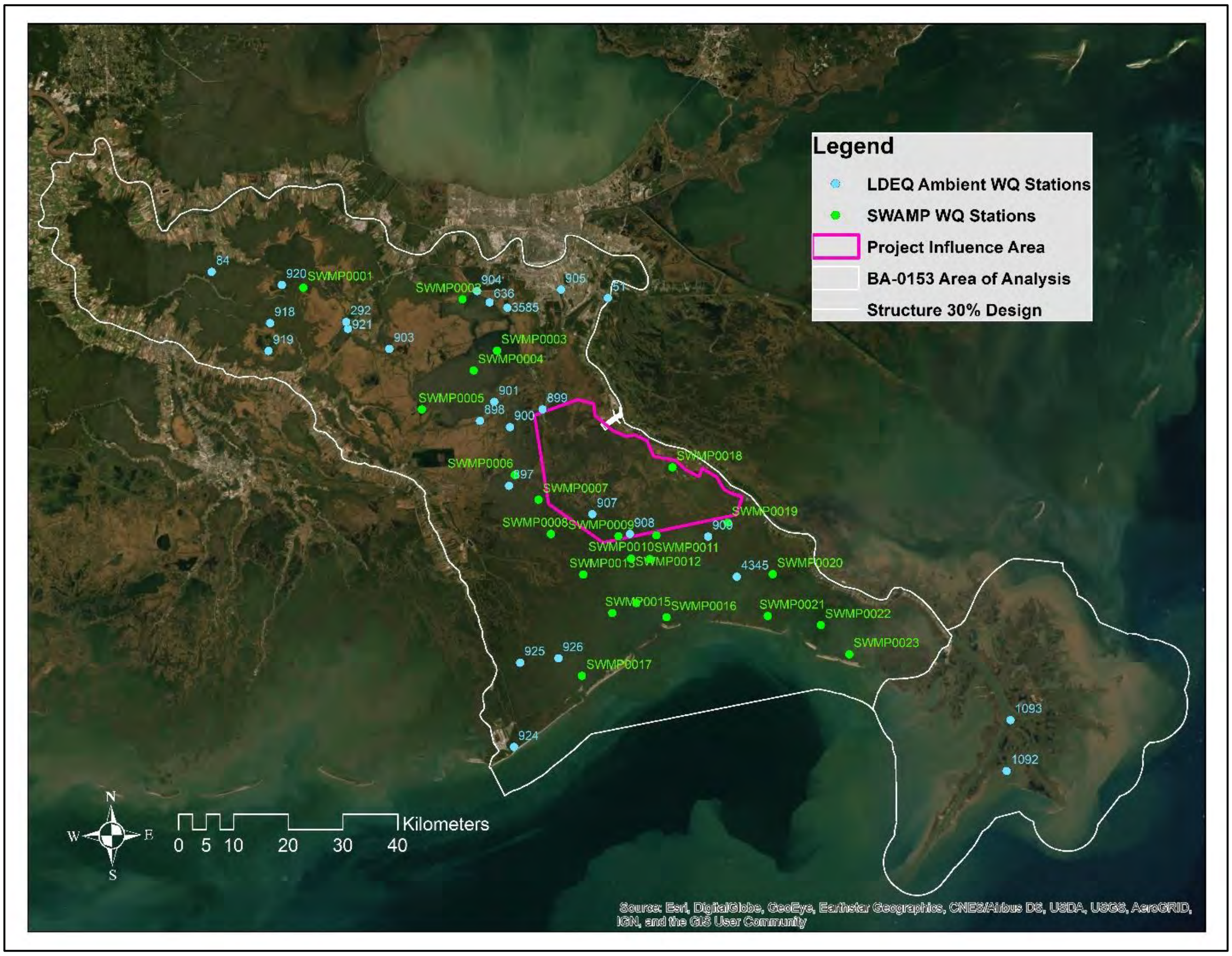


Figure 3.7-5. Existing locations of LDEQ and SWAMP discrete water quality sampling in Barataria Basin, shown in relation to the Project Influence Area.

3.7.3.9. *Chlorophyll a in Barataria Surface Waters*

- Rationale: Chlorophyll *a* is an indicator of the presence of water column primary production by phytoplankton, and thus aids estimates of the total quantity of carbon produced by primary producers.

- Schedule: Planned for both pre-operations and post-construction monitoring. Schedule varies by method. Water is sampled at least hourly at eight USGS gauges using *in situ* instruments (e.g., sondes) and is sampled monthly at 23 sites via boat-based grab samples. Additionally, remote sensing using satellite imagery will be collected and analyzed daily (when possible; e.g., cloud cover may limit usable data) to detect high biomass blooms.

- Locations: Monthly water samples will be collected at 23 SWAMP stations in the Barataria Basin. Seven of those stations that are also USGS *in situ* gauges that already collect hourly Chlorophyll *a* fluorescence (Figure 3.7-5).

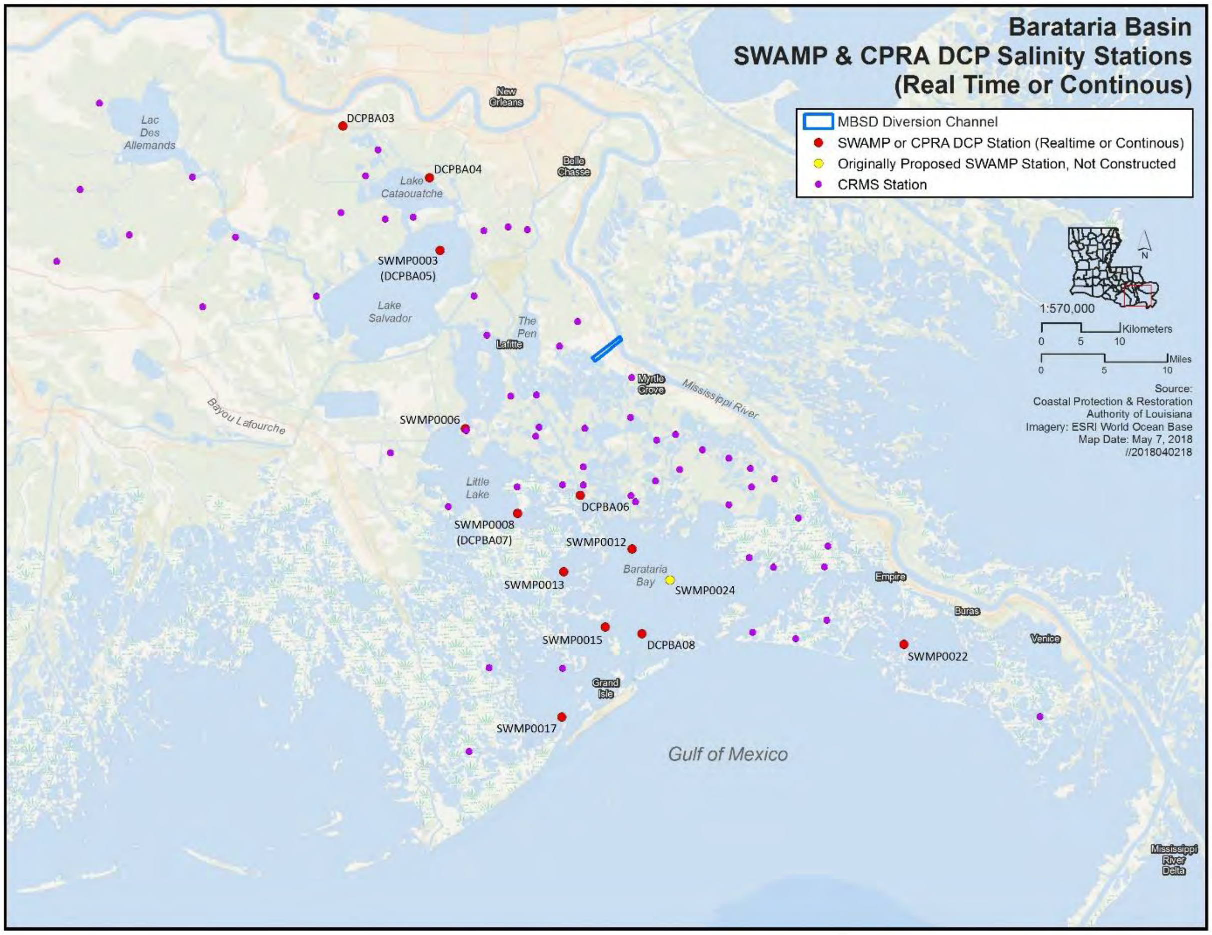


Figure 3.7-6. Existing locations for salinity sampling in Barataria Basin.

- Remote sensing products will cover the entire Project Area of Analysis (white polygon in Figure 3.7-5 encompassing both Barataria and the Mississippi River Delta). Additional discrete sampling locations would occur in response to observations of increased Chlorophyll *a* not coincident with existing stations (e.g., observations via remote sensing or other relevant data such as CPRA survey flights, LDH Molluscan Shellfish Program, NOAA Phytoplankton Monitoring Network).

- Methodology: Multiple methods are used because algal blooms can initiate and intensify over the course of days or weeks, may occur in areas that are not routinely monitored by fixed instrumentation and regularly-schedule discrete sampling, and because different technologies have different strengths and shortcomings (e.g., biofouling of continuous monitors if not serviced biweekly, while turbidity reduces remote sensing accuracy). Concentration of Chorophyll *a* in discrete water samples is measured in the lab with fluorescence techniques (*sensu* USEPA Method 445) to estimate the biomass of phytoplankton (Hijuelos and Hemmerling 2016).

  Remote sensing products will be consistent with the Cyanobacteria Index calculated by the Harmful Algal Bloom Forecasting Branch of the National Centers for Coastal Ocean Science (Wynne et al. 2018). Those products employ algorithms to detect high biomass blooms in the surface water layer and to separate bloom types by measuring proxies that estimate Chlorophyll *a*, the main component of the blooms, or to look at the optical characteristics of the bloom and surrounding waters in which they occur (NCCOS 2017). Analysis of the remote sensing products over several days will document the size, location, development, and movement of the bloom, initiate additional boat-based response sampling that would be necessary to identify species and sample for potential analysis of toxins, and can also fill data gaps when routine *in situ* monitoring plans are interrupted (e.g., gauge damage from hurricanes, COVID-19 disruption of field work).

- Parties Responsible for Data Collection:
    - Hourly *in situ* sampling: USGS;
    - Monthly discrete sampling: CPRA contractor;
    - Remote sensing data products: NOAA.

3.7.3.10. *Phytoplankton Species Composition (including Harmful Cyanobacterial/Algal Bloom Species)*

- Rationale: Phytoplankton blooms are controlled by several factors, such as nutrient type and loading rate, light availability, water residence time, temperature, and grazing by zooplankton and benthic filter feeders (Boyer et al., 2009). Determination of the cyanobacterial and/or eukaryotic algal species present can provide an indication of the ecological effects of a bloom, whether known harmful cyanobacterial and/or algal bloom (HCAB) species (e.g., *Microcystis* spp.) are present, and whether follow-up sampling for associated toxins is warranted. Because toxins can reach levels of concern before or after Chlorophyll *a* counts are high (e.g. for *Pseudo-nitzschia* and *Dinophysis)*, and because bloom toxicity is difficult to predict, species composition monitoring is independent of Chlorophyll *a* thresholds.

- Schedule: Planned monthly for both pre-operations and post-construction monitoring, with additional sampling in response to observations of elevated *Chlorophyll a in Barataria Surface Waters*, increases in the ratio of Chlorophyll to Phycocyanin (a pigment-protein complex that is specific to cyanobacteria, described in section 3.7.3.11), estimated from remote sensing (3.7.3.9), or observed in other relevant data (e.g., CPRA survey flights, LDH Molluscan Shellfish Program, NOAA Phytoplankton Monitoring Network, and other Chlorophyll *a* and HCAB monitoring programs).

- Locations: Samples will be collected at all *Chlorophyll a in Barataria Surface Waters* (3.7.3.9) sampling stations. Additional discrete sampling locations would be dependent on observations of elevated *Chlorophyll a in Barataria Surface Waters* (3.7.3.9), increases in the Phycocyanin:Chlorophyll ratio, or other relevant data as discussed under “Schedule” above.

- Methodology: Collected water samples will be analyzed for the Phycocyanin:Chlorophyll ratio (e.g., using CyanoFluor or another method; final determinations on methodology will be made if, and if so when, the USACE issues the Project permit to CPRA) to estimate the abundance of cyanobacteria in a mixed algal population. A spike in the ratio compared to preceding months would indicate a likely cyanobacteria bloom. Additionally, water samples will be examined in the lab for the presence of toxigenic HCAB species using microscopy or automated detection methods (e.g., Flowcam or Imaging FlowCytoBot), and cell counts of toxigenic HCAB species will be performed.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.11. *Harmful Cyanobacterial/Algal Bloom Toxins in Barataria Surface Waters*

- Rationale: Cyanobacterial and eukaryotic algal species capable of producing toxins that pose a risk to aquatic and human resources in the Barataria Basin include the toxic diatom *Pseudo-nitzschia* spp., raphidophytes, several species of toxic dinoflagellates (including *Akashiwo sanguinea*, *Alexandrium monilatum*, *Dinophysis* spp., *Gymnodinium* spp., *Heterocapsa*, *Lingulodinium polyedrum*, and *Prorocentrum* sppand *Dinophysis* spp.), the brown-tide alga *Aureoumbra*, and toxic cyanobacteria (*Anabaena* spp., *Anabaenopsis* cf. *elenkenii, Cylindrospermopsis raciborskii*, *Dolichospermum*, *Microcystis* spp., and *Raphidiopsis curvata*), and, if transported from the eastern Gulf, *Karenia brevis* (red tide). Toxicity varies depending on species, strains, and environmental conditions, so chlorophyll cannot be used to predict toxicity, though higher chlorophyll levels do indicate an increased likelihood that HCABs will occur.
- Several of these species are often observed in bloom abundances and may produce toxins that are known to accumulate in fish and shellfish which may serve as vectors of exposure to higher trophic wildlife (e.g., bottlenose dolphins) and people. Some toxins are transferred via the food chain, while others may affect wildlife through dermal (cyanobacteria) or aerosol (brevetoxins) contact. *Pseudo-nitzschia*, present during most of the year, occurs in high abundances inshore and offshore of Louisiana, and sometimes in estuaries over oyster reefs, and is likely to bloom in response to enhanced nutrient inputs. It produces domoic acid that is sometimes detected in filter feeders such as oysters and menhaden and in higher tropic species such as marine mammals. Cyanobacteria, commonly found within the fresh and brackish waters of many estuaries in Louisiana, are associated with hepatotoxin and/or neurotoxin production and likely to increase in low salinity environments and with enhanced nutrient inputs. Less frequently, blooms of raphidophytes occur and can produce brevetoxins.

- Schedule: Planned monthly for both pre-operations and post-construction monitoring, with additional sampling in response to observations of presence of cyanobacterial and/or eukaryotic algal species associated with harmful algal blooms, as determined in *Phytoplankton species composition in Barataria Surface Waters* (3.7.3.10).

- Locations: See discussion for *Phytoplankton species composition in Barataria Surface Waters* (3.7.3.10).

- Methodology: To identify particulate toxins in water, water samples will be collected whenever *Phytoplankton species composition in Barataria Surface Waters* (3.7.3.10) samples are collected for monthly sampling and additional discrete sampling. Samples will be filtered through an appropriate filter and frozen at -80°C. Toxin analysis will be done through both quick tests (using existing kits and filtered samples) and confirmatory methods (using laboratory analysis on some of the samples). During and after suspected bloom events, additional water sampling for dissolved and extracellular toxin may need to be conducted because filter analysis does not allow particulate intracellular and dissolved extracellular toxin determination.

- Cyanobacteria: If known harmful cyanobacteria species are observed during analysis of *Phytoplankton species composition in Barataria Surface Waters* (3.7.3.10), or if a bloom is suspected to have occurred within the previous month based on other observations, then the water samples will be tested for both particulate and dissolved forms of microcystin, the most common cyanobacteria toxin. If microcystin is not detected, then the water samples will be tested for other cyanobacteria toxins (e.g., anatoxin, saxitoxin).
- Harmful algae: For collected water samples with high *Pseudo-nitzschia* cell counts, or if a bloom is suspected to have occurred, then the water samples will be tested for domoic acid. If other harmful algal species are observed, then the water samples will be tested for other relevant toxins.

Additionally, to link toxins to potential food web impacts, whole filter feeding fish that are prey for bottlenose dolphins (e.g., anchovy, herring, menhaden, spot, mullet) will be collected based on phytoplankton cell counts and bloom locations. Toxins (domoic acid, brevetoxins, okadaic acid and related toxins) in fish tissue will be analyzed in the lab, and extracts will be frozen, using established methods.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.12. Nutrient constituents in Barataria Surface Waters

- Rationale: Nutrients stimulate the growth of aquatic primary producers. The primary limiting nutrients often include nitrogen, phosphorus, and silicate. The types of nutrients and ratios in Basin surface waters are subject to changes in MR concentrations (Turner & Rabalais, 1991) and operations of existing and proposed siphons and diversion structures.

- Schedule: Planned monthly for both pre-operations and post-construction monitoring.

- Locations: Same 23 SWAMP stations described for *Dissolved oxygen in Barataria Surface Waters* (3.7.3.7).

- Methodology: Concentration of selected elements or molecules dissolved in water (reference SWAMP). Measured as mass of nutrient per liter of sample. CPRA's current contract with ENCOS provides for monitoring TN, total Kjeldahl N, nitrate + nitrite, ammonium, TP, orthophosphate, and silica as SiO_2.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.13. Temperature of Barataria Surface Waters

- Rationale: Estuarine temperature affects the distribution, growth, and productivity of nekton communities (Minello et al., 2003; Zimmerman et al., 2000), vegetation community composition (Pennings et al., 2005), and ultimately the functions and services that wetlands provide (Odum, 1988).

- Schedule: Continuous monitoring planned for both pre-operations and post-construction monitoring.

- Locations: Same 153 stations described for *Salinity in Barataria Surface Waters* (3.7.3.8).

- Methodology: Temperature will be measured with thermometers or thermocouples and will be reported in degrees Centigrade.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.14. Turbidity of Barataria Surface Waters

- Rationale: The turbidity of Barataria Basin surface waters influences both primary producers (e.g., phytoplankton and SAV) and consumers (e.g., filter feeders and visual predators) in the estuary. Numerical modeling of Project alternatives supports an expectation of short-term increases in turbidity in Basin surface waters during Project operations.

- Schedule: Planned monthly for both pre-operations and post-construction monitoring.

- Locations: Same 23 SWAMP stations described for *Dissolved oxygen in Barataria Surface Waters* (3.7.3.7).

- Methodology: Optical (or other) measure of water clarity, which can be influenced by particles or dissolved colored materials and may be reported in various turbidity units (reference SWAMP). Measured as Nephelometric Turbidity Units.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.15. Total suspended solids in Barataria Surface Waters

- Rationale: The transport of substantial amounts of suspended sediments in diverted Mississippi River water into the Basin will result in likely increases to localized suspended sediment concentrations in Barataria surface waters, especially during Project operational flows.

- Schedule: Planned monthly for both pre-operations and post-construction monitoring.

- Locations: Same 23 SWAMP stations described for *Dissolved oxygen in Barataria Surface Waters* (3.7.3.7).

- Methodology: Concentration of particles larger than 2 µm in the water column, comprising organic or inorganic matter, which are filtered from a complete water sample and then dried and weighed.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.16. Lower Trophic Level Organisms

- Rationale: Lower trophic level organisms (e.g., amphipods) are a foundational component of the Barataria Basin food web, and provide a critical link between wetland restoration and ecological service flows to injured fish and water column invertebrates. The Project may influence environmental conditions (salinity, sediment composition) that are known to regulate local distribution of lower trophic level assemblages in estuarine systems. Additionally, this data set was identified as needed for improvement of the CASM ecosystem model described in Section 1.5.1 by an independent, external advisory panel.

  There may be an opportunity to leverage other efforts to develop this dataset. In 2020, the LA TIG allocated funding, separate from this Project, to develop a plan to assess Lower Trophic Level organisms in the Barataria Basin (https://www.fws.gov/doiddata/dwh-ar-documents/1207/DWH-ARZ009103.pdf) and may consider a second phase to collect field data. In that case, the Project Management Team would coordinate with the separate LA TIG effort to develop an implementation plan that would also address the needs for this Project.

- Schedule: Once pre-construction to create a baseline inventory, and every ten years after operations begin, or in coordination with parallel sampling if funded, as described above.

- Locations: Sampling protocols will be designed to capture the spatial and temporal variation within the Barataria Basin and will be compatible and coordinated with the separate LA TIG planning effort described above.

- Methodology: Sampling protocols will be designed to capture the spatial and temporal variation within selected locations in the Barataria Basin and to address key management questions and data needed to refine ecosystem models of the Barataria Basin food web for application in the adaptive management framework. This will include benthic infauna and epifauna. Methodology will be compatible and coordinated with the separate LA TIG planning effort described above.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.17. Aquatic Invasive (Algae and Invertebrate) Species

- Rationale: The transport of substantial amounts of diverted Mississippi River water into Barataria Basin may result in the introduction of new invasive species, or increased numbers and/or spatial extent, of aquatic invasive species.

- Schedule: Planned for both once pre-operations and once every five years after operations begin.

- Locations: Will be identified following the onset of Project operations.

- Methodology: A rapid assessment survey will identify the presence of invasive algae and invertebrates (e.g., zebra mussel). A team of trained field samplers (scientists or trained volunteers) will visit in-water structures (e.g., marinas) and other selected habitats within Barataria Basin to observe, identify, and record estuarine algal and invertebrate organism presence, abundance, and location. Samples will be collected for identification in a laboratory.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.18. Nekton (Fish and Shellfish) Species Abundance and Composition/Assemblage

- Rationale: Documenting the distribution and abundance of important fish and invertebrate species, within the project area allows for examination in trends of time (such as Catch per Unit Effort) or in space and allows for the detection of new or increased presence and range shifts or expansions, of aquatic invasive fishes and invertebrates.

  The objective of nekton community sampling is to document the population status of commercially- and recreationally-important fish and invertebrate species, as well as representative guilds. Sampling is designed to: (1) evaluate patterns of distribution, (2) evaluate changes in abundance and composition, and (3) evaluate habitat association patterns.

  To meet the monitoring objective for nekton community composition, sampling must be effective at detecting changes in abundance of resident and transient species to fully capture the diversity of species and their life stages. LDWF uses several fisheries-independent gear types across the freshwater to marine gradient (Table 3.7-3), including: entanglement nets, trawls, seine, and electrofishing. Collection of finfish and shellfish (shrimp, crab) using standardized gear can be used as an indicator of relative abundance and can be used to develop diversity indices and to quantify resource availability within estuarine habitats. Standardized gear also targets specific size classes, which provides an opportunity to examine ecological differences among life stages of a given species (Livingston, 1988). CPRA may additionally perform analyses to evaluate food web changes (e.g., stable isotope analysis on nekton gut contents).

  Table 3.7-3. Example fish and shellfish and the gear type that is generally used to assess abundance and other population characteristics.

Scientific Name	Common Name	Gear Type
Anchoa mitchilli	Bay anchovy	Trawls
Brevoortia patronus	Gulf menhaden	Trawl/Gillnet
Callinectes sapidus	Blue crab	Trawl/Seine
Cynoscion nebulosus	Spotted seatrout	Gillnet/Trammel Net
Farfantepenaeus aztecus	Brown shrimp	Trawl/Seine
Leiostomus xanthurus	Spot	Trawl/Seine
Litopenaeus setiferus	White shrimp	Trawl/Seine
Micropogonias undulates	Atlantic croaker	Trawl/Seine
Micropterus salmoides	Largemouth bass	Gillnet/Electrofishing
Paralichthys lethostigma	Southern flounder	Trawls
Scomberomorus maculatus	Atlantic Spanish mackerel	Gillnet/Trammel Net

- Schedule: Planned for both pre-operations and post-construction monitoring. See Table 3.7-4 for discussion of sampling frequencies for fisheries-independent data collection.

Table 3.7-4. Sampling details for selected fisheries-independent nekton community variables.

Gear Type	Sampling Frequency	Number of Sites
Trawl (6-ft)	Weekly: April – early May Semi-monthly: June-July	92
Trawl (16-ft)	Semi-monthly: April-July, December Monthly: August-November, January-March	92-102
Trawl (20-ft)	Semi-monthly: April, December Monthly: January, March, May, November	39
Seine	Monthly	102
Electrofishing	Monthly	12
Gill Net	Semi-monthly: April-September Monthly: October-March	52
Trammel Net	Monthly: October-March	45

- Locations: See Figures 3.7-7 and 3.7-8.

- Methodology: Individuals species sampling methods are as per LDWF 2018. Data collection for fisheries-dependent data collection is generally accomplished with creel surveys (weekly) and trip-ticket and oyster boarding (both variable in terms of frequency and number of data collection points.

- Parties Responsible for Data Collection: LDWF.

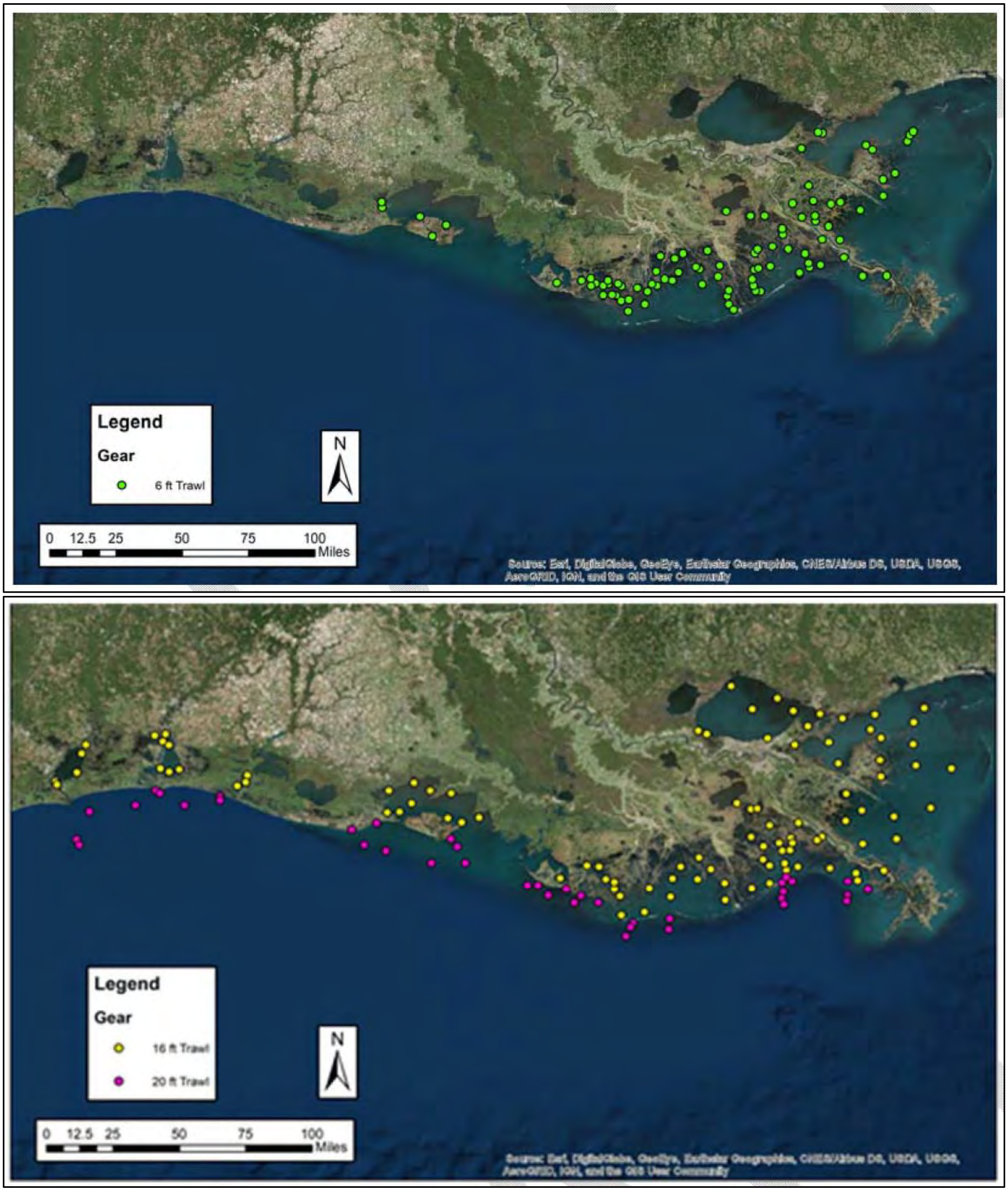
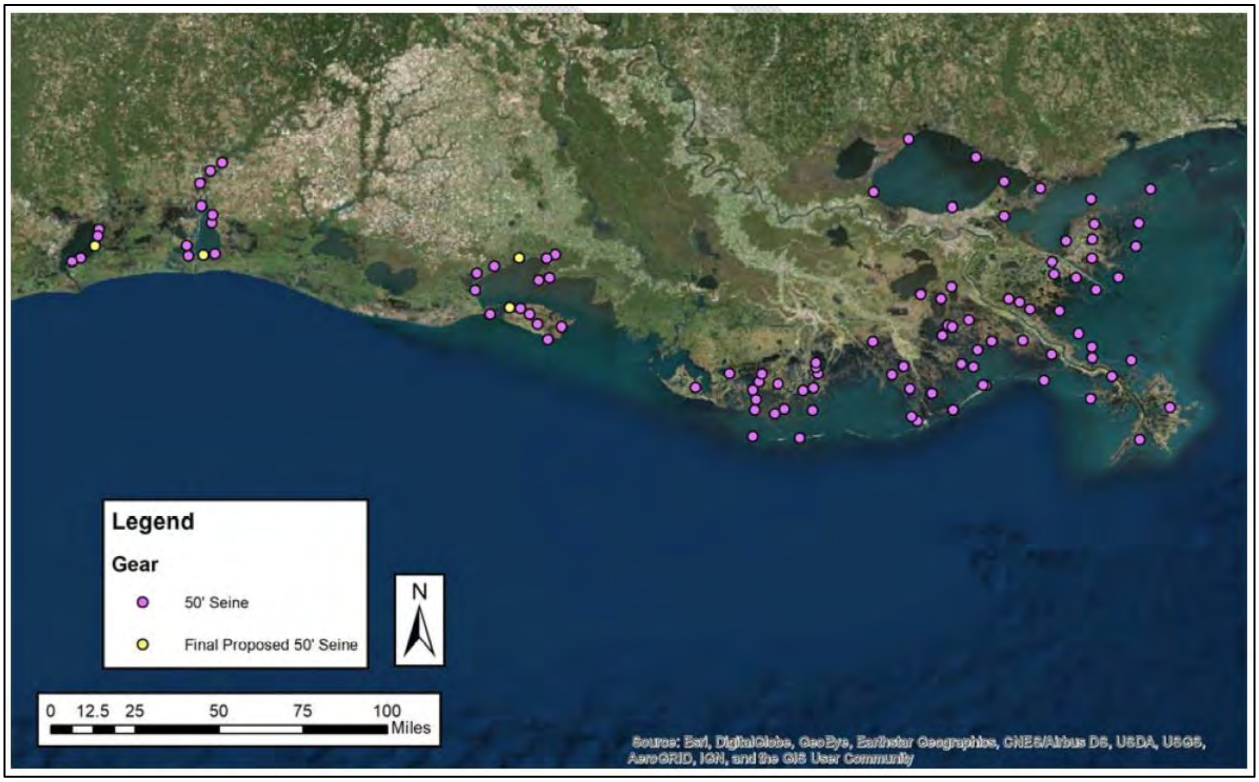


Figure 3.7-7. Existing LDWF trawl locations for along the Louisiana coast. Shown are locations of 6-ft (top) and 16-ft and 20-ft trawls (bottom). Figures from CPRA & LDWF 2019.



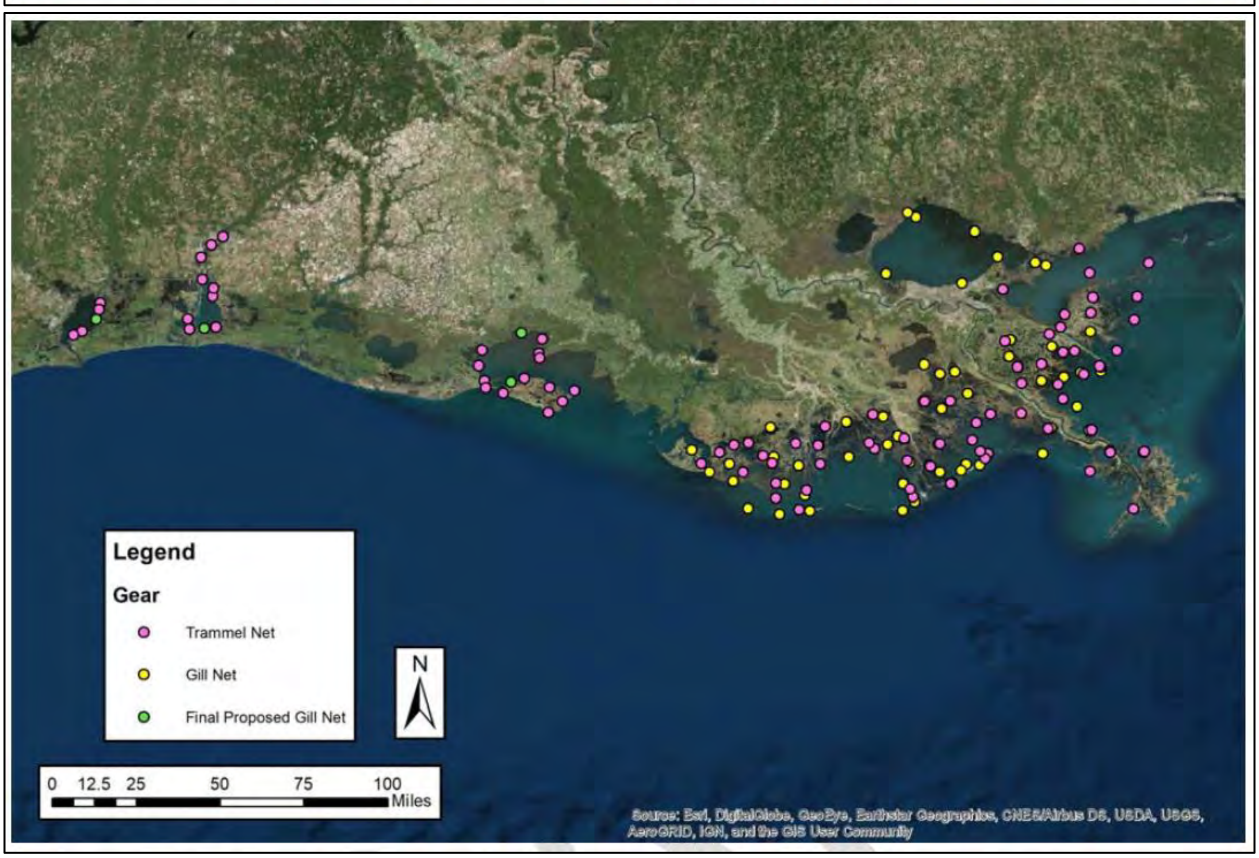


Figure 3.7-8. Existing LDWF seine (top) and trammel and gill net (bottom) sampling locations along the Louisiana coast. Figures from CPRA & LDWF 2019.

3.7.3.19. *Atlantic Bottlenose Dolphins (Tursiops truncatus)*

Rationale: Document changes to the abundance, distribution, population demography, density, survival, health and reproduction of the Barataria Bay Estuarine System (BBES) stock of bottlenose dolphins, their prey, and their habitat that may result from the operation of the Project and resulting low salinity. In addition, to the extent practicable and consistent with the purposes of the Project, minimize impacts on marine mammal species and stocks, and monitor and evaluate the impacts of the project on such species and stocks.

DWH Trustees have invested heavily in understanding the effects of DWH on the BBES stock of bottlenose dolphins. The BBES stock of dolphins was heavily impacted by the DWH oil spill (see the PDARP), and the DWH NRDA Trustees used a combination of stranding response and investigations, capture mark recapture, photo-ID surveys, remote biopsies, and capture release health assessments from April 2010 through 2015 to investigate the injury to the population. Additional studies on BBES dolphins were conducted using capture release health assessments, Capture-Mark-Recapture surveys, stranding response and investigations, and photo-ID surveys from 2016- 2019 to determine the long-term effects of the spill on this population. Dolphins are resident in Barataria Basin, and dolphins exposed to DWH oil during the spill continue to have underlying long-term health impacts from the spill.

In addition, this plan is being implemented in conjunction with planned mitigation and stewardship measures (see the Project Mitigation Plan) to address CPRA's responsibility under the Bipartisan Budget Act of 2018 (Public Law 115-123; hereafter the Budget Act). Section 20201 of the Budget Act indicates that

> *"(b) Upon the issuance of a [Marine Mammal Protection Act] waiver … the State of Louisiana shall, in consultation with the Secretary of Commerce [as delegated to NMFS]: (1) To the extent practicable and consistent with the purposes of the projects, minimize impacts on marine mammal species and population stocks, and (2) Monitor and evaluate the impacts of the projects on such species and population stocks."*

Adaptive management strategies to monitor, respond to, intervene, and minimize impacts on BBES dolphins from Project operations include a framework for data collection on dolphins and their environment, coordination between CPRA and the Dolphin Resource Team (DRT; composed of the group of individuals actively working on marine mammal data collection and stranding response in the Barataria Basin) before and during operations, an ongoing evaluation of the ability of diversion operations to be modified (to meet the purposes of the Project and reduce impacts to marine mammals), and the execution of those modifications. In addition to the contributions of data and information described here, the Dolphin Intervention Plan contains information about potential intervention activities to increase survival; reduce illness, pain, and suffering; and further contribute to the collection of scientific information that may inform mitigation activities and adaptive management of the monitoring and response activities.

- Schedule: Planned for pre-operations and post-construction monitoring. The schedule for sampling frequency for the various methods may be different in pre-operations and post-construction phases. To collect the data necessary to monitor and evaluate the impacts of the Project on dolphins and guide consideration of adaptive management actions, a variety of methods may be used. Efforts pre-operations and monitoring during the first year(s) of operation will guide consideration of operational adaptive management decisions. Results from the first five years of monitoring during operational years will guide scheduling or the need for continuation of monitoring for future years.

- Pre-operations: During the five years prior to operations, several methods will be used to identify baseline information on the abundance, distribution, density, health, stranding rates/types/causes, survival and fecundity of the resident population prior to operations to be able to identify changes once the Project is operational. The data will also help update the Intervention Plan. Given the length of time between past data collection efforts and Project operations, this additional sampling is necessary. In addition, a single effort in any given year may not be sufficient given inter- and intra-annual variability, seasonal habitat and potential changes in dolphin spatial distribution within Barataria Basin. The plan below presents a reasonable sampling design to capture both inter- and intra-annual variability.
    - Enhanced stranding response and investigations (stranding rates, causes of illness and death, standardized effort) as part of this MAM plan would be ongoing beginning five years prior to operations.
    - Active surveillance surveys (stranding rates, causes of illness and death, standardized effort) will include a pilot study in the first two years. If those drone- or boat-based surveys increase/improve detection of carcasses, then consistent and standardized surveys will be conducted from years 3-5 prior to operations to establish baseline stranding rates.
    - Capture-Mark-Recapture (CMR) surveys (abundance, distribution, density) will be conducted basin-wide, including at least one survey during the pre-operations period (e.g., 4 years prior to operations).
    - Visual assessment surveys (skin health, body condition, and reproductive follow-up).
    - Capture Release Health Assessment (CRHA) sessions will be conducted to include animals captured in locations across the basin. Health data analyses will include a variety of samples and procedures.
    - Tagging (movement and possibly salinity) from several areas across the bay.
    - Biopsies (for omics, hormones, fecundity, nutrition, contaminants, and disease) and associated analyses in different geographic areas during years without a CRHA.
    - New technologies as they become available may be used to assist in assessing dolphin habitat use. For instance, the collection of environmental DNA (eDNA) data through boat-based water collections or from archival or continuous eDNA sensors might be paired with the continuous salinity sensor platforms. The remote dolphin targeted eDNA might provide dolphin presence or absence during periods in which boat access is not possible.
    - Baseline dolphin habitat water quality monitoring will be fulfilled through other ongoing or planned resource monitoring (e.g., 3.7.3.7 - 3.7.3.15).
    - Prey data (quantity, quality, species) will be collected and analyzed seasonally by the State's FIMP (Section 3.7.3.18), and from stranding samples. These data will be shared with the Dolphin Resource Team. Whole fish samples representative of dolphin prey (no less than 10 per prey type) will be collected, preserved and analyzed by calorimetry and other parameters for evaluation of the nutritional content of current pre-operations prey.
    - Analysis of dolphin samples for evidence of contaminants, HABs, or other

potential stressors will be closely coordinated in terms of time and scope with the results from similar analyses in other resources, such as dolphin prey or habitat quality monitoring (e.g., 3.7.3.24).

    - The DRT will act as a technical focus group and will meet as needed (at least annually) to review monitoring data and adaptive management strategies, with one ongoing task of providing recommendations for potential adaptive management actions for minimizing impacts on dolphins. Pre-operations activities will include collating and assessing literature and data that can provide context for future decision making, including potential operational adaptive management actions in response to disasters (e.g., oil spills, hurricanes, etc.). The group will also assess Project-related pre-operations monitoring activities to evaluate potential dolphin-based or habitat-based indicators for informing specific adaptive management actions that are intended to be practicable and consistent with the purposes of the Project. Observations triggering potential adaptive management considerations may include response/intervention capacity, as well as morbidity and mortality of dolphins. The DRT will also evaluate the potential benefits and risks to dolphins for various operational adaptive management strategies to inform potential recommendations. In addition to activities/modifications related to managing daily, weekly, and/or monthly marine mammal response and data collection in real time, the DRT will provide the Adaptive Management Team with information to assist with their annual evaluations related to operational adaptive management actions.

- Post-Construction: Up to 10 years of post-construction monitoring will begin with the onset of Project operations to support understanding of the short and long-term impacts of the project on BBES dolphins. The DRT will review dolphin and environmental data as they become available and provide recommendations to the AMT on mitigation (including, but not limited to operation strategies, adaptive management of monitoring activities, and implementation of intervention strategies (based on the most recent version of the Intervention Plan), when warranted. The DRT will review datasets as needed. Annual review of the data collected, and results will inform planning for the following year's data collection efforts.
    - Enhanced stranding response and investigations (stranding rates, causes of illness and death, standardized effort, rapid response for live animals) as part of this MAM plan will be ongoing in the BBES and adjacent coastal areas.
    - Active surveillance (stranding rates, causes of illness and death, standardized effort, rapid response for live animals) as part of this MAM plan will be ongoing in the BBES and adjacent coastal areas (pending pilot study for effectiveness and feasibility).
    - CMR surveys bay-wide (abundance, distribution, density) will be conducted basin-wide periodically, including a survey at one year post-construction. It is anticipated that CMR surveys will be conducted during the early years of operations as this is the period of greatest expected change in survival rates.
    - Visual assessment surveys (skin health, body condition, reproductive follow-up) will be done via unmanned aircraft system (UAS; i.e., drone) and/or vessel-based assessments.
    - CRHA (health status) will be done periodically across geographic areas.
    - Biopsies (omics, hormones, fecundity, nutrition, contaminants, and disease) will be done during years without a CRHA.

        - Tagging (movement and salinity) will include approximately 140 animals total over 10 years.
        - Prey species abundance and assemblage (3.7.3.18), contaminants in fish, shellfish, and wildlife (3.7.3.23), and water quality data (i.e., salinity, dissolved oxygen, Chlorophyll *a*, phytoplankton, and biotoxins (3.7.3.7-11) provided from the monitoring programs described above will inform adaptive management guidance for the dolphin monitoring and intervention activities.
        - Prey collected as part of nekton monitoring (3.7.3.18) will be analyzed twice in years 1-5, and every 3-5 years thereafter, for nutritional quality through methods such as whole fish calorimetry.
        - Analysis of dolphin samples for evidence of contaminants, HABs, or other potential stressors will be closely coordinated in terms of time and scope with the results from similar analyses in other resources, such as dolphin prey (3.7.3.18) or habitat quality monitoring (3.7.3.23).
        - The DRT will meet as needed (at least annually) to review monitoring data, operational conditions, triggers, and adaptive management strategies, to continue providing recommendations for potential adaptive management actions designed to minimize project impacts on dolphins. Rapid access to monitoring data (e.g., habitat and water quality parameters) for a core team of the DRT, Louisiana stranding network and others, as needed, will be critical to their ability to assess conditions for dolphins and provide timely recommendations for adjustments to the adaptive management program that minimize dolphin impacts (see Section 5).

- Locations: Basin-wide environmental data collected through the current and additional real-time salinity stations and other efforts (e.g., dolphin prey base collected through the FIMP program, contaminants, HCABs, salinity/temperature) will inform stranding investigation and monitoring efforts.
    - Pre-Operations: Basin-wide studies will occur as described above ensuring that the full areas of dolphin habitat within Barataria Basin are represented.
    - Post-Construction: The basin-wide abundance, distribution and density surveys identified above will continue post-operations. Initial health assessments will be focused basin-wide, with out-year locations being dependent upon potential changes in habitat and dolphin distribution. Year-round marine mammal and environmental monitoring and stranding response basin-wide.

- Methodology: The methodologies proposed here allow for data collection efforts supported through the Project. Data consistency and scientific integrity of the data will be important. Several categories of data must be collected to monitor and evaluate the effects of the Project on dolphins using various data collection methods (Table 3.7-5). Efforts carried out separately from the Project can be leveraged, but surveys specific to this plan must be able to be integrated with past, present and future data collection, including with the DWH NRDA long-term data set.
    - Enhancing the Marine Mammal Stranding Network (MMSN): At least five years prior to operations, the DRT core team will provide for an enhanced MMSN to establish baseline stranding information pre-operations. Support for stranding response personnel, outreach and education to the community to increase reporting, active surveillance for strandings (see next bullet), and diagnostic analyses to determine causes of illness and death will be necessary. For instance, if strandings increase above the pre-operation

level (for example, mean plus 2 standard deviations) or there is an increase in the proportion of cases with cause of illness/death determined to be low salinity exposure, then an increase in effort, analyses, and response will be initiated.

Table 3.7-5. Bottlenose dolphin monitoring parameters and associated methods. Note that each parameter relies on a suite of methods, and that each method contributes to the measurement of a suite of parameters, but that no one method can measure all parameters required for project evaluation and adaptive management.

Parameters	Methods						
	CMR Survey Photo-ID	Visual Surveys (UAS, Photo-ID vessel)	Captures	Tagging (with salinity sensors)	Biopsy	Stranding Response	Prey and Water Quality
Abundance, distribution, density	X			X			
Survival	X	X	X	X		Mortality Trends	
Reproductive status/success		X	X		X	X	
Body/skin condition/nutritional status	X	X	X		X	X	
Overall in-depth health assessment or cause of death/injuries or lesions			X (in-depth health and tagging)			X (cause of death/ lesions only)	
Prey or trophic level			X		X	X (stomach content)	X
Habitat (salinity, contaminant/HAB)	X	X	X	X	X		X

- Active surveillance: Dedicated survey effort to identify and recover marine mammal carcasses within defined search areas at consistent intervals will be crucial to address variation in effort and public reporting that confound development of reliable baselines and interpretation of changes in stranding rates. A pilot study 4-5 years prior to construction will include vessel- and UAS-based surveys to examine variability by region and season, as well as evaluate effectiveness and assess protocols for documenting carcasses by drone and/or photography. A standardized, consistent survey effort will then be designed based on the pilot study's findings and implemented to establish baseline stranding rates in the three years prior to operations and ongoing through the Project lifetime.
- Periodic visual health assessment in specific geographic areas: Use UAS, vessel-based, or alternative techniques to visually assess the health of dolphins as described above. The assessment will be adaptive. For instance, if mortality increases in specific regions, dolphin body condition decreases, or skin lesions become more prevalent, sampling frequency may be increased (see Table 4.1-3). This effort might be combined with stranding response active surveillance to maximize efficiency.
- CRHA with or without tagging: These assessments will be performed similar to the assessments from 2010-2018; however, diagnostics, tag types, and sample analyses may be different. Tagging would be performed depending on the timing of the assessments

and availability of satellite tags with or without salinity sensors.

  - CMR Surveys: These surveys will be conducted similar to the 2019 CMR survey and may incorporate UAS and additional simultaneous photography for visual health assessments. If mortality or morbidity increases in specific areas, targeted CMR surveys may be implemented or increased in frequency.
  - Remote biopsy studies: Remote biopsy may be undertaken particularly in years in which CMR or CRHA studies are not being completed and there is a need to have additional information on some health parameters, nutritional parameters, and hormone status, particularly reproductive hormones in the population. In addition, biopsy frequency or implementation may occur in response to increased morbidity or mortality. These studies provide information on pregnancy, other steroid hormone status that may inform nutritional status, and other parameters such as stable isotopes or contaminants.
  - If fisheries surveys indicate that the prey base has shifted, and dolphin body condition decreases, a bioenergetics study would occur.
  - Additionally, a monitoring lab and office will be established within an existing facility or via mobile facilities, with associated equipment (e.g., vessels, trailers, truck, freezer). The DRT will regularly evaluate: 1) the operational modifications that are appropriate for considering adaptive management and/or adjustments to monitoring plans and addressing data gaps, 2) monitoring data relevant to those operational modifications/data gaps, and 3) appropriate potential adaptive management actions for minimizing impacts on dolphins. Operational modifications could be based on dolphin stranding rates; prevalence of adverse health effects; dolphin movements; qualified personnel and resources available for response/intervention (e.g., stranding network capacity); impacts from disasters; and/or habitat/water quality. The DRT will be tasked with integrating various data sources and appropriate additional analyses to best consider recommendations to the Project AMT. The specific process by which the DRT will transmit their recommendations to the State, and the State responds to those recommendations, will be identified on further discussion.

- Parties Responsible for Data Collection

  CPRA and NOAA will ensure that the Marine Mammal Monitoring and Adaptive Management addresses their respective obligations under the Bipartisan Budget Act of 2018; and NOAA will ensure that the Marine Mammal Monitoring and Adaptive Management addresses their obligations under the MMPA.

  DRT activities related to mitigation, monitoring, and intervention will be led by NOAA with a dedicated liaison to the AMT. The DRT will execute the monitoring and AM strategy (which includes both live animal fieldwork and stranding response) for up to 15 years (five years pre-construction; 10 years post-construction). The group will consist of a core team of experienced dolphin staff (including NOAA and contractors) with assistance from additional experienced dolphin staff from partners, as needed. The core team and partners will accomplish the dolphin monitoring and response fieldwork, data and sample collection, data and sample analyses, data management, sample processing, necropsies, outreach/education, and information synthesis. In addition, the group will incorporate the relevant information received from other environmental and biological monitoring sources into marine mammal recommendations to the AMT. The team will also work with federal, state and local partners to increase capacity, public awareness, and education opportunities on dolphins within Barataria Bay and may provide training opportunities for partners throughout the state.

The DRT anticipates using a tailored version of the CETACEAN platform being developed in partnership with the International Ocean Observing System under the Open Ocean TIG for data intake, management, integration, and synthesis. NOAA will ensure that this system should be compatible with the data management practices outlined in Section 6.

3.7.3.20. Eastern Oysters (Crassostrea virginica)

- Rationale: Document oyster population dynamics and abundance to assess the status and trends of the resource within the project area. The distribution of oysters within an estuary is largely a function of salinity, freshwater input, depth, and substrate (Melancon et al., 1998), although sedimentation, coastal disturbances and overharvesting also control their distribution (Oyster Technical Task Force, 2012). Storm surge and wave action can also result in the destruction of oyster reefs, killing of spat and juvenile oysters, or displacement of oysters onto habitats that cannot support them (Banks et al., 2007).

- Schedule: Planned for both pre-operations and post-construction monitoring. LDWF samples at varying frequencies depending on the methodology and the time of year:
    - Dredge:
        - Monthly, except for July
        - LDWF may also sample weekly in April and May in order to adaptively manage the oyster fishery
    - 1-m^2 quadrat:
        - Coast-wide annually between late June and early July
        - In the Barataria and Pontchartrain Basins only, twice annually in May-June and September-October

- Locations: 34 existing locations shown in Figure 3.7-9.

- Methodology: The LDWF oyster-sampling plan uses square meter plots and dredge sampling to assess oyster density, abundance, and mortality. CPRA proposes to continue that monitoring at the current sampling spatial and temporal density (see Banks et al. 2016).

- Parties Responsible for Data Collection: LDWF.

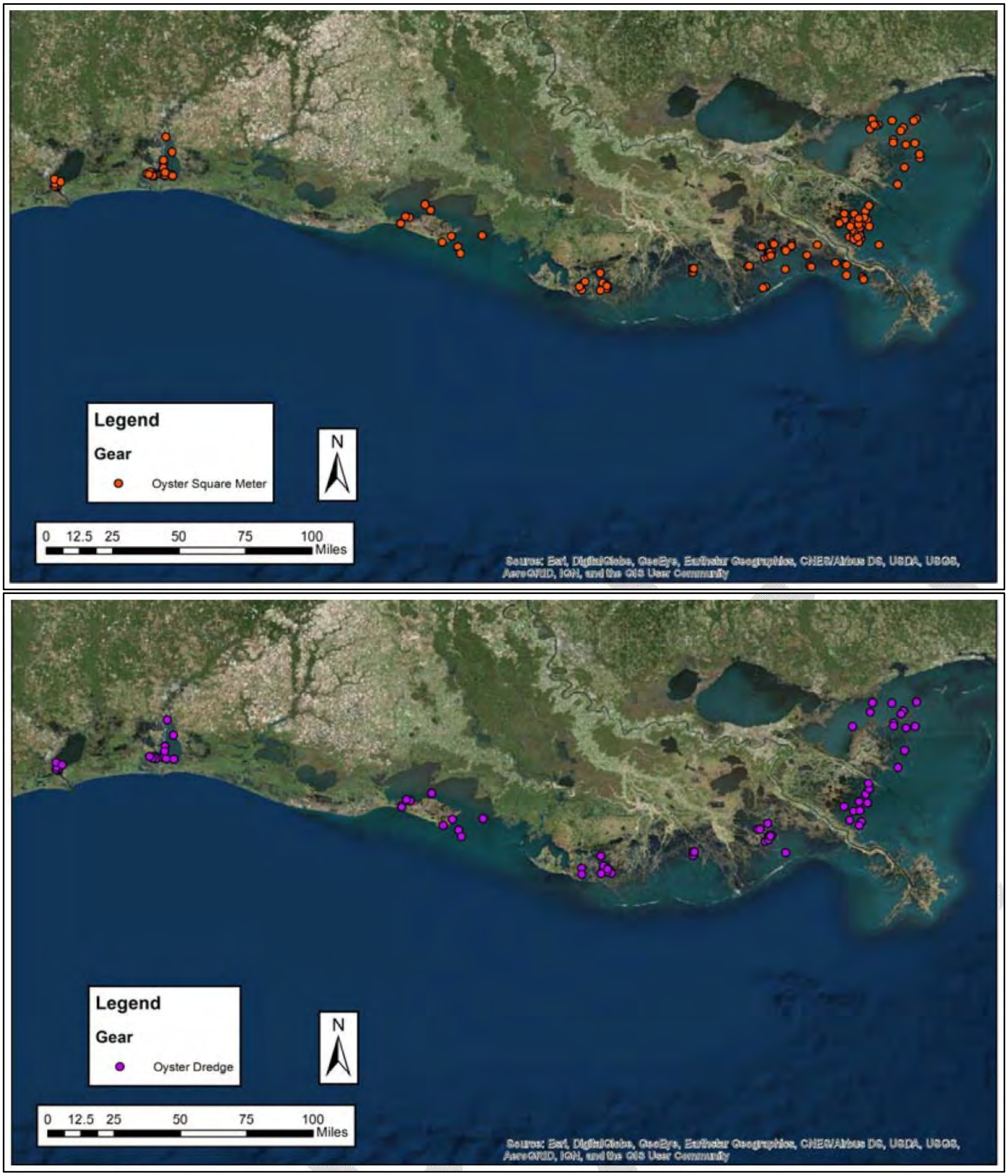


Figure 3.7-9. Existing LDWF locations for oyster density sampling along the Louisiana coast. Shown are locations for square-meter (top) and dredge sampling (bottom). Figures from CPRA & LDWF 2019.

3.7.3.21. Wildlife

- Rationale: Document changes in selected wildlife abundance within the project area. The data will support estimations of *Aquatic resource and terrestrial wildlife utilization of created/restored habitat (3.7.3.22).* The following wildlife species are priorities for Project monitoring, as there were identified in DWH Trustees (2016) as having been injured during the 2010 spill, were the subject of Project-effects estimation of habitat suitability (via the use of HSIs) or were otherwise identified as priorities for continued monitoring by Project partners.
    - *Alligator mississippiensis* (American alligator),
    - *Anas carolinensis* (green-winged teal),
    - *Anas fulvigula* (mottled duck),
    - *Mareca strepera* (gadwall), and
    - *Pelecanus occidentalis* (brown pelican.

- Schedule: Planned for both pre-operations and post-construction monitoring. Schedule varies by species; see Methodology below for details.

- Locations: Survey locations for the species listed above will be consistent with existing LDWF aerial surveys paths.

- Methodology:
    - LDWF conducts annual aerial surveys coast-wide to estimate the number of waterfowl (Figure 3.7-10). The survey consists of 27 north-south transect lines from the Gulf northward to U.S. Highway 90 that are one-quarter mile in width and vary in length from 8 to 48 miles. Survey lines are spaced at 7.5-mile intervals in the southwest and at 15 miles in the southeast resulting in 3% and 1.5% sampling rates in the two areas, respectively. A fixed-wing aircraft is used for this inventory from an altitude of 125 feet at approximately 100 mph. The number of ducks and type of waterfowl species are recorded by habitat type on each survey line. The AMT will rely on the continuation of those data-collection efforts, and will consult with LDWF staff to determine reasonable approaches to estimate those relevant population estimates for the PIA.
    - LDWF conducts nesting surveys for brown pelicans. The AMT will rely on the continuation of those data-collection efforts, and will consult with LDWF staff to determine reasonable approaches to estimate those relevant population estimates for the PIA.
    - LDWF also conducts annual aerial surveys coast-wide to estimate the number of alligator nests, for purposes of setting the annual limits for the taking of eggs in support of the alligator farming industry. The AMT will rely on the continuation of those data-collection efforts, and will consult with LDWF staff to determine reasonable approaches to estimate those relevant population estimates for the PIA.

- Parties Responsible for Data Collection: LDWF.

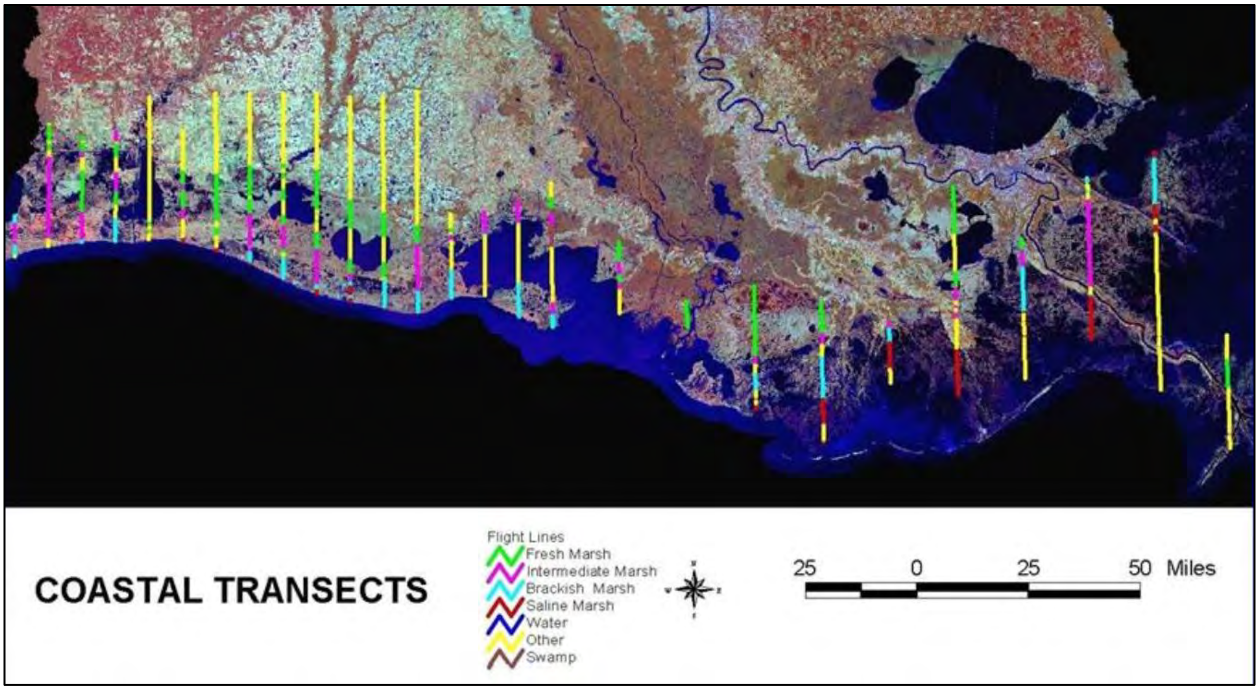


Figure 3.7-10. Locations of coastal transects flown by LDWF for waterfowl population estimations. Transects are shown in relation to marsh type from 2001 (see Linscombe and Hartley (2011). Figure courtesy of LDWF.

3.7.3.22. Aquatic resource and terrestrial wildlife utilization of created/restored habitat

- Rationale: Estimate utilization of created or restored habitat by aquatic resources and terrestrial wildlife. The DWH PDARP (DWH Trustees 2016) discussed several fish and wildlife species that served as indicators of injury to the coastal vegetated marsh ecosystem caused by the 2010 spill (though it is noted that these were not the only species for which Deepwater Horizon injuries were documented):
  - *Fundulus grandis* (Gulf killifish),
  - *Cyprinodon variegatus* (sheepshead minnow),
  - *Palaemonetes pugio (*grass shrimp)
  - *Callinectes sapidus* (blue crab)
  - *Littorina irrorata* (marsh periwinkle), and
  - *Uca longisignalis* (Gulf marsh fiddler crab).

- Schedule: Planned to occur once pre-operations and every five years post-construction.

- Locations: Will include a mix of existing marsh sites within the PIA and newly-created marshes in the PDDA, and in two additional wetland areas (a conventionally restored wetland and an unrestored wetland) as described in Section 4.1.3, for purposes of assessing the relative ecosystem function of different marsh restoration treatments.

- Methodology:
  - Entrapment gears will be used to sample nekton such as *Gulf killifish and* grass shrimp in the tidal creeks, marsh and at the marsh edge.
  - Data from *Nekton (Fish and Shellfish) Species Abundance and Composition/Assemblage* (3.7.3.18), *Eastern Oysters* (3.8.3.20), and *Wildlife* (3.7.3.21) surveys will be combined

with data collection at historically-occurring emergent wetlands within the Project Influence Area and newly-created emergent wetlands in the Project delta development area to provide an estimate of wildlife utilization.
    - *Gulf marsh fiddler crabs* will be surveyed non-destructively, through either burrow counts or visual counts of individual crabs (see discussion in Miller (no date)).
    - Marsh periwinkles will be sampled through visual counts.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.23. Contaminants in Fish, Shellfish, and Wildlife

- Rationale: Document 1) presence of Contaminants of Concern (COCs) on fish and wildlife resources within the Project Influence Area and 2) potential risks to human health and wildlife from consuming fish and shellfish from the Project Influence Area. Many of the soluble organic contaminants in the Mississippi River (e.g., hexachlorobenzene and polychlorinated biphenyls are associated with the suspended sediment fractions that contain the most organic carbon. Contaminants can bioaccumulate in organisms, and higher trophic levels exhibit higher concentrations (biomagnification).

- Schedule: One pre-operations sampling event to establish baseline concentrations of COCs in sediment, fish, and shellfish in the Project Influence Area. Initial post-operations fish and shellfish sampling schedules will be informed by baseline results of COCs found in the sediment of the Project Influence Area. For example, elevated levels of certain contaminants in baseline samples (e.g., mercury) may necessitate more frequent sampling. The periodic post-operational sampling of fish and shellfish will begin after sufficient time for potential contaminants to accumulate (2 to 5 years). The frequency, intensity, and potential expansion of subsequent periodic sampling (e.g., 2 to 5 years, or later) will be predicated upon the type and level of contaminants detected in tissue and/or sediment.

- Locations: Within the outfall area and the Mississippi River.

- Methodology:
    - CPRA, in coordination with the US Fish & Wildlife Service (USFWS), will develop
        - A list of contaminants to be analyzed, taken from the most recent EPA Priority Pollutants list (40 CFR Part 423 Appendix A) and relevant to Mississippi River water quality; and
        - A list of fish and shellfish to sample for the selected contaminants. Recommended species and analytes are detailed in USEPA (2000). A bottom-dwelling species of finfish will be included in all sampling events due to proximity with sediments.
    - Expansion of sampling to local nesting bald eagles (e.g., fecal and blood samples analyzed for the same contaminants) would also be predicated upon the type and level of contaminants detected.
    - Sediments will be sampled once pre-operations. Post-operations sampling may be added after sufficient time for potential contaminants to accumulate.
    - Analytical results will be shared with USFWS and LDWF. Based upon results and in consultation with USFWS and LDWF, the MAM plan may be modified as appropriate.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.3.24. Socio-economic Data

At this time, CPRA is proposing to rely on the Human Dimensions data collection in Barataria Basin outlined in the SWAMP implementation plan (Hijuelos and Hemmerling, 2016; https://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=11464). To summarize the proposed information outlined in Table C:1 therein, the categories (*in italics*) and variables proposed by Hijuelos and Hemmerling (2016) are listed in Table 3.7-6. The Multi-year Project Synthesis Reporting (5.2.3) will summarize these data for interested parties.

- Parties Responsible for Data Collection: Most of these parameters are collected and archived by the US Census Bureau or other federal agencies. CPRA or its contractor will obtain and summarize the federal data to be considered as part of the 5-year synthesis (Section 5.2.3).

Table 3.7-6. Socio-economic parameters and data respositories. See Hijuelos and Hemmerling (2016) Table C:1 for additional details.

Category/Parameter	Currently Collected By	Data Availability
Population and Demographics		
Number of Households	Census Bureau	https://data.census.gov/cedsci/
Total Population	Census Bureau	https://data.census.gov/cedsci/
Race and Ethnicity	Census Bureau	https://data.census.gov/cedsci/
Housing and Community Characteristics		
Residential Stability	Census Bureau	https://data.census.gov/cedsci/
Home Ownership	Census Bureau	https://data.census.gov/cedsci/
Residential Occupancy Rates	Census Bureau	https://data.census.gov/cedsci/
Property Values	Census Bureau	https://data.census.gov/cedsci/
Economy and Employment		
Economic Development	Bureau of Economic Analysis	https://apps.bea.gov/itable/index.cfm
Income Levels	Bureau of Labor Statistics	https://beta.bls.gov/dataQuery/find?removeAll=1
Poverty Rates	Census Bureau	https://www.census.gov/library/publications/2021/demo/p60-273.html#:~:text=The%20official%20poverty%20rate%20in,and%20Table%20B%2D4).
Unemployment Levels	Bureau of Labor Statistics	https://beta.bls.gov/dataQuery/find?removeAll=1

Table 3.7-6 (*continued*). Socio-economic parameters and data respositories.

Category/Parameter	Currently Collected By	Data Availability
Ecosystem Dependency		
Natural Resource Extraction (agriculture and forestry, fisheries landings, oil & gas production)	Several including US Department of Agriculture (USDA), US Department of Energy, Bureau of Land Management, Federal Emergency Management Agency (FEMA), USGS; USDA Census of Agriculture ZIP code agricultural yield data; Louisiana State University AgCenter parish agricultural totals; LDWF trip ticket zone fisheries landings data; LDNR oil and gas production data	https://www.ers.usda.gov/about-ers/partnerships/strengthening-statistics-through-the-icars/natural-resources-datasets/
Cultural and Traditional Uses of Natural Resources	Louisiana Division of Archaeology, State Division of Historical Preservation, LDWF, LDNR; additional sampling surveys needed	
Natural Resource-based Employment (agriculture, forestry, fishing and hunting, and oil & gas):	Bureau of Labor Statistics; 5-year American Community Survey block group estimates of employment in agriculture, forestry, fishing and hunting, and oil and gas extraction	https://www.bls.gov/iag/tgs/iag10.htm#workforce
Tourism, Commercial and Recreational Use of Natural Resources (e.g., number of recreational fishing and hunting licenses, number of recreational trips to the area)	Louisiana Wildlife and Fisheries; additional sampling surveys needed	https://www.wlf.louisiana.gov/page/wma-gis-data-download
Residential Properties Protection		
Residential Risk Reduction	FEMA digital flood maps	https://www.fema.gov/about/openfema/data-sets#hazard
Households Receiving Structural Protection	FEMA; USACE levee locations	https://www.fema.gov/about/openfema/data-sets#hazard
Residential Properties Receiving Nonstructural Protection	FEMA; Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) mitigated structures data	https://www.fema.gov/about/openfema/data-sets#hazard
Critical Infrastructure and Essential Services Protection		
Risk Reduction for Critical Facilities	NOAA; FEMA's Hazus Multi-Hazard tool data; GOHSEP Severe Repetitive Loss Data	https://coast.noaa.gov/digitalcoast/data/criticalfacilities.html
Miles of Levees Created and Maintained	USACE	https://levees.sec.usace.army.mil/
Number of Critical Facilities Protected by Levees	USACE	https://levees.sec.usace.army.mil/
Public and Commercial Properties Receiving Nonstructural Protection	Regional Planning Commission; GOHSEP mitigated structures data	

3.7.4. Compliance Monitoring

The purpose of compliance monitoring is to document the ability of those managing the Project to meet permitting requirements.

3.7.4.1. National Historic Preservation Act, Section 106 Monitoring Requirements

- Rationale: In compliance with Stipulation X. Monitoring Plan of the Programmatic Agreement among USACE, the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and CPRA, CPRA will monitor the effects of the diversion on archaeological sites within the Operations Impact Area of Potential Effect.

- Schedule: Planned to occur once pre-operations and annually, after the cessation of operational flows and return to base flow, for the first fifteen years after the onset of Project operations.

- Locations: Documented historical sites in the Project Influence Area.

- Methodology: CPRA will use a team of Secretary of the Interior Qualified Archaeologists to conduct an annual one-day reconnaissance of the Operations Area of Potential Effect (APE)/PIA by boat. The first reconnaissance visit will occur within three months before the first operation of the MBSD and will document current conditions prior to operation for later, post-operation comparison. This reconnaissance team will take photographs and document visible changes to the landscape within the Operations APE/PIA, including in proximity to the National Register of Historic Places (NRHP) properties (16JE2, 16JE3, 16JE11, 16JE147, and 16JE237), with the particular attention to any evidence of previously undiscovered cultural resources and the appearance of human remains at known archaeological sites. If an apparent cultural resource is/are located by the reconnaissance team, CPRA will notify all Consulting Parties within 24 hours pursuant to Stipulation VIII.B.1 of the Programmatic Agreement. If apparent Human Remains are found, the provisions of Stipulation IX of the Programmatic Agreement will be followed. CPRA will comply with the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671 et seq.). CPRA will notify local law enforcement and the Louisiana Division of Archaeology (LDOA), within the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, by telephone to assess the nature and age of the human skeletal remains within 24 hours of the discovery of unmarked human remains and will accompany local law enforcement during all field investigations.

- Parties Responsible for Data Collection
  - CPRA
  - Contracted team of Secretary of the Interior Qualified Archaeologists

3.7.4.2. Sea Turtles (Green, Kemps Ridley, Loggerhead) Fishery-related Take

- Rationale: The National Marine Fisheries Service's (NMFS) Biological Opinion Reasonable and Prudent Measure (RPM) 1 requires monitoring and reporting of LDWF collected annual brown shrimp fishing trip ticket data for area 211 to determine if shrimp fishing activity over a 3-year running average is within the range considered in the consultation.

- Schedule: Annually.

- Locations: Area 211, which covers most of the lower Barataria Basin and nearshore waters where increased sea turtle interactions resulting from relocation of shrimping activity are most likely to occur.

- Methodology: The level of fishing activity (number of brown shrimp fishing trips) that will occur in the lower basin (area 211) will be reported based on data collected by LDWF. The annual brown shrimp trip ticket data for area 211, along with the 3-year running average of brown shrimp fishing trips in area 211, will be reported to NMFS Protected Resources Division (PRD).

- Parties Responsible for Data Collection: CPRA contractor will request and synthesize the trip ticket data collected by LDWF.

3.7.4.3. Sea Turtles (Green, Kemps Ridley, Loggerhead) Habitat change-related Take

- Rationale: The Delft3D-based alternatives modeling outlined in the FEIS provided estimates of projected salinity conditions at various locations throughout the basin under FWOP and FWP scenarios. Staff from the NMFS Southeast Regional Office used those modeling outputs as a basis for drafting the Biological Opinion on the effect of the proposed Mid-Barataria Sediment Diversion Project on sea turtles in the Barataria Basin. The NMFS Biological Opinion RPM 2 requires the inclusion of a monitoring component in this Plan that establishes measurable triggers to determine if seasonal salinity conditions under actual project operations are within the expected range projected by the Delft 3D based model, to confirm that the level of take analyzed and authorized in the Biological Opinion is not exceeded.

- Schedule: CPRA and the NMFS Southeast Regional Office (SERO) will fully develop the monitoring plan prior to commencement of operations and will implement the plan prior to or immediately following commencement of operations. The monitoring plan will be integrated into this MAM Plan.

- Locations: Lower Barataria Basin.

- Methodology: The actual salinity levels occurring in the action area will be monitored as a surrogate for the level of sea turtle exclusion and harm occurring in the action area. See methods described under *3.7.3.8. Salinity in Barataria Basin Surface Waters*. CPRA and NMFS SERO and Southeast Fisheries Science Center (SEFSC) will implement a monitoring program and analytical design that establishes measurable triggers that will indicate when salinity conditions have exceeded the levels anticipated and analyzed in the Biological Opinion. An annual report of the data and analytical output from this monitoring shall be sent to NMFS.

- Parties Responsible for Data Collection:
  - Salinity at select monitoring stations: USGS and/or CPRA contractor.
  - Sea turtle location: TBD.

3.7.4.4. Sea Turtles (Green, Kemps Ridley, Loggerhead) Use and Abundance

- Rationale: There is a scarcity of information on sea turtle activity and use of the action area. The NMFS Biological Opinion RPM 3 requires the inclusion of a monitoring plan targeting sea turtle abundance, distribution, health, and habitat use within the Barataria Basin.

  Schedule: 3 years of field work pre-operations, 3 years of field work immediately post-construction, and 1 year of data analysis.

- Locations: Turtle monitoring and tagging field work will be conducted in selected areas of the lower Barataria Basin, from the area below the proposed outfall, down to and including the passes and inlets around the barrier islands and the Gulf-side shallow water habitat adjacent to the barrier islands at the southern end of Barataria Bay.

- Methodology: CPRA and NMFS SEFSC will develop and implement a monitoring plan approved by PRD, targeting sea turtle abundance, distribution, health, and habitat use within the Barataria Basin. Data collected will be used to analyze habitat use in relation to physical and biological habitat characteristics and salinity level parameters. Once finalized, the monitoring plan will be integrated into this MAM Plan.

  The field work will include trawl vessel surveys, satellite tag deployment, health assessment, and data analysis including the following:
    - Transect surveys - Direct capture of sea turtles using otter trawl and skimmer trawl vessels using standardized seasonal 30-minute transects during spring, summer, and autumn of each year to obtain a statistically appropriate sample size in the action area. Turtles will be captured using skimmer trawls in shallow areas (<10ft), focusing on salt marsh habitat where we expect to find smaller juvenile sea turtles, and larger otter trawl vessels using paired otter trawls in depths > 10 ft. Appropriate scientific research and collection permits will be required for these activities.
    - Health assessments -Turtles captured in trawl surveys will be measured, weighed, tagged with flipper and passive integrated transponder tags, tissue sampled (for genetic analysis and stable isotopes), and blood sampled (for blood chemistry analyses). Environmental data (salinity, water temperature, etc.) will be collected in conjunction with sea turtle capture efforts. Turtles will be released at or near the capture site.
    - Satellite Tagging – Up to 240 turtles (target of 40 per year, with selection based on appropriate size and condition) captured in the trawl surveys will be satellite tagged to monitor location, dive behavior, salinity, and temperature. Salinity sensor-equipped satellite tags will be used on a portion of these turtles to better understand habitat use patterns relative to salinity regimes and if shifts in salinity affect behavior.
    - Annual and seasonal estimates of relative abundance will be generated from the trawl data at the conclusion of each year’s sampling.

  The data analysis and modeling will include the following:
    - Estimate habitat use by overlaying our satellite tracking data on available benthic habitat geospatial data, as well as salinity information collected by the satellite tags. Additionally, data from any current in-water environmental monitoring stations could be used to provide additional supplemental environmental data. In addition, we plan to coordinate with other research groups, such as benthic researchers studying lower trophic level organisms to provide abundance and species composition data for key prey organisms to further understand habitat use and sea turtle distribution.

- Complete development of a predictive model for sea turtle species habitat use and distribution in relation to physical and biological habitat characteristics and salinity level parameters. The model can be used to assess the overlap of sea turtle distribution with known and emerging threats to prioritize the type and location of restoration activities and to evaluate their effectiveness.

Due to uncertainties related to sea turtle activity and use of the study area, monitoring results and efficacy, and extrinsic factors (e.g., hydrologic conditions), monitoring activities will be adaptively managed. A team consisting of up to 3 state (CPRA) and 3 federal (NMFS SEFSC, NMFS PRD, and NOAA Restoration Center) representatives (along with any technical experts invited by these entities) will meet at least once a year to review progress and results of the monitoring activities. The USACE may also participate on this team if they wish. This team may make recommendations on any necessary changes to the monitoring and tagging activities, locations, timing, or level of effort, based on current information and monitoring/tagging results to date. Any proposed changes to the sea turtle monitoring activities must be approved by NMFS PRD before implementation.

- Parties Responsible for Data Collection:
  - Salinity at select monitoring stations: USGS and/or CPRA or its contractor.
  - Sea turtle location: CPRA or NOAA contractor.

3.7.4.5. Pallid Sturgeon

Project operation poses the risk of entrainment of all life stages of pallid sturgeon present in the area near the structure. Therefore, the USFWS Biological Opinion Terms and Conditions require the inclusion of a monitoring component in this Plan to confirm that the level of incidental take analyzed and authorized in the Biological Opinion is not exceeded, a condition that might require the re-initiation of formal consultations between USFWS and CPRA. CPRA has agreed to jointly develop a monitoring plan for pallid sturgeon with USFWS if, and if so after, the USACE awards a Project permit. That plan will be completed prior to construction and will detail schedule, locations, methodology and parties responsible for data collection. The monitoring plan will be approved by USFWS and integrated into this MAM Plan before construction of the cofferdam begins.

3.7.4.6. Bald Eagle Nests and Wading Bird Colonies

CPRA has agreed to jointly develop a monitoring plan for bald eagles and wading bird colonies in the vicinity of the Project during construction with USFWS. That plan will provide in part that if a bald eagle nest is within or adjacent to the proposed project area during construction, CPRA will follow the bald and golden eagle guidelines found on-line at https://www.fws.gov/library/collections/bald-and-golden-eagle-management to determine whether disturbance will occur and/or an incidental take permit is needed. That plan will further detail schedule, locations, methodology and parties responsible for data collection. Once finalized, the monitoring plan will be integrated into this MAM Plan.

3.7.5. Variables Associated with the Mitigation and Stewardship Plan

This section describes monitoring parameters that will inform or evaluate actions associated with the separate Mitigation and Stewardship Plan. These parameters are not expected to directly inform Adaptive Management Actions undertaken as part of the MAM Plan.

3.7.5.1. Fecal Coliform

- Rationale: This dataset will inform actions described in the Aquatic/Fisheries Impact of the Mitigation and Stewardship Plan (Section 6.3.3) related to re-establishment of oyster reefs within Public Seed Grounds.

- Schedule: Pre-operations and post-operations, monthly

- Locations: Hackberry Bay Seed Reservation and Lower Barataria Basin

- Methodology: Monthly boat-based water sample collection at 165 established LDH sampling stations (Figure 3.7-11). Water samples undergo fecal coliform testing per methods established for the state laboratory (IDEXX 2000 - 5 step decimal dilution method using Most Probable Number/100mL) and results analysis (applying the geometric mean, 90% tile and percentage greater than 43).

- Parties Responsible for Data Collection:
  - Empirical data collection: LDH
  - Data synthesis: CPRA contractor.

3.7.5.2. Effectiveness of Investment in Vessel/Facility Improvements in the Finfish and Shrimp Fisheries

- Rationale: These datasets will help to evaluate the success of mitigation actions described in the Aquatic/Fisheries Impact of the Mitigation and Stewardship Plan (Section 6.3.3) related to investments in improvements to dockside facilities and vessels (such as refrigeration or gear improvements) and acquisition of new vessels for the finfish and shrimp fisheries.

- Schedule: Annually, pre-operations and post-construction, for 5 years following completion of Project investment in vessel/facility improvements.

- Locations: Within the Barataria Estuary (BA-0153 Area of Analysis in Figure 3.7-11)

- Methodology: Use LDWF LA Creel and/or Trip Ticket data for landings by weight for finfish, brown shrimp, and white shrimp from within the Barataria Estuary. Evaluate changes for fishers that received grants related to the Project’s Stewardship and Mitigation Plan.

- Parties Responsible for Data Collection:
  - Empirical data collection: LDWF
  - Data synthesis: CPRA staff or contractor.

3.7.5.3. Effectiveness of Marketing Support for the Oyster, Finfish, and Shrimp Fisheries

CPRA will develop a protocol to monitor and evaluate the success of mitigation actions described in the

Aquatic/Fisheries Impact of the Mitigation and Stewardship Plan (Section 6.3.3) related to additional marketing for the oyster, finfish, and shrimp fisheries. Once finalized, the monitoring protocol, including schedule, locations, and methodology, will be integrated into this MAM Plan.

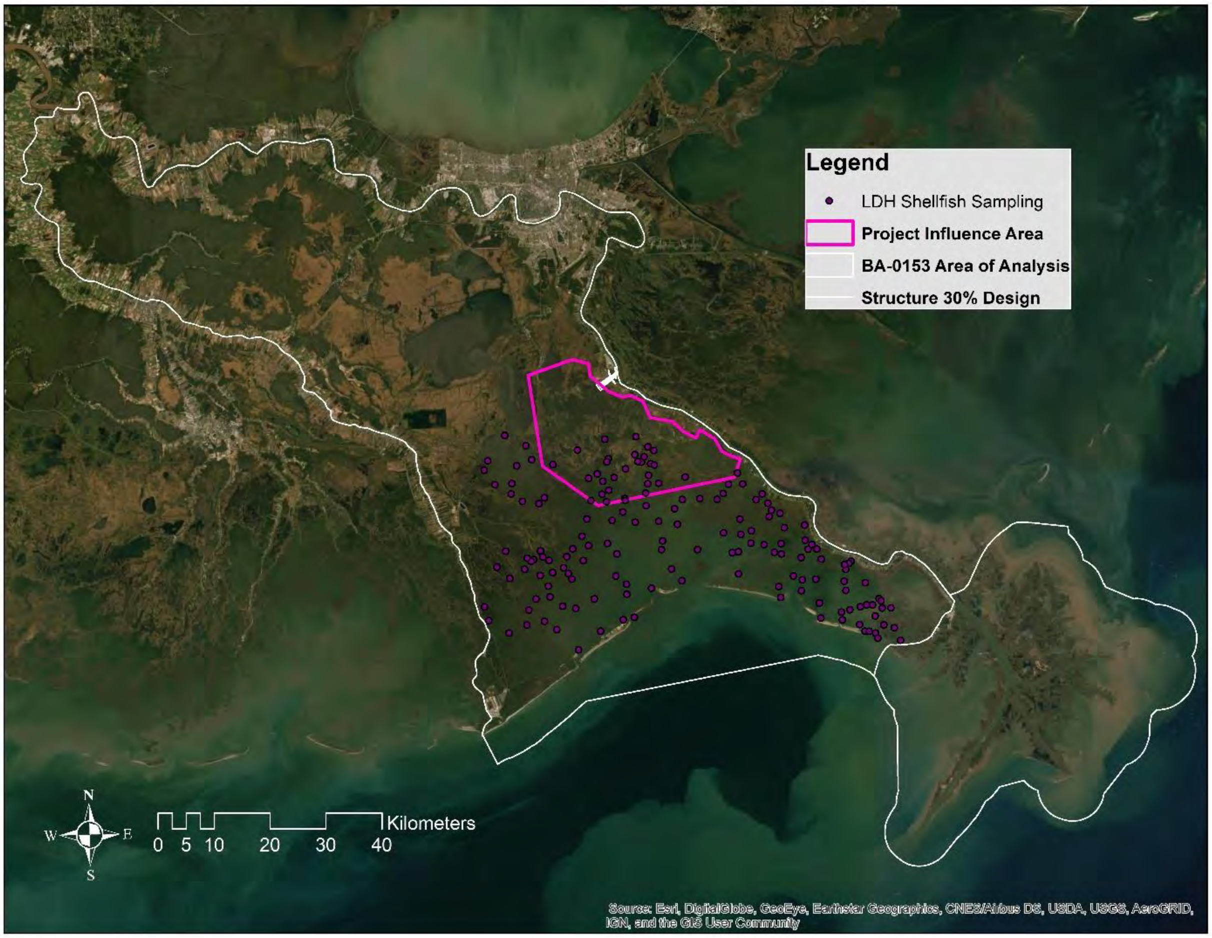


Figure 3.7-11. Louisiana Department of Health (LDH) shellfish sampling stations in the Barataria Basin.

3.7.5.4. Effectiveness of Workforce and Business Training for Commercial Fishing Industries

- Rationale: Evaluate the success of mitigation actions described in the Aquatic/Fisheries Impact of the Mitigation and Stewardship Plan (Section 6.3.3) related to investments in workforce and business training within various sectors of the commercial fishing industry.

- Schedule: Annually, pre-operations and post-construction, for 10 years following completion of Project investment in training.

- Locations: Within the Barataria Estuary (BA-0153 Area of Analysis in Figure 3.7-11)

- Methodology:
    - Compare annual income of commercial fishing industry participants before and after receiving Project support for workforce training to transition into new employment or for business training to enhance revenue within current employment.

    - For commercial fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project, compare number and income before and after being targeted by the Project outreach plan, to include the number of applicants assisted, the number of applications completed, the number of grants awarded to applicants, and the percentage of program resources that are utilized.

- Parties Responsible for Data Collection: CPRA contractor.

3.7.5.5. Effectiveness of Environmental Justice Mitigation Measures

- Rationale: These datasets will help to evaluate the success of mitigation actions described in the Environmental Justice section of the Mitigation and Stewardship Plan (Section 6.3.8) related to outreach and engagement to identified communities with environmental justice concerns that may be disproportionately impacted by the Project. Programs will include startup grants, workforce training, shrimping vessel and gear improvement grants, enhancing public and private oyster seed grounds, alternative oyster culture, and overall fisheries workforce and business training.

- Schedule: Annually, pre-operations and post-construction, for 10 years following completion of Project investments.

- Locations: Within the targeted Environmental Justice populations.

- Methodology: For commercial fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project, compare income before and after implementation of the Project mitigation and stewardship programs; the number of applicants assisted; the number of applications completed; the number of grants awarded to applicants; and the percentage of program resources that are utilized.

- Parties Responsible for Data Collection: CPRA contractor.

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4. EVALUATION AND PROJECT-LEVEL DECISIONS FOR CONDUCTING MANAGEMENT ACTIONS

Evaluation in the context of the Project MAM Plan refers to the consideration of data collected from the monitoring protocols outlined in Section 2. Those data will inform future Project management decisions aimed at improving Project effectiveness and limiting ecological and/or human impacts when possible.

This section describes the general types and anticipated frequency of evaluations that will ultimately inform management actions, such as operations refinements and outfall management measures, changes to monitoring protocols, and refinements to modeling assumptions. Table 4-1 outlines the general classes of evaluations that correspond to the Project objectives that are described in detail in Section 1.

Table 4-1. A description of how evaluation will support the fundamental and secondary objectives.

Types of Monitoring (Section)	**Fulfills:**	**Overarching Questions Linking Evaluation to Decision-making**
Effectiveness (Section 3.6)	Fundamental Project Objectives (1,2,3)	How can the components of the Project (intake, channel, outfall transition) and/or operation strategies be optimized for sediment delivery between the river and basin? What measures are available? Is the pace or magnitude of wetland habitat creation and sustainability meeting expectations, within natural constraints?
Compliance (Section 3.8)	Resource management and permit conditions	How can Project components and/or operations be optimized to balance Project objectives and impacts?

Decisions on Project management actions, including the development and amendment of annual Operations Plans, will be made based on evaluation of the Project monitoring data. The basis for initiation of Project operations is outlined in Section 4.2 of the OMRR&R main report. The OMT will work with the AMT and other adaptive management partners to decide on continuation, alteration or discontinuation of operations (and subsequent amendments to the Annual Operations Plans) and/or the need for outfall management actions or other management responses during individual structure openings (events) and on annual and multi-year cycles as outlined in Section 5. An overview of the process of assessing and evaluating new and existing information to inform project management decisions is illustrated in Figure 4-1, which is Step 8 of the Project Adaptive Management cycle (Figure 1.1-1).

It is important to note that while Project alternatives modeling informs expectation of biophysical responses to Project operations, it isn't possible to know for certain prior to the onset of Project operations what the monitoring data will show, and thus what specific changes in Project operations or outfall management actions will be necessary. Outfall management actions, such as spoil bank gapping or construction of water-directing features, may be considered in the future as potential adaptive management actions, based on assessment of project performance and monitoring data and recommendations of the Project Adaptive Management Team to the Project Operations Management Team. Consideration of those actions would likely require NEPA evaluation of potential environmental impacts prior to implementation, as summarized in *Mitigation Measures Environmental Analysis* in this FEIS Appendix.

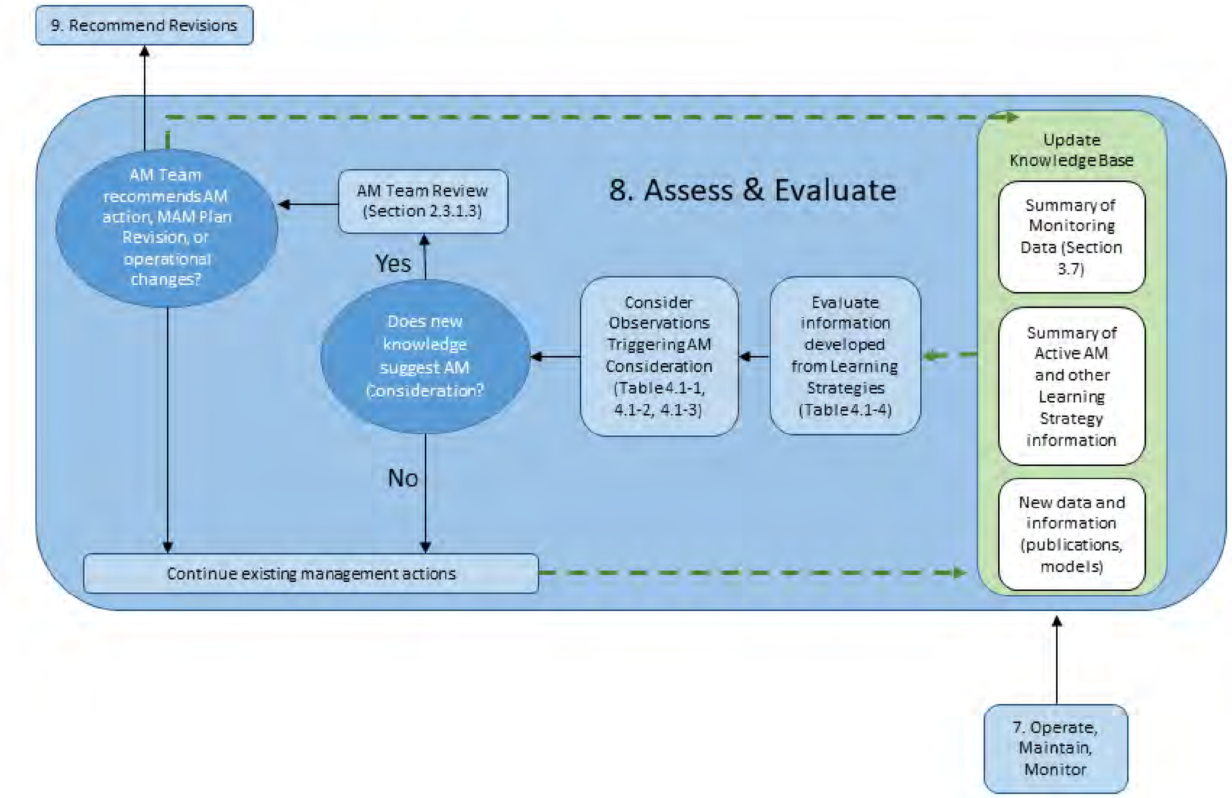

Figure 4-1. New and existing data are evaluated to reduce uncertainties and inform Project management decisions in Step 8 of the Project Adaptive Management cycle (Figure 1.1-1).

In the initial drafting of this section the focus has been to provide some considerations of the response to the Project Effectiveness data (Table 4-1), especially the efficiency by which the Project captures sediment from the MR and transports that sediment through the conveyance channel and into the Project receiving basin. CPRA expects these data will underpin the immediate needs and opportunities for adaptive management decision making. Evaluation of Project effectiveness in meeting Project objectives is described in Section 4.1. For critical uncertainties related to changes of existing conditions in response to the Project, a learning strategy to address each uncertainty is identified in Table 4.1-4.

To date, CPRA and LA TIG partners have proposed categorizing the monitoring parameters and evaluations into four categories. These categories reflect how the monitoring data will be evaluated, and whether the data evaluations would warrant or trigger considerations of some type of adaptive management action such as a change in operations or the implementation of outfall management. Those four categories are:

- Range: Data for these parameters will be evaluated with the goal of maintaining observations within a range of values based on documented historical and/or current variability, as well as scientific understandings of the parameter. Adaptive management actions will be considered if values were observed outside the range for a particular parameter.
- Presence/Absence: Data for these parameters will be evaluated in the binary of parameter occurrence or absence. Adaptive management actions will be considered if values occurred in the undesirable half of the binary (i.e., absent when presence is desired, or vice-versa).

- Trend: Data for these parameters will be evaluated as a progression of values in time and space. Adaptive management actions will be considered if the expected or desired trend (at least in part informed by Project alternative numerical modeling) does not occur or reverses from historical patterns.
- Context: Data for these parameters will be collected and analyzed due to broader interests in the values and trends. However, at this point, we do not anticipate data observations for these parameters triggering any considerations of adaptive management actions.

Initial categorization of each monitored parameter described in Section 3 is outlined in the tables below, with an emphasis on the term “initial.” Consistent with the idea of Project adaptive management, it is plausible that there may be changes in categorization of monitored parameters over time, as additional observations are made and data collected.

The authors also acknowledge that these bins may be artificially discrete. For example, a parameter might be assigned to be evaluated within a Range of values, but repeated observations of a Trend of values increasing unabated towards the maximum “acceptable” value within that Range might realistically trigger adaptive management considerations before values are observed exceeding that maximum.

4.1. Evaluation of Project Effectiveness Monitoring Data

There will be extensive monitoring of the Mississippi River, conveyance structure and Barataria Basin to inform Project effectiveness and document natural and human community response, as outlined in Section 3. Evaluation and decision making should be tempered by expected and empirical outcomes and the disparate timescales over which meaningful and discernable trends are exhibited by the resource or landscape. For example, the hydrologic impacts of the Project on basin habitats will be sudden and widespread; however, the emergence of new land area or plant community changes may experience various lag effects. There should be caution against premature evaluations on processes that require an accumulation of interacting processes over time; such an approach avoids cross-scale issues common to some large-scale restoration projects (Walters 1997). It is envisioned that peer review and collaborative analysis approaches will converge on accepted time scales for certain resource evaluations, especially as they pertain to further constraining an operation regime designed to meet the primary Project objectives.

4.1.1. Evaluation of Monitoring Data in Support of Project Objective 1: Deliver Freshwater, Sediment, and Nutrients to Barataria Bay through a Large-Scale Sediment Diversion from the Mississippi River

The overt, empirical basis for Project structure operations, at least in the initial years, will be continuous monitoring of *Mississippi River water discharge* (3.7.1.1.1). Additionally, early in Project operations, *Mississippi River suspended sediment concentrations* (3.7.1.1.2), and *Sediment concentrations in the flows conveyed into Barataria Basin* (3.7.1.1.9) will be collected and analyzed immediately, as they will provide the technical rationale for confirmation and potential changes in operations to optimize *Sediment:water in the flows conveyed into Barataria basin* (Section 3.7.1.2.2).

Longer-term plans for the specific time intervals to conduct evaluations have not been determined. Measurements and surveys of each operational event could occur at higher frequencies during early operations, for example, to evaluate the sediment transport performance of all the conveyance features. As learning increases, the evaluations may shift from event-based to periodic (e.g., annual) intervals to inform operation decisions. However, it is not possible in advance of Project operations to predict how quickly the Project Implementation Teams (Section 2.2) will learn from each operational event. A performance metric such as *Sediment: water in the flows conveyed into Barataria basin* (Section 3.7.1.2.2) may initially be studied on multiple events within a year, but as river discharge and sediment availability relationships improve, evaluations may be limited to the water year.

Equally important is the determination of the extent to which Project operational flows are leading to changes in *Topography/bathymetry of the Project outfall area* (3.7.1.1.7), especially erosion of the native soils and sediments in the outfall area. Erosion may exceed deposition at some specific locations, especially immediately after operations commence. The Project Implementation Teams will need to make those assessments during and after distinct operational flow events, determine whether erosion and deposition patterns are within or exceed expectations, and, after evaluating other relevant context variables such as *Water velocities at multiple locations in the Project Influence Area* (3.7.2.1.1), whether these changes warrant immediate adaptive management of operations, which could include adjustment of the timing or extent that the Project structure is opened between operational and base flows, within permitted ranges (see Table 4.1-1).

The focus of this monitoring will be outside of the immediate Project Outfall Area. For areas most proximal to the discharge of the Project, numerical modeling has projected the scouring of some existing marsh and subaqueous water bottoms. This phenomenon is necessary for the Project flows to build the distributary network in the receiving area needed to distribute freshwater, nutrients and sediments into the Basin. Table 4.1-1 identifies "outfall management actions" as an example of a potential adaptive management action in response to observations of excessive water velocities. Examples of outfall management actions, based on experience with management of the Caernarvon and Davis Pond Freshwater Diversion Projects, could include spoil bank gapping to increase dispersal of diverted water, or, conversely, construction of water control structures to focus diverted water dispersal to targeted areas and/or restrict dispersal to more vulnerable areas of the Barataria Basin. Those or other outfall management actions could be recommended by the AMT to the OMT in response to observed data for other parameters listed in Tables 4.1-2 and 4.1-3, depending on specific future observations.

4.1.2. Evaluation of Monitoring Data in Support of Project Objective 2: Reconnect and Re-establish Sustainable Deltaic Processes between the MR and the Barataria Basin

The parameters listed in Table 4.1-2 and Section 3.7.2 are proposed to support Objective 2 by informing how the Project would reconnect the Mississippi River to the Barataria Basin and re-establish delta building in the Basin. Objective 2 is explicitly centered on the movement of water and sediment through the Basin and the response of soil-building processes; specifically, the repeated addition of riverine mineral sediments to Basin wetland soils and the resulting increase in marsh soil surface elevation that help those marshes be sustainable intertidal habitats in the face of relative SLR.

Project alternatives modeling has projected that *Frequency, depth and duration of inundation at multiple locations on the marsh in the Project Influence Area* (3.7.2.1.2) will increase during Project operations. The Project partners will monitor this parameter to determine if, and if so the extent to which, Project operations will result in inundation patterns that are limiting subaerial wetlands in the PIA. This limitation, if present, could result from excessive water levels physically inundating wetland surfaces, and/or the imposition of an inundation stress on emergent wetland vegetation. Currently the available science informing what inundation patterns are either optimal for or detrimental to marsh vegetation growth is inexact and hinders establishing firm limits. As a result, no explicit thresholds in inundation have been established *a priori*, and instead the intention is to monitor this parameter to see whether an increasing trend in inundation results over time from Project operations. While the Project Operations and Adaptive Management Teams await scientific advances and Project-specific data to inform eventual thresholds on optimal versus detrimental inundation to specific plant species, a consistent increase in inundation would be more broadly recognized as undesirable.

The hydrologic flows resulting from Project operations are ultimately what will transport the mineral sediments in diverted Mississippi River flows (Objective 1) into the Barataria Basin and distribute those sediments into open waterbodies and onto the marsh surface. The two remaining parameters proposed as adaptive management triggers in Table 4.1-2 reflect the fate and effect of those sediments.

Most central to the overall intention of the Project, and thus the determination of Project success and effects, is the effect of diverted freshwater, nutrients and sediments on the *Marsh surface elevation change rate in the Project Influence Area* (3.7.2.1.9), as measured at CRMS-*Wetlands* sites. The Project is intended to create and sustain emergent marshes in the Basin indirectly by stimulating plant growth that will contribute organic matter to the marsh soil profile, and by directly transporting mineral sediments onto the marsh surface and into the soil profile. Both of these processes would be manifested by increases in marsh surface elevation over time, with sustainability defined as rates of increase exceeding local estimates of RSLR and thus sustaining subaerial emergent marsh. Observations of declines in marsh surface elevation, especially at CRMS-*Wetlands* sites that currently demonstrate other elevation change patterns, would suggest either limitations in diverted material flows to the marsh or that Project operations are imposing other stresses on the wetlands.

Similarly, calculations of *Sediment dispersal and retention on the emergent marsh surface in the Project Influence Area* (3.7.2.2.1) will elucidate Project success by determining patterns of mineral sediment distribution onto the surface, and into the soil matrix, of the wetlands in the PIA. This parameter will be important for the Project Operations Management Team and Adaptive Management Team to monitor because unlike the well-recognized benefits of filling erosional open water bottoms with sediment and establishing new emergent wetlands, the available science suggests that there is a “Goldilocks” optimum to the benefits of dispersed sediments to intact marshes. Too few sediments transported to the marsh surface may not stimulate plant growth and maintain *Marsh surface elevation change rate in the Project Influence Area*, while too great a sediment delivery can impose lethal physical stresses to the native vegetation and lead to mineral lenses in the soil profile that hinder future marsh growth. The CPRA Executive Team, OMT and AMT will have to evaluate the observational data and, for example, decide if outfall management options that would limit short-term sediment deposition (to best achieve those “Goldilocks” rates and/or magnitudes) would negatively impact longer-term Project goals.

CPRA has proposed that a number of soil development parameters be relegated for now as Context variables; i.e., parameters for which data will be collected, but which at this time are not being identified as representing overt triggers for adaptive management consideration (see Section 4.2). As proposed, if there are issues noted with the soil-related triggers above, these parameters will be more fully investigated to determine why issues were identified.

Adaptive management actions to improve Project performance as measured by these parameters could include outfall management actions; maintenance dredging; or adjustment of the timing or extent that the Project structure is opened between operational and base flows, within permitted ranges (see Table 4.1-2).

4.1.3. Evaluation of Monitoring Data in Support of Project Objective 3: Create, restore, and sustain wetlands and associated ecosystem services

If the processes represented by the monitoring parameters designated in support of Objective 2 represent the secondary effects on Barataria Basin hydrology and soils of diverted Mississippi River freshwater, nutrients and sediments, then Objective 3, and the parameters intended to support the evaluations of meeting Objective 3 (Section 3.7.3) and the needs for adaptive management actions (Table 4.1-3), are the tertiary effects of the diverted flows, and are the primary goal of and need for this project. The proposed Objective 3 parameters are specifically concerned with the actual development of new wetlands, and restoration and sustenance of existing wetlands, resulting from sediment dispersal into the Basin, changes in water quality, and the response of living resources (plant, animal and human) to the diverted freshwater, nutrients and sediments.

As defined by Objective 3, *Land and water extent/Area of new delta formation* (3.7.3.1) and *Emergent wetland area* (3.7.3.2) will be priority parameters for mid-term consideration. These two parameters specifically follow the Objective 2 observations of dispersal of materials by the Project, and whether those material flows are resulting in new or sustained emergent wetlands within the Basin. This report has discussed earlier why the projections of wetland loss and gain from numerical modeling are inappropriate as temporal benchmarks of Project performance. However, the modeling can provide an order-of-magnitude estimate of what land gain and loss could be expected if the Project were to be operated over a particular time period under conditions (river discharge, operational frequency, sediment content, etc.) similar to those modeled. Those evaluations cannot be made *a priori*, and so will need to wait on both actual operations and the land/water data availability. That said, land building or land-loss that is anomalous to the model's order-of-magnitude projections will trigger closer looks at other variables (e.g., those described under Objective 2) that might provide an explanation for why.

To quantify the restoration benefits of the marsh that develops in the diversion outfall area, a Before-After-Control-Impact study will be established. Ecosystem function in the created marsh will be compared to the pre-construction existing condition using the following datasets: *Land and water extent* (3.7.3.1), *Emergent wetland area* (3.7.3.2), *Vegetation Cover, Abundance, and* Height (3.7.3.3), *Emergent and submerged vegetation community type* (3.7.3.5), *Emergent vegetation biomass in the Project area* (3.7.3.6), *Topography/bathymetry of the Project delta development area* (3.7.1.1.7), *Lower trophic level organisms* (3.7.3.16), *Nekton species abundance and composition/assemblage* (3.7.3.18), and *Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area* (3.7.3.22).

To compare the wetland function of a marsh built by a sediment diversion to that of a marsh built by conventional wetland restoration (marsh creation from dredged sediments), a study will be established to compare three types of wetland treatments. MAM partners will develop the experimental design for the study once the study goals and objectives are finalized. Assessment will rely heavily on the data collection that was otherwise established for this Project, planned coast-wide LiDAR surveys, existing CRMS-*Wetlands* stations (for unrestored marsh), and pre- and post-construction sampling from a conventionally-restored marsh. Wetland function will be evaluated using the same parameters listed in the paragraph above.

Regarding water quality parameters, the adaptive management focus will be on the response of *Dissolved oxygen* (3.7.3.7) and *Salinity* (3.7.3.8), as these are expected to drive many of the biological responses described below in the Basin, as well as fundamentally defining the ability of Project operations to still retain a functional estuary, from a *Salinity* standpoint. On that latter point, while Project alternatives numerical modeling does project that salinities will freshen substantially during Project operations beyond base flows, the same modeling projects a rapid return to a full range of estuarine salinities in the Basin once base flows are reinstated. Observations of freshwater salinities or hypoxic conditions that persist throughout the Basin even after Project operations return to base flow would trigger adaptive management considerations (see Table 4.1-3 for details).

Concerns have been expressed about the potential for Project operations to result in the development of phytoplankton blooms, and especially HCABs. The Project partners propose to capture these possible changes by systematically monitoring *Chlorophyll a* (3.7.3.9) using *in situ* sondes, remote sensing, and other relevant data; by identifying *Phytoplankton species composition* (3.7.3.10) both monthly and when *Chlorophyll a* (3.7.3.9) or other datasets warrant it; and by testing HCAB toxins both in water samples with a presence of cyanobacterial and/or eukaryotic algal species associated with harmful algal blooms, and in fish tissue.

The proposal described above for a Presence/Absence approach to evaluating *Salinity* data is similar to the proposal for evaluating a number of living resources; namely, *Submerged aquatic vegetation area* (3.7.3.4), *Emergent and submerged vegetation community type* (3.7.3.5), *Nekton species abundance and composition/assemblage* (3.7.3.18), and *Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area* (3.7.3.22). The reason for this proposal is the same as described earlier as well. We expect, from the results of the Project alternatives numerical modeling, that Project operations will result in some persistent and some temporary changes in the salinity structure of the estuary, including localized salinity decreases (especially closer to the Project outfall). Living resource distributions are expected to likewise change, at least in so far as that described by the Basin-wide Model (for vegetation) and model outputs for fish and wildlife. No adaptive management considerations are proposed in the event that there are not persistent and large-scale changes in estuarine species distributions throughout the Basin as a whole; i.e., that Project operations do not result in major and widespread Basin-wide losses of estuarine plants and animals. Explicit in this proposal is the idea that localized estuarine species losses where salinities decrease would not trigger AM considerations.

The project may cause a change in the occurrence of invasive species. The new or increased occurrence of invasive nekton species (*Nekton species abundance and composition/assemblage* (3.7.3.18)) or invasive aquatic invertebrate or algal species (*Aquatic Invasive (Algae and Invertebrate) Species* (3.7.3.17)) would trigger an adaptive management action to control species that are deemed as a threat to ecosystem function. The new or increased occurrence of invasive vegetation species (*Emergent and submerged vegetation community type* (3.7.3.5)) would be noted as a sign of changing conditions, and would provide context, but would not trigger an adaptive management action.

The exception to this Presence/Absence consideration of living resources data would be for consideration of *Emergent vegetation biomass in the Project Influence Area* (3.7.3.6), measured at the existing and proposed CRMS-*Wetlands* stations. It is uncertain how exactly emergent plant biomass will respond to the environmental changes resulting from Project operations. As mentioned earlier, numerical modeling projects localized increases in *Marsh surface elevation change rate in the Project*

Influence Area (3.7.2.1.9) during Project operations. Similar to the data evaluation for that parameter (described in section 4.1.2), repeated, consistent year-over-year decreases in emergent plant biomass would trigger data evaluation.

To evaluate changes in the Barataria Basin food web, multiple datasets will be used. Changes in community assemblage over time will be clarified through *Nekton species abundance and composition/assemblage* (3.7.3.18) and in *Lower Trophic Level Organisms* (Section 3.7.3.16). Questions about changes in the biodiversity of the aquatic food web, the food web links, and the benthic: pelagic ratios (biomass and productivity, including interannual and seasonal variability) over time will be explored through the use of ecosystem models refined and run as described in Section 1.5 and by incorporating additional information collected as described in *Lower Trophic Level Organisms* (Section 3.7.3.16) *Nekton species abundance and composition/assemblage* (3.7.3.18), and *Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area* (3.7.3.22). Refined models will also be used to qualify the ecosystem benefits of the Project; test and understand ongoing and potential future changes resulting from management actions to existing conditions; statistically relate environmental condition variability to food web responses; improve predictive capabilities. Adaptive management actions to improve Project performance as measured by these parameters could include outfall management actions; adjustment of the timing or extent that the Project structure is opened between operational and base flows, within permitted ranges; invasive species control; or changes in sampling frequency or intensity; and refinement of Learning Strategies to reduce Critical Uncertainties (see Tables 4.1-3 and 4.1-4).

4.2. Evaluation of Context Variables

Comprehensive evaluation of all monitored parameters is anticipated to occur at every five years during the preparation of the Multi-year Project Synthesis Reporting (5.2.3). Some of these variables will be monitored due to substantial interest in changes in value, but we do not anticipate the data serving as triggers for adaptive management at this time (although consistent with the idea of adaptive management, those parameter classifications/considerations could change in the future); and are thus classified as Context variables. Other variables listed below are not proposed in themselves as potential triggers for adaptive management, but may contribute to calculations of other variables that are presented above as adaptive management triggers.

However, it is not that these parameters would not inform adaptive management considerations. In fact, when observations of the more actionable parameters described in Section 4.1 trigger adaptive management consideration, it is entirely likely that related or contributing parameter data will also be analyzed to help inform decision making on the best course of action. For instance, if consideration of an adaptive management action is triggered based on observations of *Sediment dispersal and retention on the emergent marsh surface in the Project Influence Area* (3.7.2.2.2) below the desired range of values, the Adaptive Management Team would likely examine *Soil mineral matter density* (3.7.2.2.3) or *Rate of accretion above feldspar marker horizons* (3.7.2.1.7) to help inform why dispersal may be insufficient.

Parameters proposed for classification as Context variables are

- Mississippi River nutrient concentrations (3.7.1.1.3),
- Sedimentology of the Alliance South sand bar (3.7.1.1.5),
- River bathymetry at and around the Project structure inlet (3.7.1.1.6),
- Water volume conveyed into Barataria Basin (3.7.1.1.8),
- Sediment concentrations in the flows conveyed into Barataria Basin (3.7.1.1.9),
- Mississippi River sediment load (3.7.1.2.1),
- Sediment volume conveyed into Barataria Basin (3.7.1.2.3),
- Nutrient loads conveyed into Barataria Basin (3.7.1.2.4),
- Water velocities at multiple locations in the Barataria Basin (3.7.2.1.1),
- Soil bulk density (3.7.2.1.3),
- Loss of soil organic matter on ignition (3.7.2.1.4),
- Soil mineral matter grain size (3.7.2.1.5),
- Soil total nutrients (3.7.2.1.6),
- Rate of accretion above feldspar marker horizons (3.7.2.1.7),
- Soil strength (3.7.2.1.8),
- Soil organic matter density (3.7.2.2.2),
- Soil mineral matter density (3.7.2.2.3),
- Vegetation Cover, Abundance, and Height (3.7.3.3),
- Nutrient constituents in Barataria surface waters (3.7.3.12),
- Temperature of Barataria surface waters (3.7.3.13),
- Turbidity of Barataria surface waters (3.7.3.14),
- Total suspended solids in Barataria surface waters (3.7.3.15),
- Lower Trophic Level Organisms (3.7.3.16)
- Wildlife (3.7.3.21), and
- Socio-economic data (3.7.3.23).

4.3. Evaluation of Compliance Monitoring Data

This placeholder exists for descriptions of the evaluation of compliance data identified in Section 3.7.4. If the Project permit is approved and issued identifying those requirements, the corresponding details will be developed accordingly.

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Table 4.1-1. Parameters monitored to ensure Project Objective 1 (Delivery of freshwater, sediment, and nutrients), proposed frequency of evaluation, categorization of parameter evaluation, and criteria that would trigger consideration of undertaking adaptive management action.

Parameter/Calculation	Frequency of Evaluation or Data Collection	Category	Observations Triggering Adaptive Management Consideration	Examples of Potential Adaptive Management Actions
Mississippi River water discharge (3.7.1.1.1)	Pre-operations: Continuous Post-construction: Continuous	Range	MR discharges less than 450,000 cfs would constrain operations to a base flow of up to 5,000 cfs, dependent on head differential between MR and basin. MR discharges 450,000 – 1,000,000 cfs would result in operational flows, also dependent on head differential between MR and basin. MR discharge greater than 1,000,000 cfs would constrain operational flows to maximum 75,000 cfs Outside that, irregular discharge patterns beyond those observed in the historical record (e.g., persistent high or low discharges outside expected seasonal patterns) would trigger consideration of flow alterations.	Adjust the extent that the Project structure is opened between operational and base flows, within permitted ranges.
Mississippi River suspended sediment concentrations (3.7.1.1.2)	Pre-operations: Continuous Post-construction: Continuous	Context/ Range	Initial considerations as a Context variable may be amended in the future to a Range variable, with learning following some period of data collection. As Range, decline of concentrations below expected for a particular *Mississippi River water discharge* (3.7.1.1.1)	None in the short term while this is considered a Context variable.
Bathymetry of the Alliance South sand bar (3.7.1.1.4)	Pre-operations: Annually Post-construction: before/after each Project operational event for first five years, every two years thereafter	Range	Excessive magnitude or rate of erosion in bar bathymetry would trigger consideration of adaptive management. Numerical criteria are pending continued high-resolution modeling outcomes by the PDT.	To be determined.
Topography/bathymetry of the Project Delta Development Area (3.7.1.1.7)	Pre-operations: Once prior to onset of operations Post-construction: before/after each Project operational event for first five years, every five years thereafter	Trend/Range	Year-to-year observations of a magnitude or rate of erosion of the Project outfall area, compared to model projections as order-of-magnitude expectations. Deposition in the Project outfall area without the development of a deltaic distributary network, compared to model projections as order-of-magnitude expectations.	Conduct maintenance dredging of the canals to address impacts from the Project. Implement outfall management measures to limit the loss of sediments to the canals. Implement outfall management measures to increase the deposition of sediments in shallow open water and onto the surface of intertidal wetlands
Sediment:water in the flows conveyed into Barataria Basin (3.7.1.2.2)	Post-construction: Biweekly during operational events, quarterly during base flows	Range	Persistent (greater than 5 year) sediment:water below initial operations values; declines in sediment:water through time during operational events and base flows. Numerical criteria are pending continued high-resolution modeling outcomes by the PDT.	With learning gained from monitoring, and if possible, adjust timing of Project operational flows in relation to river discharge and suspended sediment concentration. Optimize project to reduce freshwater inflows to the Basin while maintaining the efficacy of the Project consistent with goals and objectives.
Nutrient loads conveyed into Barataria Basin (3.7.1.2.4)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Context	None in the short term while this is considered a Context variable.	None in the short term while this is considered a Context variable.

Table 4.1-2. Parameters monitored to ensure Project Objective 2 (Reconnect and Re-establish Deltaic Processes), proposed frequency of evaluation, categorization of parameter evaluation, and criteria that would trigger adaptive management action.

Parameter/Calculation	Frequency of Evaluation	Category	Observations Triggering Adaptive Management Consideration	Examples of Potential Adaptive Management Actions
Frequency, depth and duration of inundation of marsh at locations in the Project Influence Area (3.7.2.1.2)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Trend	Persistent (greater than 5-year) trend of increasing frequency of inundation would trigger consideration of adaptive management if data and learning could lead to identification of a threshold. No explicit threshold value has been identified at this time. Potential for a revision of the parameter to be binned as Range if data and learning allow.	Adjust the timing or extent that the Project structure is opened between operational and base flows, within permitted ranges. Outfall management actions
Marsh surface elevation change rate in the Project Influence Area (3.7.2.1.9)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Trend	A decline in marsh surface elevation that exceeds the projected rate (considering RSLR) within the Project Influence Area would trigger consideration of adaptive management	Outfall management actions
Sediment dispersal and retention on the emergent marsh surface in the Project Influence Area (3.7.2.2.1)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Presence/ Absence	Absence of sediment dispersal onto marsh surface, or substantially lower values than modeling results as order-of-magnitude expectations. Values would be based on high-resolution design modeling, which is still ongoing.	Outfall management actions

Table 4.1-3. Parameters monitored to ensure Project Objective 3 (Create, restore, and sustain wetlands and associated ecosystem services), proposed frequency of evaluation, categorization of parameter evaluation, and criteria that would trigger adaptive management action.

Parameter/Calculation	Frequency of Evaluation or Data Collection	Category	Observations Triggering Adaptive Management Consideration	Examples of Potential Adaptive Management Actions
Land and water extent / Area of new delta formation in the Project Influence Area (3.7.3.1)	Pre-operations: Once prior to onset of operations Post-construction: Every three years after the onset of Project operations	Trend	Land building that does not occur after a reasonable amount of time, using the Delft Basin-wide Project modeling as an order-of-magnitude projection (e.g., if no land gain after five years IF the project operated during the first decade as proposed in response to environmental drivers).	Outfall management actions
Emergent wetland area (3.7.3.2)	Pre-operations: Once prior to onset of operations Post-construction: Every three years after the onset of Project operations	Trend	Repeated observations of loss of existing and lack of creation of new emergent wetlands from the Project Influence Area, using the Delft Basin-wide Project modeling as an order-of-magnitude projection (e.g., if no land gain after five years IF the project operated during the first decade as proposed in response to environmental drivers).	Outfall management actions
Submerged aquatic vegetation area (3.7.3.4)	Limited analysis annually; comprehensive analysis every five years after the onset of Project operations	Presence/ Absence	Repeated observations of a complete loss of submerged aquatic vegetation from the Barataria Basin	Outfall management actions
Emergent and submerged vegetation community type (3.7.3.5)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Presence/ Absence	A persistent (greater than five-year) shift in vegetation communities to a fully freshwater + intermediate character of the Barataria Basin	Outfall management actions
Emergent vegetation biomass in the Project Influence Area (3.7.3.6)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Trend	Reductions in emergent vegetation biomass in the Project Influence Area over a five-year period (dependent on Project operations) that suggests excessive inundation or other imposed stresses on the vegetation.	Outfall and operational adaptive management actions;
Dissolved Oxygen in Barataria Surface Waters (3.7.3.7)	Pre-operations: Continuous (sondes); monthly (discrete water sampling) Post-construction: Continuous (sondes); monthly (discrete water sampling); Comprehensive analysis every five years after the onset of Project operations	Range	Changes in oxygen within a "normoxic" range (4-14 mg/L) would be viewed as acceptable Development of hypoxic conditions (dO_2 < 4 mg/L) that persist throughout the Basin for more than 3 months after Project operations return to base flow, as a result of Project operations in areas currently and historically normoxic.	Outfall management actions
Salinity in Barataria Surface Waters (3.7.3.8)	Pre-operations: Continuous (sondes); monthly (discrete water sampling) Post-construction: Continuous (sondes); monthly (discrete water sampling); Comprehensive analysis every five years after the onset of Project operations	Presence/ Absence	Observations of freshwater salinities that persist throughout the Basin for more than 3 months after Project operations return to base flow would trigger adaptive management considerations.	Outfall management actions
Chlorophyll *a* in Barataria Surface Waters (3.7.3.9)	Pre-operations: Continuous (sondes), daily (remote sensing), monthly (discrete water sampling) Post-construction: Continuous (sondes), daily (remote sensing), monthly (discrete water sampling)	Trend	Increase in chlorophyll concentrations suggestive of a cyanobacterial bloom with a moderate probability of acute health effects (in-water samples with > 10 µg L^{-1} per World Health Organization 2003, or remotely sensed cyanobacterial index of >100,000 cells L^{-1} per WHO 1999) would trigger follow-up discrete sampling for *Phytoplankton species composition (3.7.3.10*) and *Harmful algal bloom toxins* (3.7.3.11)	Outfall and operational adaptive management actions;

Table 4.1-3 (*continued*). Parameters monitored to ensure Project Objective 3 (Create, restore, and sustain wetlands and associated ecosystem services), proposed frequency of evaluation, categorization of parameter evaluation, and criteria that would trigger adaptive management action.

Parameter/Calculation	Frequency of Evaluation	Category	Observations Triggering Adaptive Management Consideration	Adaptive Management Actions to Consider
Phytoplankton species composition in Barataria Surface Waters (3.7.3.10)	Pre-operations: Monthly (discrete sampling) Post-construction: Monthly (discrete sampling) and as needed	Presence/ Absence	Presence of cyanobacterial and/or eukaryotic algal species associated with harmful algal blooms would trigger analysis of discrete samples from 3.7.3.10 for *Harmful algal bloom toxins* (3.7.3.11) (≥ 5000 cells L^{-1} for *K. brevis* (LDHH guidelines) or ≥ 1,000 cells L^{-1} for *Pseudo-nitzschia* spp. (GOMA 2014) or ≥ 1,000 cells L^{-1} for *Dinophysis* spp. (GOMA 2014) or ≥ 20 cells L^{-1} for cyanobacteria (World Health Organization 2003)	Outfall and operational adaptive management actions.
Harmful Cyanobacterial/Algal bloom Toxins in Barataria Surface Waters (3.7.3.11)	Pre-operations: Monthly (discrete sampling) Post-construction: Monthly and as-needed sampling; analysis as needed based on Phytoplankton species composition (3.7.3.10)	Presence/ Absence	Presence of cyanobacterial and/or eukaryotic algal bloom toxins could trigger consideration of a receiving basin adaptive management action. Thresholds related to harvesting closures: 20MU/100g brevetoxins ((or > 1.6 ppm in clams, > 1.8 ppm in oysters using NSP ELISA) or ≥ 20 ppm Domoic Acid or ≥ 0.16 ppm Okadaic Acid or ≥ 0.16 ppm Dinophysis toxins or > 80 µg Saxitoxin eq./100 g (per GOMA 2014 and FDA National Shellfish Sanitation Program)) Thresholds related to recreational water advisories: > 8 ppm Total Microcystins (EPA 2019; note: > 24 ppm Microcystin-LR per WHO 2020) or > 15 ppm Cylindrospermopsin (EPA 2019; note: > 6 ppm per WHO 2020) or > 60 ppm Anatoxin-a (WHO 2020) or > 30 ppm Saxitoxin (WHO 2020)	Outfall and operational adaptive management actions; shellfish harvesting closures; recreational water advisories.
Aquatic Invasive (Algae and Invertebrate) Species (3.7.3.17)	Pre-operations: Once Post-construction: Once per five years	Presence/ Absence	The new or increased presence of aquatic invasive species could trigger an adaptive management action to address species viewed as an ecosystem threat.	If presence of aquatic invasive species is deemed a threat to ecosystem function, control or eradication measures may be initiated.
Nekton (Fish and Shellfish) Species Abundance and Composition/Assemblage (3.7.3.18)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Presence/ Absence	-Measuring a persistent basin-wide decline in abundance over five years for an estuarine assemblage could trigger an adaptive management action (NOT a change in community assemblage or location-specific shift from marine to freshwater character of the assemblage). The new or increased presence of aquatic invasive species could trigger an adaptive management action to address species viewed as an ecosystem threat. Sufficient project monitoring indicates that freshwater inflows to the Basin may be reduced while still maintaining the efficacy of the Project consistent with goals and objectives.	Outfall management actions If presence of aquatic invasive species is threat to ecosystem function, control or eradication measures may be initiated.
Bottlenose Dolphins (*Tursiops truncatus*) (3.7.3.19)	Pre-operations: Varies over 5-year period Post-construction: Periodically, with annual analysis	Trend, Range	1. Increase in average stranding rate above the pre-operation level (for example, mean plus 2 standard deviations) or increase in the proportion of cases with cause of illness/death determined to be low salinity exposure 2. Increase in mortality in specific regions, decrease in dolphin body condition, or increase in prevalence of skin lesions 3. Increase in morbidity or mortality 4. Shift in prey base and decrease in dolphin body condition 5. Increase in dolphin stranding rates; prevalence of adverse health effects; dolphin movements; qualified personnel and resources available for response/intervention (e.g., stranding network capacity); impacts from disasters; and/or habitat/water quality. Other indicators are TBD. See discussion in Section 3.7.3.19.	1. Increase in Marine Mammal Stranding Network effort, analyses, and response 2. Increase in visual health assessment sampling frequency, possibly combined with stranding response active surveillance 3. Increase in biopsy frequency or implementation 4. Bioenergetics study 5. Operational modifications

Table 4.1-3 (*continued*). Parameters monitored to ensure Project Objective 3 (Create, restore, and sustain wetlands and associated ecosystem services), proposed frequency of evaluation, categorization of parameter evaluation, and criteria that would trigger adaptive management action.

Parameter/Calculation	**Frequency of Evaluation**	**Category**	**Observations Triggering Adaptive Management Consideration**	**Adaptive Management Actions to Consider**
Eastern Oysters (*Crassostrea virginica*) (3.7.3.20)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Range	Persistent decline in parameter values over three consecutive years that suggests the loss of a viable population in the Basin or current seed grounds would trigger additional analyses of the relationship between operations, freshwater, sediment and nutrient loads and oyster density, abundance and mortality to inform mitigation strategy actions Persistent decline over the five-year comprehensive analysis period could trigger consideration of actions outlined in the mitigation strategy, such as relocation of seed grounds to more environmentally-suitable areas within the Basin or establishment of brood-stock reefs to address larval supply. Observations that Project operations result in hydrodynamic barriers to larval dispersion	Analysis of project operations and resulting conditions across the basin.
Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area (3.7.3.22)	Limited analysis annually, comprehensive analysis every five years after the onset of Project operations	Trend	Measuring a persistent decline in aquatic resource and/or terrestrial wildlife utilization of habitat in the Project Influence Area.	Outfall management actions
Contaminants in Fish, Shellfish, and Wildlife (3.7.3.24)	Will be determined by CPRA in consultation with USFWS pending the Project permit record of decision by USACE.	Range	Measuring a level outside of the acceptable range for any one EPA Priority Pollutant or Contaminant of Concern	Increase frequency and/or intensity, and potential expansion of sampling

Table 4.1-4. A learning strategy has been identified to address each uncertainty in responses of environmental resources to project inputs. Reducing these uncertainties will help to refine Project Adaptive Management. Other uncertainties that will not directly affect adaptive management decisions, such as quantifying restoration benefits, are listed in Section 10. The "Reference" column provides sources of additional information including this MAM Plan, the Project Phase II Restoration Plan, and the Diversion Expert Panel reports #1-7 (CPRA 2014/2015/2016).

Uncertainty	Reference	Purpose of Learning Goal	Learning Strategy
Effect of inundation patterns on subaerial wetlands in the Project Influence Area.	MAM Plan 4.1.2	Inform thresholds for *Frequency, depth and duration of inundation at multiple locations on the marsh in the Project Influence Area* (3.7.2.1.2) / Objective 2 evaluation	Determine whether limitation results from excessive water levels physically inundating wetland surfaces, and/or the imposition of an inundation stress on emergent wetland vegetation.
Optimum dispersal of sediments to intact marshes	MAM Plan 4.1.2	Weigh the costs and benefits of observed short-term sediment depositional patterns to the long-term goals of the Project	Evaluate *Sediment dispersal and retention on the emergent marsh surface in the Project Influence Area* (3.7.2.2.1) to determine patterns of mineral sediment distribution onto, and into the soil matrix of, the wetlands in the Project Influence Area.
Marsh surface capture of sediment	MAM Plan 4.1.2	Inform observations of *Marsh surface elevation change rate in the Project Influence Area* (3.7.2.1.9)	Identify cause, possibly including limitations in diverted material flows to the marsh, or Project operations stresses on the wetlands. Evaluate related parameters, including *Sediment dispersal and retention on the emergent marsh surface in the Project Influence Area* (3.7.2.2.2), *Soil mineral matter density* (3.7.2.2.3), *Rate of accretion above feldspar marker horizons* (3.7.2.1.7), and vegetation parameters.
Project order-of-magnitude land building or land loss under future conditions (river discharge, operational frequency, sediment content)	MAM Plan 4.1.3	*Inform creation of trigger for Land and water extent/Area of new delta formation* (3.7.3.1) and *Emergent wetland area* (3.7.3.2)	Input post-operations conditions into model over time period of interest.
Ongoing and potential future changes resulting from management actions to existing conditions	MAM Plan 1.4 and 4.1.3	Adaptive management of project	Refine and run ecosystem models (Section 1.5).
Ability to reduce freshwater inflows to the Basin while maintaining the efficacy of the Project consistent with goals and objectives	MAM Plan 3.6, 3.8, 4.1.3	Optimize project to balance Project objectives and impacts; reduce freshwater influence on resources including Nekton (Fish and Shellfish) Species Abundance and Composition/Assemblage (3.7.3.18) and Bottlenose Dolphins (*Tursiops truncatus*) (3.7.3.19)	Input post-operations conditions into Delft Basin-wide model every 5 years post-operation; evaluate related parameters, including *Sediment:water in the flows conveyed into Barataria Basin* (3.7.1.2.2), *Topography/bathymetry of the Project Delta Development Area* (3.7.1.1.7), and *Marsh surface elevation change rate in the Project Influence Area* (3.7.2.1.9).
Limits of vegetation growth at very low elevation marshes	TWIG 2016b	Land building in low elevation marshes	Prioritize model refinement to focus on vegetation species or communities that are most likely to influence land building
Indicators of Harmful Algal Bloom Toxins from *Pseudo-nitzschia* and *Dinophysis* cell counts	MAM Plan 4.1.3	Inform thresholds for follow-up analysis for *Pseudo-nitzschia* and *Dinophysis* as part of Phytoplankton species composition in Barataria Surface Waters (3.7.3.10) analysis and associated Harmful algal bloom toxins in Barataria Surface Waters (3.7.3.11)	Evaluate pre-operations and post-construction relationship between impacts on aquatic resources or human health, and combinations of cell counts and environmental conditions known to trigger toxin production in P *Pseudo-nitzschia* and *Dinophysis*.
Correlation of changes in distribution and productivity of juvenile and adult fishery species to far-field changes in salinity and temperature	TWIG 2014a	Adaptive management of project	Salinity (3.7.3.8), Temperature of Barataria Surface Waters (3.7.3.13.), Nekton species abundance and composition/assemblage (3.7.3.18)

5. MONITORING AND ADAPTIVE MANAGEMENT SCHEDULE

5.1. Project Monitoring Schedule 1

5.1.1. Pre-operational Monitoring

The Pre-operations Monitoring Plan introduced in Section 3 are currently being planned as up to a five-year effort (no less than three), to establish a robust baseline condition within the Project receiving area and the larger Barataria Basin during Project construction. Critical in that baseline monitoring will also be clarifying spatial variability in the data, as well as inherent temporal trends in the data that might refine considerations of when to undertake adaptive management action.

5.1.2. Post-operational Monitoring

Given the intended 50-year life of the Project that guided Project E&D, at least some of the attributes outlined in Section 3 will be collected for that entire time. However, the planned length of monitoring for all attributes will ultimately depend on evaluation of the early datasets for responsiveness and variability.

5.2. Timeline of Adaptive Management Decision-Making and Implementation

The overall timeline of adaptive management will include activities that take place during individual structure openings (events), annually, as well as activities occurring on a five-year planning cycle that will more comprehensively consider and integrate data across a longer cycle. Periods for evaluation of whether each adaptive management trigger has been met vary by parameter; see section 4 for details.

5.2.1. Event Timeline

Evaluation and decision-making at the level of individual structure openings will occur as discussed in Section 4. Decisions made during individual events will be memorialized in the annual and multi-year reporting described below.

5.2.2. Annual Timeline

Figure 5.2-1 proposes two categories of actions that will occur on an annual basis. The top of the figure illustrates a more expedited consideration of a limited set of operations performance data from the Water Year (WY) operations that ends on September 30, to provide CPRA with a rapid summary of the past year's Project operations and to support annual State funding requests for continued operations during the upcoming State Fiscal Year. In contrast, the bottom of the figure illustrates the consideration of a more comprehensive set of WY operations data that underpins the development of annual Operations, Maintenance and Monitoring (OM&M) Reports and the formal Operations Plan. Both sets of actions center on the annual management of the Project by the Operations Management Team and continuous collection of the data outlined in Section 3.

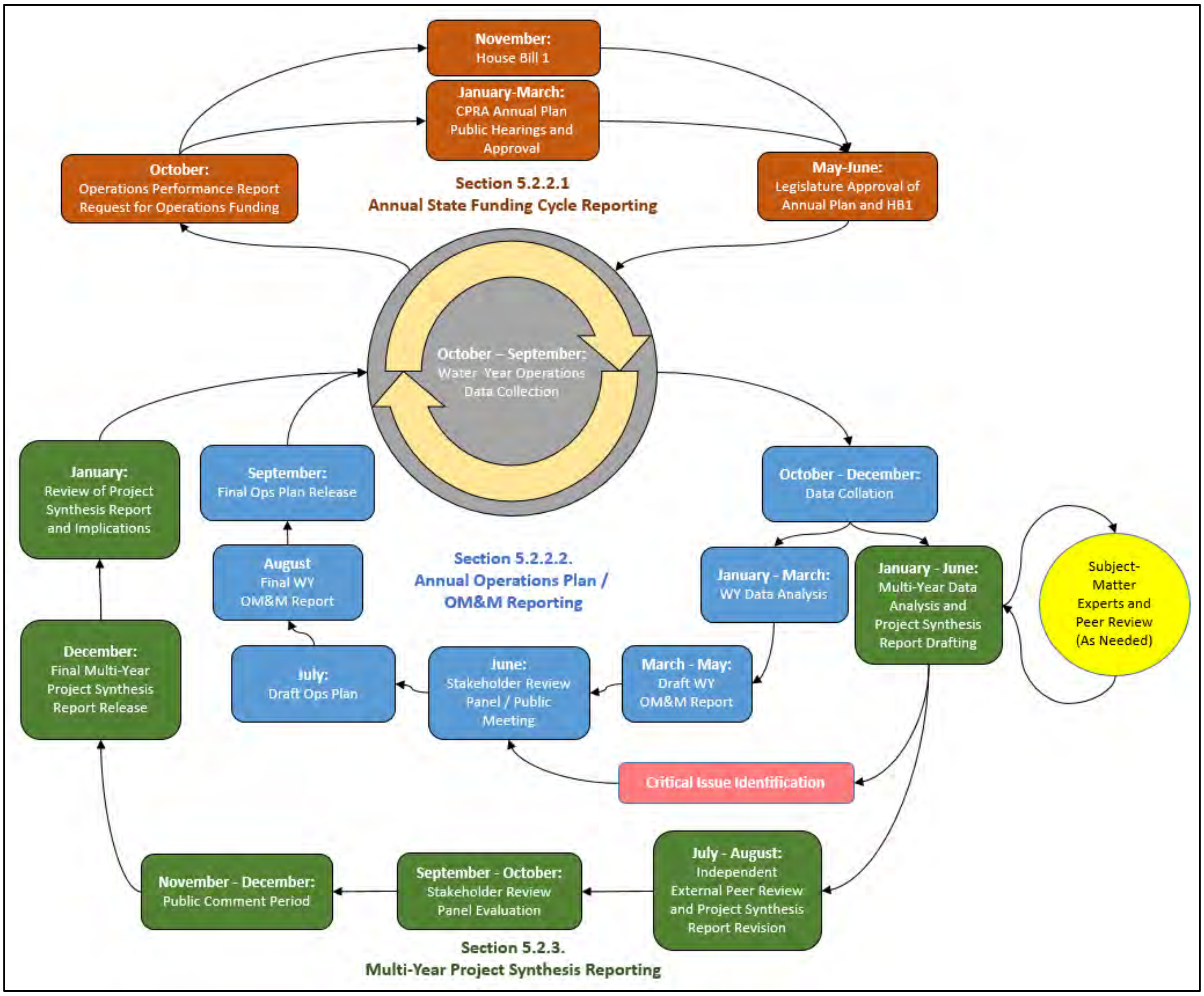

Figure 5.2-1. Idealized timeline of Annual Cycle Adaptive Management Activities discussed in Section 5.2.2 and the Multi-year Project data evaluations discussed in Section 5.2.3. The steps illustrated in the orange boxes are discussed in Section 5.2.2.1. The steps illustrated in the blue boxes are discussed in Section 5.2.2.2. The steps illustrated in the green boxes are discussed in Section 5.2.3.

5.2.2.1. State Funding Cycle Reporting

- October
  - Immediately following the end of the WY, the Data Management Team (DMT) and OMT will work to develop an Operations Performance Report to underpin upcoming State Fiscal Year funding requests.
- November
  - CPRA will submit the upcoming State Fiscal Year project operations funding request to the State's Division of Administration for inclusion in the draft of House Bill 1.
- January - March
  - The upcoming State Fiscal Year Project operations funding request will be included in the draft of CPRA's Annual Plan, which CPRA submits annually for a 3 year-budget outlook. Typically, CPRA releases the draft Annual Plan for public comment in January for the upcoming fiscal year, with CPRA Board vote for approval of the Annual Plan

occurring during the last Board meeting prior to the beginning of the annual Session of the Legislature. Following approval by the Board, CPRA submits the Annual Plan to the Legislature for consideration.

- May-June
  - Typically, the Legislature votes on both House Bill 1 and the CPRA Annual Plan late in the annual Legislative session. Both bills must pass the Legislature to appropriate Project operational funds in the next State Fiscal Year starting on July 1.

5.2.2.2. Annual Operations Plan / OM&M Reporting

The following idealized annual timeline may be adjusted to allow the Annual Operations Plan to be included in CPRA's Annual Plan and aligned with the State's funding cycle.

- October to December, Year
  - Data collection will largely follow a WY schedule, but due to the nature of some data collection/analysis, the WY data inventory will likely not be complete until the end of the calendar year.
- January – March
  - Analysis of the WY data, along with relevant external data collection and publications, by the Data Management Team
- March – June
  - Preparation of the draft WY OM&M Report, including progress towards reducing identified Critical Uncertainties to address Learning Strategies and recommendations from the Adaptive Management Team for Adaptive Management actions, MAM Plan revisions, and operational changes.
- June-July: Stakeholder Review Panel / Public Meeting
  - CPRA will present the draft Operations Plan for the upcoming year, to gather input for possible incorporation into that plan, and to consider possible items to be evaluated and or addressed in an OM&M or Adaptive Management report.
  - CPRA will solicit comments, perspectives, and insights from stakeholders and the public on the information contained within the draft OM&M report and the proposed annual Operations Plan for the upcoming WY.
  - CPRA may convene additional meetings throughout the year as deemed appropriate and/or necessary.
  -
- August
  - Completion and release of previous WY OM&M Report, prior to the release of the draft operations plan. WY Project data will be uploaded to the Diver data server (Section 6).
- September: Final Operations Plan
  - Completion and public release of the upcoming WY Operations Plan, prior to October implementation.

5.2.3. Multi-year Project Synthesis Reporting

In addition to the annual timeline of adaptive management activities, additional review and comprehensive synthesis of monitoring data and evaluation of management options will occur at five-year intervals, allowing for the consideration and evaluation of multiple years of monitoring data and to assess processes on a longer time scale. It will also describe progress towards reducing identified Critical Uncertainties to address Learning Strategies, and recommendations from the Adaptive Management Team for Adaptive Management actions, MAM Plan revisions, and operational changes.

The comprehensive data syntheses will be based on multiple years-worth of Project Effectiveness evaluations (Section 4) and other data. The syntheses will be developed consistent with processes used to conduct other comprehensive data reviews.

5.2.3.1. October-December: Data Collation

The DMT will collate multi-year data in the last quarter of the Calendar Year following the end of a particular WY, with the same rationale as described in Section 5.2.2.2 above.

5.2.3.2. January-June: Data Analysis and Project Synthesis Report Drafting

The AMT will lead the analysis of the multi-year datasets and the drafting of the Multi-year MAM Report, in coordination with the OMT. Given the nature of the data, CPRA expects to conduct analyses using a mix of AMT members directly and outside contractors as needed. Note that any serious issues initially identified during this analysis/synthesis could be addressed by the AMT and PMT outside of the rest of the review and communication process below, and brought to the attention of the Stakeholder Review Panel during their June meeting (5.2.2.2).

5.2.3.3. July-August: External Peer Review and Revision

The AMT will coordinate an external peer review of the draft Multi-year MAM Report. The Team will develop the protocols for the external review in coordination with the Stakeholder Review Panel to ensure an objective process. This draft schedule assumes a 45-day review of the draft report, after which the AMT and any relevant contractors will revise the report based on the reviews received.

5.2.3.4. September-October: Stakeholder Review Panel Evaluation

The AMT will work with the OMT to present the revised draft Multi-year MAM Report to the Stakeholder Review Panel and solicit a review and comments from the Panel. CPRA will conduct this presentation as an in-person meeting or a web seminar with the Panel members. The Panel will have four weeks to review the report, after which time the AMT and its contractors will revise the document into a final draft report based on the reviews received.

5.2.3.5. November-December: Public Comment Period

The AMT will coordinate with the OMT to make the revised draft Multi-year MAM Report available for a 30-day public comment period on the final draft report, after which the Adaptive Management Team and any relevant contractors will revise the report based on the reviews received. CPRA will then publicly release the final report.

5.2.3.6. January: Review of Project Synthesis Report Implications

The AMT and OMT will review the Multi-year MAM Report for implications to Project operations and/or additional management actions. Recommendations based on that review will be made to the CPRA Executive Team, and if adopted will be discussed at the next Stakeholder Review Meeting.

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6. DATA MANAGEMENT

6.1. Data Description

Data collected as part of this Project will occur via site visits, field surveys, *in situ* continuous recorder devices, and remote sensing. As discussion in Section 3, data types include hydrologic (e.g., water level, water velocity), bathymetric/topographic (e.g., land/water area, elevations, accretion), geotechnical (e.g., soil characteristics), geophysical (e.g., sidescan sonar), chemical (e.g., salinity, water quality), biological (e.g., fish, invertebrates, wildlife, vegetation), and geospatial (e.g., vector, raster, aerial and satellite imagery). A substantial amount of data will be collected via existing programs, including those coordinated by CPRA (e.g., CRMS, BICM, SWAMP) as well as other agencies (e.g., LDWF, LDEQ, USGS, NOAA). Additional data collection will occur from targeted project-specific monitoring and research. The timing and frequency of data collection varies by parameter, ranging from continuous sampling (e.g., water level), to biannual or annual (e.g., biological surveys), to every few years (e.g., land change).

To the extent practicable, data collection will follow relevant standard operating procedures (SOPs). These include, but are not limited to

- A Standard Operating Procedures Manual for the CRMS – *Wetlands* (Folse et al., 2020).
- Standard Operating Procedures for Geo-scientific Data Management, Louisiana Sand Resources Database (Khalil et al., 2016)
- A Contractor's Guide to the Standards of Practice for CPRA Contractors Performing GPS Surveys and Determining GPS Derived Orthometric Heights within the Louisiana Coastal Zone (CPRA, 2016)
- Coast-wide and Barataria Basin Monitoring Plans for Louisiana's SWAMP (Hijuelos and Hemmerling, 2015)

Electronic data files will follow the file naming convention used by CPRA's Coastal Information Management System (CIMS) as outlined in Appendix 4 of Khalil et al. (2016). Metadata will be developed for project data, and to the extent practicable will follow Federal Geographic Data Committee and International Organization for Standardization standards.

6.2. Data Review and Clearance

All data collected as part of the Project will undergo proper QA/QC, review, and clearance procedures consistent with the guidelines developed by the NRDA Cross-TIG Monitoring and Adaptive Management work group (https://www.gulfspillrestoration.noaa.gov/project?id=71). CPRA's DMT will be responsible for data stewardship following CPRA's documented policies, SOPs, data conventions, and QA/QC procedures (e.g., Folse et al., 2020; Khalil et al., 2015; CPRA, 2016; CPRA, 2017). Data integrity will be checked with detailed and complex QA/QC software routines prior to input into the database, and additional automated routines when input into the database. CPRA staff and contractors who collect and input data into the database may also provide feedback on data quality and software routines to the DMT. Following data QA/QC, CPRA will give the other TIG members time to review the data before publishing on a public site.

6.3. Data Storage and Accessibility

CPRA will provide an online information dashboard to keep the public informed of diversion operations and monitoring results, including real-time data where available (e.g., turbidity, river stage, velocity, and water quality).

All data collected and analyzed as part of this project will be stored on either CPRA's CIMS website (https://cims.coastal.louisiana.gov/default.aspx) and/or the NOAA's Data Integration, Visualization, Exploration, and Reporting (DIVER) tool. CPRA will submit Project data to CIMS and/or DIVER as soon as possible and no more than one year from when data are collected. NOAA will provide a link to CIMS in the DIVER Restoration Portal.

CIMS is the official repository for environmental, modeling, and monitoring data for restoration projects undertaken by the state, as well as programmatic data collected by CRMS and BICM. CIMS combines a network of webpages hosted by CPRA, a GIS database, and a relational tabular database into one public-facing, GIS-integrated system capable of data visualizations and data delivery. Data preservation of the CIMS database/application suite is largely done through regular tape back-up and/or cloud storage for disaster recovery and continuation of service. All data and documents in the CIMS database/application suite are publicly available will continue to be available in perpetuity and/or for the life of the agency.

DIVER serves as the public NOAA repository for data related to the DWH Trustees' NRDA efforts. To provide additional context to the NRDA data, the site also includes historical (pre-2010) contaminant chemistry data for the onshore area of the Gulf of Mexico, as well as contaminant chemistry data collected during the response efforts and by the responsible party, British Petroleum. These data are available to the public and are accessed through a query and mapping interface called DIVER Explorer. Categories of Trustee NRDA data in DIVER include:

- photographs of the emergency response, the oiled animals, plants, fish, and beaches;
- telemetry information collected from remote sensing devices such as transmitter data from animal monitoring;
- field observations such as notes about the condition of animals found in the spill and extent of oiling in marshes;
- instrument data such as water temperatures and salinity collected during the spill; and
- sample results of laboratory analysis on tissue, sediment, oil, and water.

CPRA and NOAA are discussing ways to establish links between the two systems (e.g., ways to point to NRDA project data stored in each system) so CIMS users can easily find relevant data stored in DIVER and vice versa.

6.4. Data Sharing

Preliminary datasets (e.g., data that have not yet been subject to QA/QC or do not have complete metadata) will be accessible to Project participants and partners through non-public repositories (e.g., DWH SharePoint) as they become available. Fully QA/QC'ed data will be made publicly available, in accordance with the Federal Open Data Policy, through either the CIMS Data Portal (https://cims.coastal.louisiana.gov/) and/or the DIVER Explorer (https://www.diver.orr.noaa.gov) within one year of data collection. In the event of a public records request related to data and information on a project that is not already publicly available, the Trustee to whom the request is addressed will provide notice, and an opportunity to comment or object, to the other LA TIG Trustees prior to releasing any project data that is the subject of the request.

Any data that is protected from public disclosure under federal and state law (e.g., personally identifiable information under the Privacy Act or observer information collected under Magnuson–Stevens Fishery Conservation and Management Act will not be publicly distributed.

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7. REPORTING

7.1. DIVER Restoration Portal Reporting

Once finalized, this MAM Plan will be uploaded to the DIVER Restoration Portal and made publicly available through the DIVER Explorer https://www.diver.orr.noaa.gov/) and Trustee Council website (https://www.gulfspillrestoration.noaa.gov/). CPRA will also upload future revisions of the MAM Plan to the DIVER Restoration Portal following development and approval by the LA TIG, following discussions between CPRA and the TIG about the magnitudes of Plan amendments that would warrant reposting.

MAM activities and corresponding documents will be reported annually in the DIVER Restoration Portal. This will include information on the monitoring parameters, performance criteria (if applicable), monitoring duration and frequency, etc.

7.2. Mid-Basin Sediment Diversion Project Annual Operations Plans

The basis of Project operations is the main OMRR&R Plan, and the Annual Operations Plan is its yearly implementation. Information and lessons learned from the previous year will be considered when adjusting the operations plan for each upcoming year. Draft Annual Operations Plans will be presented to the Stakeholder Review Panel and at public meetings to solicit comments, perspectives, and insights. Following any revisions, the plan will be finalized for approval by the CPRA Executive Director.

7.3. Annual Operations Performance Reports

The Project DMT will develop Annual Operations Performance Reports to underpin CPRA's annual Project operations funding requests to the CPRA Board and the Louisiana Legislature. These reports will be limited to a summary of the Project Effectiveness monitoring data available in October of any Calendar Year, immediately following the end of a WY. Once developed, these reports will be posted onto CPRA's CIMS website, as well as uploaded to the DIVER Explorer and Trustee Council websites.

7.4. Annual Operations, Maintenance & Monitoring Reports

Annual OM&M Reports of Water Year Project Effectiveness and Status & Trends Data will be developed by the Operations Management Team that provides data collection results, attribute outcomes, operations information, maintenance updates, recommendations for monitoring, additional project features, lessons learned, etc. from the previous year's operations. As described in Section 5.2.2, these reports will provide a summary of the monitoring data collected during the WY regarding Project Operations and river and basin responses. Some descriptive and initial statistical analyses will be conducted on the WY data. However, more robust analyses will be relegated to the Multi-Year Report described below. Once developed, CPRA will post these reports the CIMS website, as well as upload them to the DIVER Explorer and Trustee Council websites.

7.5. Multi-year Monitoring and Adaptive Management Reports

Multi-year Monitoring and Adaptive Management Reports will be developed as described in Section 5.2.3 to provide a comprehensive analysis of Project Effectiveness and Status & Trends Data during the duration of the project. To the extent practicable, the interim and final MAM reports will be consistent with the MAM report template in the Deepwater Horizon TIG MAM Manual. Once developed, CPRA will post these reports the CIMS website, as well as upload them to the DIVER Explorer and Trustee Council websites.

7.6. Compliance Reporting

7.6.1. National Historic Preservation Act Annual Report

A report documenting the results of the annual reconnaissance survey, developed by CPRA, will be provided to all Consulting Parties within 30 days after completion of the survey. CPRA shall share annual survey results only after USACE New Orleans District (CEMVN) has been allowed to review proposed language and redact any specific location data for the historic properties or new findings or other sensitive data under applicable law and regulations.

7.6.2. US Fish & Wildlife Service Coordination Act Annual Report

CPRA's responsibilities with regards to the US Fish & Wildlife Service (USFWS) Coordination Act require the development and communication of an annual report outlining data specific to USFWS trust resources in the Barataria Basin. CPRA intends for that report to represent a subset of, but otherwise largely mirror the level of analysis in, the Annual OM&M Reports (7.4). The final format, content, and review process for this report will be developed by CPRA and USFWS.

7.6.3. Louisiana Trustee Implementation Group Annual Report

CPRA will develop an annual report to the LA TIG outlining data specific to NRDA trust resources in the Barataria Basin. CPRA intends for that report to represent a subset of, but otherwise largely mirror the level of analysis in, the Annual OM&M Reports (7.4). The final format, content, and review process for this report will be developed by CPRA and the LA TIG.

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9. MONITORING AND ADAPTIVE MANAGEMENT BUDGET

The adaptive management component of a MAM strategy makes long-term budget estimating of a MAM budget difficult, given decisions that will be made throughout Project operations of continued need for collection of data on specific parameters. To match the analyses conducted in support of the Project EIS, however, the budget (Table 9-1) below projects out MAM costs through both a five-year pre-operations (baseline) period and 50 years post-construction (Project operations). Final MAM budget estimates are subject to further conversation between CPRA and the LA TIG agencies.

Table 9-1. Initial estimated costs for Project monitoring and adaptive management during the 5-years pre-operations and either 20 years (NRDA) or 50 years (Other) post-construction. Cost estimates shown are limited to estimated contractual costs for the empirical data collection items outlined in Section 3.

Time Period / Data Collection Are	**Initial Proposed Funding Source**		
	NRDA	**Other**	**Total**
Pre-operations (Baseline)	$29,160,124	$0	$29,160,124
Post-construction (Operations)	$119,577,350	$40,167,600	$159,744,950
Total (Pre + Post)	$148,737,474	$40,167,600	$188,905,074

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10. INVENTORY OF PROJECT-RELATED DISCRETE/APERIODIC STUDIES

Table 10-1. A learning strategy has been identified to address uncertainties in responses of environmental resources to project inputs. In contrast to the uncertainties listed in Table 4.1-4, reducing the uncertainties in this table is not critical to the Adaptive Management cycle for this Project. The "Reference" column lists the source that identified the uncertainty (this MAM Plan, the Project Phase II Restoration Plan, and the Diversion Expert Panel reports #1-7 (CPRA 2014/2015/2016)).

Uncertainty	Reference	Purpose of Learning Goal	Learning Strategy
Ecosystem function in the created marsh (project outfall area) compared to pre-construction existing condition in the same area.	MAM Plan 4.1.3; Diversion Expert Panel Report #1	Quantify restoration benefits (Objective 3)	Compare pre-construction and 5-year post-operations values for *Land and water extent* (3.7.3.1), *Emergent wetland area* (3.7.3.2), *Vegetation Cover, Abundance, and Height* (3.7.3.3), *Emergent and submerged vegetation community type* (3.7.3.5), *Emergent vegetation biomass in the Project area* (3.7.3.6), *Topography/bathymetry of the Project delta development area* (3.7.1.1.7), *Lower trophic level organisms* (3.7.3.16), *Nekton species abundance and composition/assemblage* (3.7.3.18), and *Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area* (3.7.3.22). Use an ecosystem model ensemble approach (spatially articulate and including trophic interactions) to increase confidence in conclusions.
Comparative wetland function of three types of wetland treatments: marsh built by this sediment diversion; a marsh built by conventional wetland restoration (marsh creation from dredged sediments); and unrestored marsh (CRMS-Wetlands stations).	MAM Plan 4.1.3	Quantify restoration benefits (Objective 3)	Develop experimental design and evaluate wetland function including *Topography/bathymetry of the Project Influence Area* (3.7.1.1.7) and *Aquatic resource and terrestrial wildlife utilization of created/restored habitat* (3.7.3.22)

Table 10-1 (*continued*). A learning strategy has been identified to address uncertainties in responses of environmental resources to project inputs (*continued*).

Uncertainty	Reference	Purpose of Learning Goal	Learning Strategy
Will the Project help to reduce the size, shape, or severity of the Gulf hypoxic zone by filtering some of the Mississippi River nutrients that would otherwise reach Gulf waters?	Restoration Plan 3.2.1.6.5	Quantify restoration benefits (Objective 3)	Evaluate *Dissolved Oxygen* (3.7.3.7) and data from the nearshore Gulf of Mexico (e.g. www.gulfhypoxia.net), *Nutrient loads conveyed into Barataria Basin* (3.7.1.2.4), and *Nutrient constituents in Barataria Surface Waters* (3.7.3.12).
Changes in the Barataria basin community assemblage, biodiversity of the aquatic food web, the food web links, and the benthic: pelagic ratios (biomass and productivity, including interannual and seasonal variability) over time.	MAM Plan 4.1.3	Quantify restoration benefits (Objective 3)	Refine and run ecosystem models (Section 1.5) and evaluate additional parameters: *Lower Trophic Level Organisms* (Section 3.7.3.16), *Nekton species abundance and composition/assemblage* (3.7.3.18), and *Aquatic resource and terrestrial wildlife utilization of habitat in the Project Influence Area* (3.7.3.22).
Statistical relationship of environmental condition variability to food web changes	MAM Plan 4.1.3	Quantify restoration benefits (Objective 3)	Refine and run ecosystem models (Section 1.5).

Table 10-1 (*continued*). A learning strategy has been identified to address uncertainties in responses of environmental resources to project inputs (*continued*).

Uncertainty	Reference	Purpose of Learning Goal	Learning Strategy
Nutrient influence on soil strength and efficacy of land building; Effects of nutrients on floating marsh and emergent marsh soil strength, organic accretion rates, shallow rooting, increased rate of microbial decomposition of soil organic materials, and/or growth alterations to emergent vegetation	TWIG 2014a, TWIG 2015b; MAM Plan 1.4.3, 3.7.1.1.3	Quantify restoration benefits (Objective 3)	Evaluate *Topography/bathymetry of the Project Influence Area* (3.7.1.1.7), *Nutrient loads conveyed into Barataria Basin* (3.7.1.2.4), *Soil organic matter content* (3.7.2.1.4), *Soil total nutrients* (3.7.2.1.6), Soil strength (3.7.2.1.8), *Marsh surface elevation change rate in the Project Influence Area* (3.7.2.1.9), *Land and water extent / Area of new delta formation in the Project Influence Area (3.7.3.1)*, *Emergent wetland area* (3.7.3.2.), *Vegetation Cover, Abundance, and Height* (3.7.3.3), *Emergent and submerged vegetation community typ*e (3.7.3.5), *Emergent vegetation biomass in the Project area* (3.7.3.6), *Nutrient constituents in Barataria Surface Waters* (3.7.3.12). Establish marsh experiments in controlled environments and in greenhouses. Consider data and publications from other Barataria Basin diversion studies.
Can nutrients be effectively filtered by vegetation and sediment in receiving basins, or will nutrient delivery exceed the needs of primary producers and lead to local and far-field algal bloom?	TWIG 2014a, MAM Plan 3.7.1.1.3	Effect of excess nutrients on water quality	Evaluate *Nutrient loads conveyed into Barataria Basin* (3.7.1.2.4), phytoplankton blooms (3.7.3.9), harmful algal blooms (3.7.3.10), dissolved oxygen (3.7.3.7). May require supplemental data collection (beyond the scope of this MAM Plan).
How will rates of nutrient and toxin assimilation change following Project Operations?	TWIG 2014a	Effects of nutrients on HCABs, toxins, and associated implications for ecosystem effects and human health	Phytoplankton Species Composition (including Harmful Cyanobacterial/Algal Bloom Species) (3.7.3.10), Harmful Cyanobacterial/Algal Bloom Toxins 3.7.3.11). May require supplemental data collection (beyond the scope of this MAM Plan).

Table 10-1 (*continued*). A learning strategy has been identified to address uncertainties in responses of environmental resources to project inputs (*continued*).

Uncertainty	Reference	Purpose of Learning Goal	Learning Strategy
Effects on SAV coverage related to dispersal opportunities (expansion) and reduced salinity and suspended sediments (shifts in composition)	TWIG 2014a	Quantify restoration benefits (Objective 3)	*Submerged aquatic vegetation area* (3.7.3.4), *Emergent and submerged vegetation community type* (3.7.3.5), *Salinity* (3.7.3.8), *Turbidity of Barataria Surface Waters* (3.7.3.14)
Recruitment potential of emergent marsh species in newly formed deltaic sediments, and colonization in receiving basins that are relatively isolated and degrading vs in vegetated basins with ample propagule sources	TWIG 2014a	Quantify restoration benefits (Objective 3)	Emergent wetland area (3.7.3.2.), Vegetation Cover, Abundance, and Height (3.7.3.3), Emergent and submerged vegetation community type (3.7.3.5), Emergent vegetation biomass in the Project area (3.7.3.6). May require supplemental data collection (beyond the scope of this MAM Plan).
Relationship of social factors to diversion performance and operations (e.g., sediment volumes affected by runoff throughout the watershed; future navigation needs related to economic activity)	TWIG 2014a	Socioeconomic influences on Project performance	Explicitly link social outcome analysis to biophysical models. Incorporate the role of upstream social and economic factors, including other diversions and restoration projects, into diversion project performance assessment.

Table 10-1 (*continued*). A learning strategy has been identified to address uncertainties in responses of environmental resources to project inputs (*continued*).

Uncertainty	**Reference**	**Purpose of Learning Goal**	**Learning Strategy**
Correlation of socioeconomic changes and biophysical changes, such as character of natural resources (e.g., land mass, water quality, flood risks, species abundance) and social resources (e.g., fishing, hunting, navigation, agriculture, community structure, property value).	TWIG 2014a, 2016b	Socioeconomic response to biophysical changes	Ecosystem Services analysis approach to link policy and management interventions to changed biophysical outcomes and then corresponding changes in social impacts, expressed as human health, financial, employment, and community welfare outcomes. Evaluate changes in community demographics; results of retail/service and housing market analyses; demand for public services; changes in employment and income levels; and changes in the aesthetic quality of the community.

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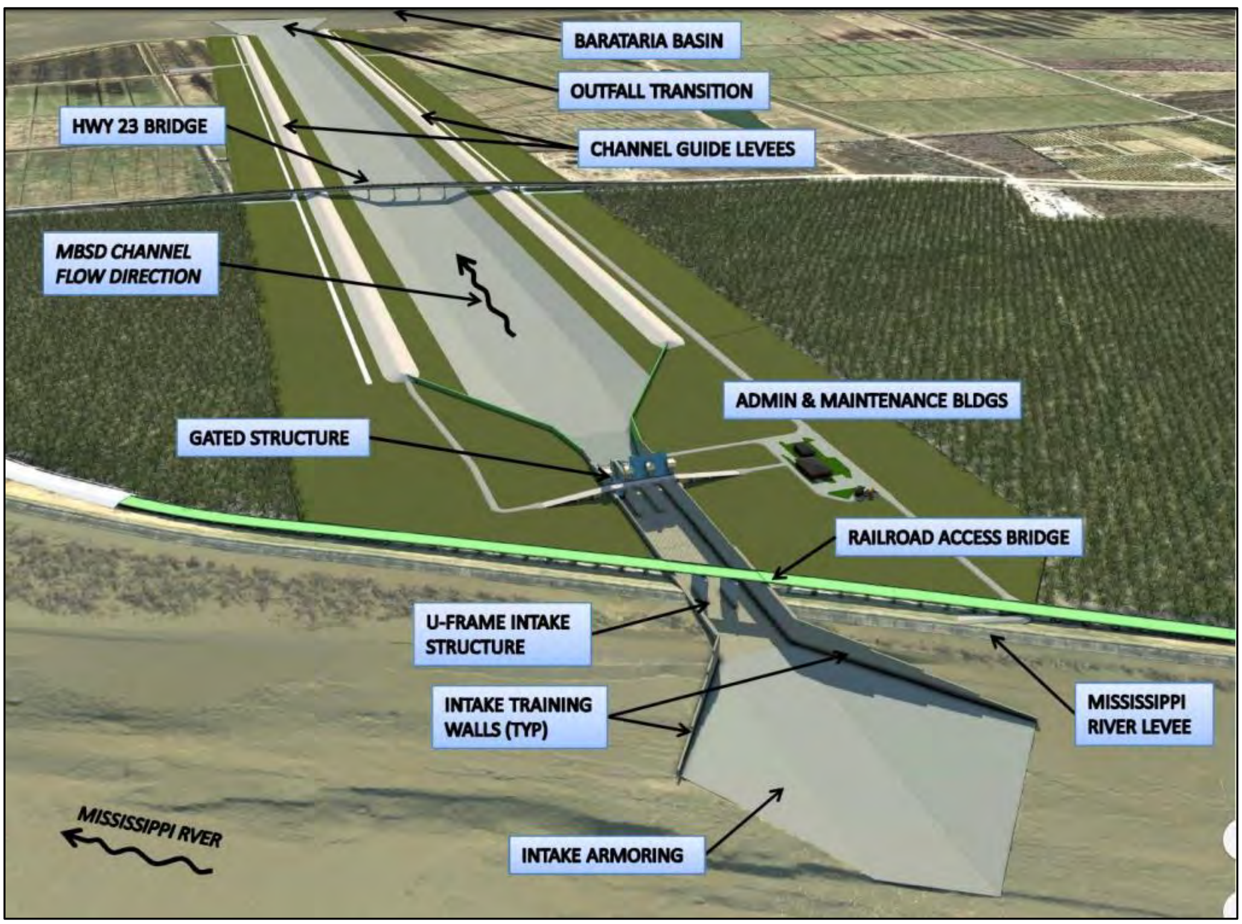
11. PROJECT ADAPTIVE MANAGEMENT DECISION LOG AND CATALOG OF UPDATES TO THE MONITORING AND ADAPTIVE MANAGEMENT PLAN

This section will be populated through time as this Plan is updated.

Attachment 2: Mitigation and Stewardship Plan for the Proposed MBSD Project

Note: The Mitigation and Stewardship Plan for the Proposed MBSD Project may be revised over time based on the outcome of Project operations, the results of monitoring under the MAM Plan, and the need for and effectiveness of the mitigation and stewardship measures. The most up to date version of the Mitigation and Stewardship Plan can be found on the Louisiana CPRA Mid-Basin Sediment Diversion Program webpage at https://cims.coastal.la.gov/.

MITIGATION AND STEWARDSHIP PLAN
FOR THE
MID-BARATARIA SEDIMENT DIVERSION PROJECT
(CPRA PROJECT NUMBER BA-0153)



22 August 2022

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MID-BARATARIA SEDIMENT DIVERSION
MITIGATION AND STEWARDSHIP PLAN

1. INTRODUCTION

The Coastal Protection and Restoration Authority of Louisiana (CPRA) is planning to construct, operate, and maintain the proposed Mid-Barataria Sediment Diversion Project (Project). The Project is intended to address injuries caused by the *Deepwater Horizon* (DWH) oil spill by implementing a large-scale sediment diversion in the Barataria Basin. The sediment diversion will reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, fresh water, and nutrients to support the long-term viability of existing and planned coastal restoration efforts.

The Project has the potential to directly and indirectly impact—both beneficially or adversely—jurisdictional wetlands and other waters of the United States, U.S. Army Corps of Engineers (USACE) civil works projects, threatened and endangered species, marine mammals, essential fish habitat (EFH), and other elements of the environment, as identified in the National Environmental Policy Act (NEPA) environmental impact statement (EIS) for the Project.

The Purpose of this Mid-Barataria Sediment Diversion Mitigation and Stewardship Plan (Mitigation Plan) is to demonstrate how adverse impacts of the Project will be avoided, minimized, or mitigated to the extent required under applicable federal law. In particular, the objectives of the Mitigation Plan include identifying mitigation that will: (1) offset unavoidable adverse impacts to jurisdictional waters of the United States; and (2) ensure the Project is not contrary to the public interest, pursuant to section 404 of the Clean Water Act (CWA), and sections 9 and 10 of the Rivers and Harbors Act.

The Mitigation Plan also identifies: (1) conservation measures to avoid and minimize potential effects to species listed as threatened or endangered under the federal Endangered Species Act (ESA); (2) conservation recommendations provided by the National Marine Fisheries Service (NMFS) to conserve, avoid and/or minimize adverse effects to EFH; (3) recommendations provided by the U.S. Department of Interior’s Fish and Wildlife Service (FWS) under the Fish and Wildlife Coordination Act (FWCA); and (4) stewardship measures to address project-related changes to the environment.

CPRA will implement the mitigation and stewardship measures set forth in this Plan provided the Project receives all necessary approvals and is funded for construction.

2. PROJECT OVERVIEW

The Project is a controlled intake diversion structure in Plaquemines Parish, Louisiana connecting the Mississippi River with the adjoining Barataria Basin. The structural features of the Project will be located on the west bank of the Mississippi River at River Mile (RM) 60.7. The Project is intended to convey sediment, fresh water, and nutrients from the Mississippi River into an outfall area within the Barataria Basin in Plaquemines and Jefferson Parishes. After passing through a proposed intake structure complex at the confluence of the Mississippi River and the proposed intake channel, the sediment-laden water would be transported through a conveyance channel to an outfall area in the mid-Barataria Basin.

Flow in the diversion would be variable, with the gates opening when the Mississippi River gage in Belle Chasse reaches 450,000 cubic feet per second (cfs). The diversion would reach a peak flow of 75,000 cfs into the mid-Barataria Basin when the Mississippi River discharge is 1,000,000 cfs or more. When Mississippi River flows are below 450,000 cfs at Belle Chasse, the Project would maintain a background (base) flow of up to 5,000 cfs to protect, sustain, and maintain newly vegetated or recently converted fresh and intermediate habitats near the diversion outflow.

As more fully explained in Section 5 below, the Project is anticipated to have major, permanent benefits on wetlands and other U.S. jurisdictional waters in the Barataria Basin. The purpose of the diversion of fresh water, sediments, and nutrients into the Barataria Basin is to build, sustain, and maintain wetlands and riverine deltaic processes in an area that has been isolated from natural flooding inputs from the Mississippi River. A consistent and large magnitude input of sediment will lead to accumulation of diverted sediments and formation of new sub-areal features available for plant colonization. Direct deposition within existing wetlands contributes to surface accretion helping to offset the effects of sea level rise and subsidence.

3. PROJECT SITE

The Project Area is shown in Figures 1 and 2 below. A detailed description of the ecologic characteristics of the Project site is presented in Chapter 3 of the Final EIS.

Figure 1

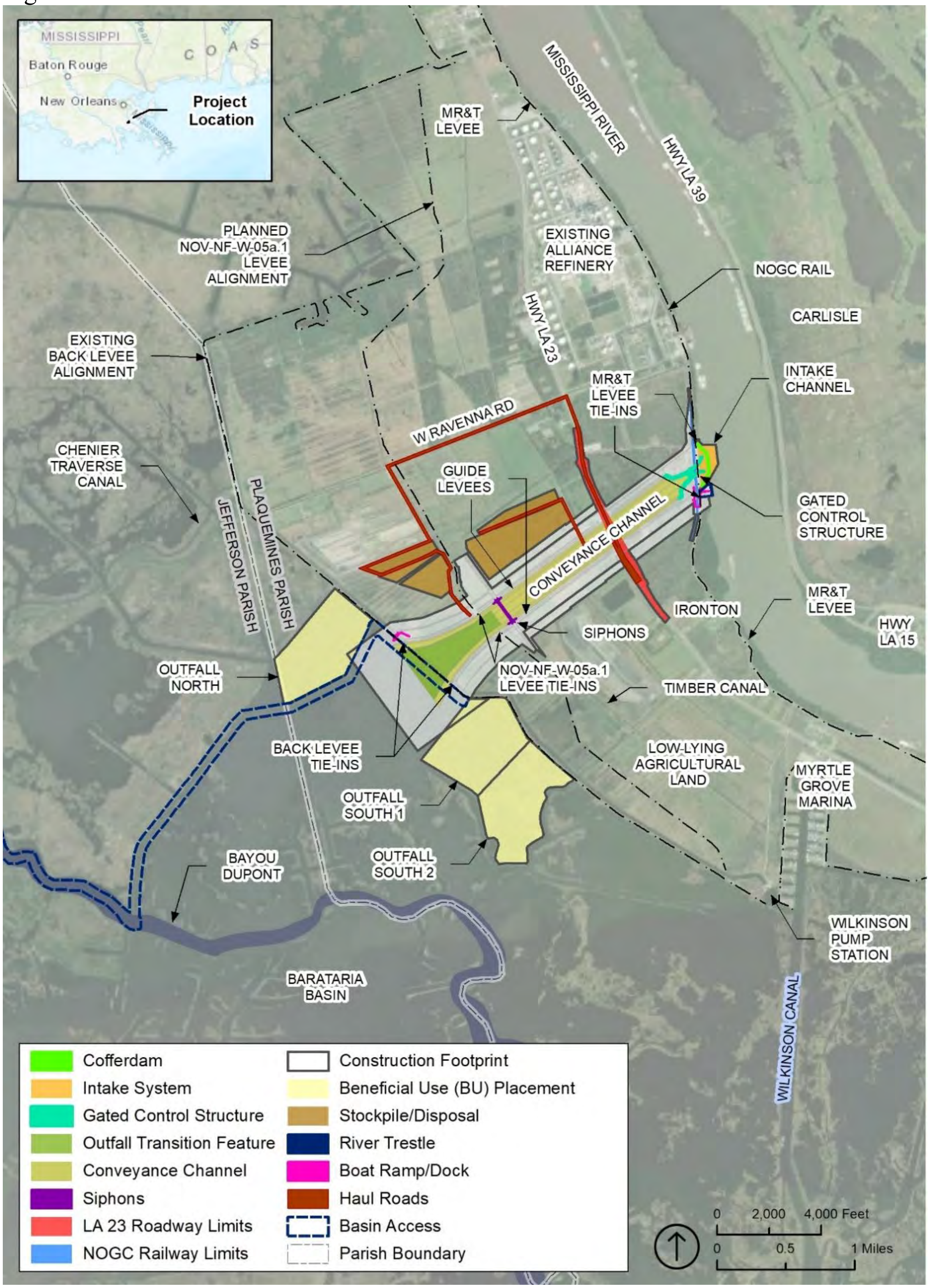
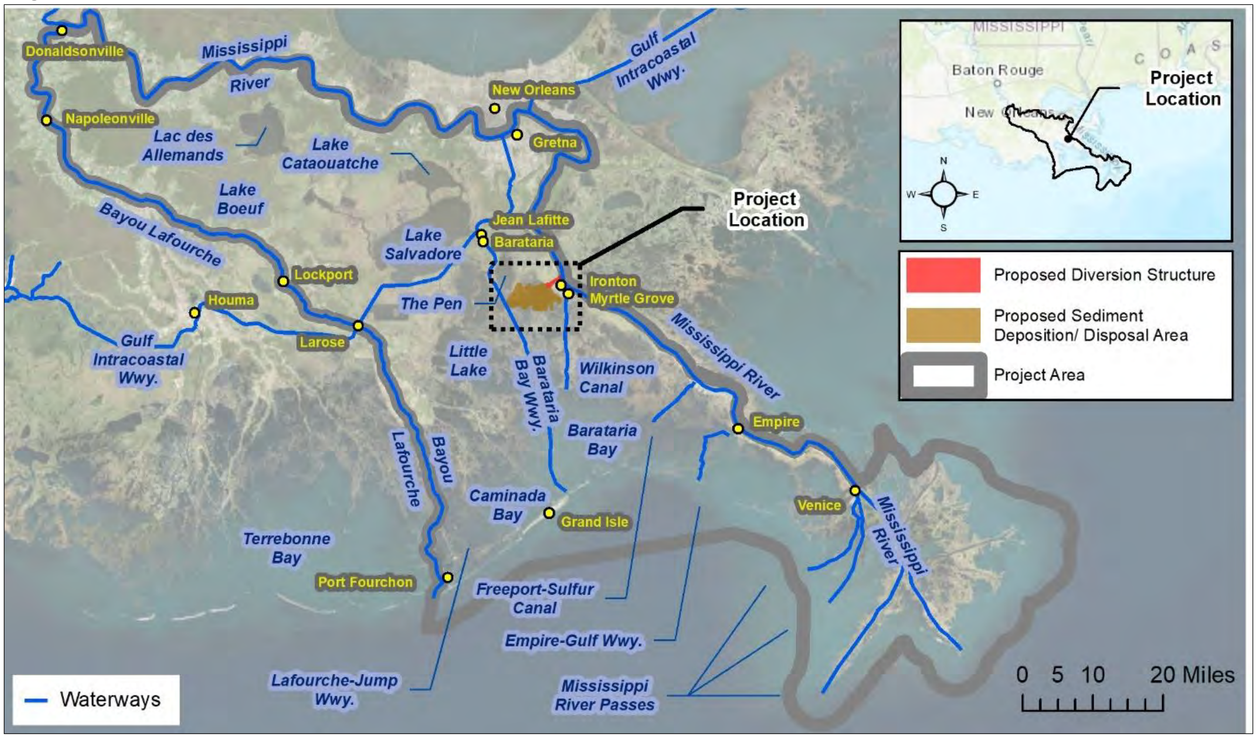

MISSISSIPPI
Baton Rouge
New Orleans
COAS
Project Location
MR&T LEVEE
MISSISSIPPI RIVER
HWY LA 39
PLANNED NOV-NF-W-05a.1 LEVEE ALIGNMENT
EXISTING ALLIANCE REFINERY
NOGC RAIL
CARLISLE
EXISTING BACK LEVEE ALIGNMENT
HWY LA 23
MR&T LEVEE TIE-INS
INTAKE CHANNEL
W RAVENNA RD
CHENIER TRAVERSE CANAL
GUIDE LEVEES
GATED CONTROL STRUCTURE
CONVEYANCE CHANNEL
JEFFERSON PARISH
PLAQUEMINES PARISH
MR&T LEVEE
IRONTON
HWY LA 15
SIPHONS
OUTFALL NORTH
NOV-NF-W-05a.1 LEVEE TIE-INS
TIMBER CANAL
BACK LEVEE TIE-INS
LOW-LYING AGRICULTURAL LAND
MYRTLE GROVE MARINA
OUTFALL SOUTH 1
BAYOU DUPONT
OUTFALL SOUTH 2
WILKINSON PUMP STATION
BARATARIA BASIN
WILKINSON CANAL
Cofferdam
Intake System
Gated Control Structure
Outfall Transition Feature
Conveyance Channel
Siphons
LA 23 Roadway Limits
NOGC Railway Limits
Construction Footprint
Beneficial Use (BU) Placement
Stockpile/Disposal
River Trestle
Boat Ramp/Dock
Haul Roads
Basin Access
Parish Boundary
0 2,000 4,000 Feet
0 0.5 1 Miles

Figure 2



The marshes of the mid-Barataria Basin are increasingly fragmented due to increased saltwater intrusion, subsidence, and erosional forces and are losing land area at a more rapid rate than other areas of the basin (Ayres 2012; Couvillion et al. 2016; CPRA 2012 and 2017). As a result, this portion of the Basin is viewed as an area of critical need within the Barataria Basin that may benefit most markedly from a sustained infusion of sediment, fresh water, and nutrients from a sediment diversion.

If no action were taken, the trend of increasing land loss in the Barataria Basin would continue, resulting in the projected conversion of up to nearly 274,000 acres of emergent wetlands and other subaerial (above the water surface) landforms to subaqueous (below the water surface) shallow water by the year 2070 (see Table 4.2-3 in Final EIS Section 4.2.3 Geology, Topography and Geomorphology).

The Barataria Basin was identified in the Louisiana Trustee Implementation Group's (LA TIG) Final Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana (SRP/EA #3) as a focus area for restoration activities because within Louisiana, the Barataria Basin suffered the most severe and persistent oiling from the DWH oil spill (LA TIG 2017). It is also an "area of critical need" due to its significant and continuing land loss. In the SRP/EA #3, the LA TIG identified a combination of sediment diversions and marsh creation projects as the preferred restoration strategy for the Barataria Basin.

The proposed location for the Project is in the Middle Basin. As described in more detail in the Final EIS, a project in the Middle Basin allows for capture and redistribution of fine-grained and coarse-grained sediments, is buffered from excessive erosional forces, and is better protected from extreme changes in salinity.

4. PERMITTING HISTORY AND RELATED MITIGATION GUIDELINES AND REQUIREMENTS

4.1. Oil Pollution Act

On March 20, 2018, consistent with Oil Pollution Act (OPA), the LA TIG published the SRP/EA #3. In the SRP/EA #3, the LA TIG Trustees selected a large-scale sediment diversion for further planning as part of a suite of restoration projects that constitutes the Applicant's Preferred Alternative for restoring DWH oil spill injuries through restoration in the Barataria Basin. The Trustees further selected the Project, among others, for advancement and further evaluation under OPA and NEPA in a Phase II Restoration Plan and NEPA analysis.

4.2. Clean Water Act Section 404/Rivers and Harbors Act Section 10

Because the Project would involve the discharge of dredged and fill material into waters of the United States and requires construction to be performed in the Mississippi River and the Barataria Basin, a CWA Section 404 permit and a Rivers and Harbors Act (RHA) Section 10 permit are required for construction and operation of the Project. Permits for activities requiring approval under both Section 10 of the RHA and Section 404 of the CWA are processed simultaneously by the USACE.

CPRA submitted a Joint Permit Application on June 23, 2016, to the USACE, New Orleans District (CEMVN) for Section 404/10 permits. On March 26, 2018, CPRA submitted a revision to the permit application including a revised statement of Purpose and Need.

The USACE decision whether to issue Section 404/10 permits will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest.[i] Relevant factors in such evaluation include: "conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people."[ii] Compensatory mitigation may be required to ensure that an activity requiring authorization is not contrary to the public interest.[iii]

In addition, pursuant to CWA Section 404, compensatory mitigation is required to offset environmental losses from unavoidable impacts to waters of the United States.[iv] The U.S. Environmental Protection Agency (EPA) and the USACE have articulated the policy and procedures to be used in the determination of the type and level of compensatory mitigation necessary (Section 404(b)(1) Guidelines).[v] The Section 404(b)(1) Guidelines state that "the district engineer will issue an individual Section 404 permit only upon a determination that the proposed discharge complies with applicable provisions of 40 CFR Part 230, including those which require the permit applicant to take all appropriate and practicable steps to avoid and minimize adverse impacts to waters of the United States."[vi] Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Under the Section 404(b)(1) Guidelines, impacts must first be avoided and minimized.[vii] Avoidance of impacts to aquatic resources involves the least-damaging project type, spatial location and extent compatible with achieving the purpose of the project. Avoidance is achieved through an analysis of appropriate and practicable alternatives and a consideration of the impact footprint. Minimization involves managing the severity of a project's impact on resources at the selected site. Minimization is achieved through the incorporation of appropriate and practicable design and risk avoidance measures. If impacts cannot be avoided or minimized, compensatory mitigation should be provided.[viii]

Compensatory mitigation involves replacing or providing substitute resources for impacts that remain after avoidance and minimization measures have been applied. The implementation of the compensatory mitigation should be in advance of or concurrent with the impacts.

4.3. Rivers and Harbors Act Section 408

Section 408 of the RHA provides that the USACE may grant permission for another party to alter a Civil Works project upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the Civil Works project.[ix] As in the context of Section 404/10 permits, the USACE may require mitigation to ensure the proposed alteration is not injurious to the public interest.[x]

The Project has the potential to alter USACE civil works projects and requires Section 408 permission to proceed. The following USACE civil works projects are located within the Project area: the Mississippi River Ship Channel Gulf to Baton Rouge Project, Saltwater Sill Mitigation Project, Gulf Intracoastal Waterway, Barataria Bay Waterway, Bayou Lafourche and Lafourche-Jump Waterway, Mississippi River and Tributaries Project – Mississippi River Levee, Hurricane and Storm Damage Risk Reduction System Projects, Larose to Golden Meadow Project, and Davis Pond Freshwater Diversion Project.

CPRA submitted a Section 408 Permission Request Letter on January 13, 2017, to CEMVN for a Section 408 permission. CEMVN determined that Section 408 permission was required with respect to the Mississippi River Ship Channel, the Mississippi River & Tributaries Levees, and the New Orleans to Venice (NOV) Non-Federal Levee (NFL) USACE, New Orleans District projects.

4.4. National Environmental Policy Act

NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. NEPA does not require federal agencies to prescribe mitigation for effects of their actions.

Because federal approvals, including Section 404 and 10 permits and Section 408 permission, are required for the Project, the Project is a federal action subject to NEPA. The USACE is the lead federal agency for compliance with NEPA. The USACE determined that the Project may significantly affect the quality of the human environment and therefore, decided to prepare an EIS. The USACE prepared a DEIS dated March 5, 2021, in accordance with NEPA and applicable NEPA implementation regulations (43 U.S.C. § 4321 *et. seq*.; 40 C.F.R. § 1500, as amended; 33 C.F.R. § 325, Appendices B and C). The USACE requested that six federal and state agencies with statutory authority or special expertise with an environmental issue participate in the EIS process as cooperating agencies, including the Environmental Protection Agency, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), the NOAA Damage Assessment, Remediation, and Restoration Program (DARRP), the U.S. Department of Interior's FWS, the Louisiana State Historic Preservation Office (LA SHPO), and the Louisiana Department of Transportation and Development (LDOTD). The USACE also invited several federal, state, and local agencies to participate in the EIS process as commenting agencies, including the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS), the Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), the Louisiana Department of Wildlife and Fisheries (LDWF), the Louisiana Department of Natural Resources (LDNR), the Louisiana Office of State Lands (OSL), the Louisiana Department of Environmental Quality (LDEQ), the Plaquemines Parish Government (PPG), and the Jefferson Parish Government (JPG).

Impacts identified in the Draft and Final EIS and associated technical analyses (as well as in other analyses outside of the NEPA process) were used as the basis for mitigation in the Mitigation Plan. The Final EIS is expected to be published in 2022. The Final EIS will also inform decisions made by the LA TIG regarding restoration planning and related funding decisions relevant to the Deepwater Horizon natural resource damage settlement. The Final EIS evaluates any environmental consequences associated with implementation of the mitigation and stewardship measures presented here. That evaluation is included in Appendix R-3 and Appendix R-4 of the Final EIS.

4.5. Endangered Species Act

Section 7(a)(2) of the ESA requires federal agencies to consult with NMFS and/or the FWS (collectively the Services) to ensure that effects of actions that the federal agencies authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitat. During this consultation, the federal action agency prepares an initial assessment of the potential impacts of the proposed action on listed species and critical habitat. If the action agency determines that an action is not likely to adversely affect listed species or critical habitat, and the Services agree with that assessment, the ESA consultation is concluded informally.

If the action agency determines that an action is likely to adversely affect listed species or designated critical habitat, the action agency prepares an assessment of those potential impacts and provides it to the Services. The Services then evaluate the impacts to listed species and their designated critical habitat, including impacts resulting from any indirect and cumulative effects.[xi] Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur.[xii] Cumulative effects are effects of future State, tribal, local, or private actions (not Federal actions) that are reasonably certain to occur in the action area.

The evaluation of the impact of the proposed action may take into account the actions to benefit or promote the recovery of listed species that are included by the federal agency as an integral part of the proposed action. If the applicable Service determines that the action is not likely to jeopardize the continued existence of the listed species and not likely to destroy or adversely modify its designated critical habitat, it will issue a “no jeopardy” biological opinion and an incidental take statement (ITS), detailing the amount and extent of anticipated incidental take.[xiii] The ITS will include reasonable and prudent measures—actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. The ITS will also include additional terms and conditions that the federal agency and any applicant must implement to minimize the impact of such incidental take. If the applicable Service determines that the action is likely to jeopardize the listed species or to destroy or adversely modify its designated critical habitat, it will issue a “jeopardy” biological opinion and identify a reasonable and prudent alternative to the proposed action.

The USACE submitted a biological assessment to NMFS and initiated Section 7 consultation for the Project in February 2021. The USACE submitted a biological assessment to FWS and initiated Section 7 consultation for the Project on July 2, 2021. These consultations resulted in a biological opinion from each Service in December 2021. This documentation is provided in Appendix O of the FEIS.

4.6. Fish and Wildlife Coordination Act

The FWCA requires federal agencies to consult with FWS and the head of the agency exercising administration over the wildlife resources of the particular State regarding activities that affect, control or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat.[xiv] FWS and the state agency may make recommendations for consideration by the federal agency; the agency may consider the recommendations but is not required to follow them.[xv]

Pursuant to FWS guidance,[xvi] mitigation is accomplished through the use of a five-step process for reducing or eliminating losses from a project: avoidance, minimization, rectification, rectification over time, and compensation. Compensation is used to mitigate for unavoidable losses after the first four components of mitigation have been applied. Compensation means full replacement—substitution of fish and wildlife resource losses with resources considered to be of equivalent biological value—of project-induced losses to fish and wildlife resources.

Under the policy, the mitigation goal depends on the category of resource to be impacted by the action, as follows:

- Resource category 1: Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section.
    - Mitigation goal: no loss of existing habitat value.
- Resource category 2: Habitat to be impacted is of high value for evaluation species and is relatively scarce.
    - Mitigation goal: no net loss of in-kind habitat value.
- Resource category 3: Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant.
    - Mitigation goal: no net loss of habitat value while minimizing loss of in-kind habitat value.
- Resource category 4: Habitat to be impacted is of medium to low value for evaluation species.
    - Mitigation goal: minimize loss of habitat value.

The USACE initiated consultation with the FWS and the state under the FWCA on January 19, 2021. FWS made the following recommendations:

1. The Service recommends the construction of crevasse projects that may include terracing to offset the indirect loss of 926 acres on the Delta NWR [National Wildlife Reserve] and 37 acres on the Pass-A-Loutre (PAL) WMA [Wildlife Management Area]. Funding for these crevasse projects is potentially available from a variety of sources, including the Coastal Wetland Planning, Protection and Restoration Act (CWPPRA), but should funding not be available through those sources to implement the crevasse projects, funding should be secured through Operations and Maintenance costs associated with the project or set aside in the Monitoring and Adaptive Management Plan to ensure wetland losses in Delta NWR and PAL WMA will be addressed. Any CWPPRA funding for these crevasse projects should be in addition to, and should not displace, CWPPRA funding that would otherwise be used to implement crevasse projects in Delta NWR and PAL WMA. The Service recognizes that the Birdfoot Delta Hydrologic Restoration Project, the Engineering and design of which were funded pursuant to Deepwater Horizon Oil Spill, Louisiana Trustee Implementation Group Final Restoration Plan and Environmental Assessment #7: Wetlands, Coastal and Nearshore Habitats and Birds (November 2020), will, if funded for implementation, provide further benefits to the Delta NWR and PAL WMA and offset the indirect losses on those resources from the MBSD. For additional information on possible projects, associated permits, and for all activities occurring on the Delta NWR, please coordinate with this office and the Southeast Louisiana Refuges by contacting Barret Fortier (985.882.2011, barret_fortier@fs.gov), and for similar information on any activities planned for Pass a

Loutre WVA contact LDWF, Mr. Vaughn McDonald 225-765-2708, atvmcdonald@wlf.la.gov).
Applicant Response: Within 5 years of the commencement of Project operations, CPRA or the LA TIG will provide $10,000,000 of additional funding for wetland preservation and restoration work in the Delta NWR and the PAL WMA to offset modeled acres of indirect wetland losses in those areas. That funding may be accomplished through additional funding through the CWPPRA program, through additional restoration work sponsored by the LA TIG (for example, construction of the E&D work discussed in the DWH LA TIG's Restoration Plan and Environmental Assessment #7), or through a direct contribution for additional work. The funding will be proportioned between the Delta NWR and the PAL WMA based on the magnitude of the predicted wetland loss in each area. FWS concurs with this implementation strategy for Conservation Recommendation Number 1.

2. The impacts to Essential Fish Habitat should be discussed with the NMFS to determine if the project complies with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Magnuson-Stevens Act; P.L. 104-297, as amended, and its implementing regulations.
   Applicant Response: CPRA agrees to Conservation Recommendation 2 and is actively coordinating with NMFS regarding potential impacts to Essential Fish Habitat.

3. In order to better coordinate and consider the overall health of the Barataria Basin, the Service recommends that a basin-wide operations and basin monitoring data repository be developed. The data and conclusions should be readily available to help in the general coordination among diversion operators, within their authorizations, and to understand both adverse and beneficial impacts to the overall basin. The Service and other natural resource agencies should be involved in reviewing and commenting on this data repository.
   Applicant Response: CPRA agrees to Conservation Recommendation 3 and has developed a data repository consistent with this Recommendation. CPRA looks forward to discussing that repository with the Service and other natural resource agencies.

4. Monitoring of the Davis Pond and Caernarvon Diversions indicated that some contaminants were being introduced into the receiving areas from the Mississippi River. To address potential impacts of future contaminants on fish and wildlife resources, the Service recommends that pre and post sampling of fish and shellfish from the outfall area and the Mississippi River be undertaken. The Service recommends that CPRA, in coordination with the Service, develop a list of contaminants to be analyzed. The Service and CPRA should refer to the most recent EPA Priority Pollutant list in developing the list of contaminants to be analyzed. Periodic post-operational sampling should start after sufficient time for potential contaminants to accumulate (i.e., 3 to 5 years) and the frequency of subsequent periodic sampling (e.g., 3 to 5 years) would be predicated upon levels of contaminants detected. Expansion of sampling to local nesting bald eagles (e.g., fecal and blood samples analyzed for the same contaminant) would also be predicated

upon the type and level of contaminants detected. If high levels of contaminants are found, the Service and other resource agencies should be consulted. This adaptive sampling plan should be developed in cooperation with the Service and other natural resource agencies and implemented prior to operation.
Applicant Response: CPRA agrees to Conservation Recommendation 4.

5. The Service recommends that consideration be given to operating the diversion in a manner that would prevent or minimize adverse impacts to wetlands due to prolonged inundation and focus on the overall enhancement of the entire project area to the greatest extent possible.
   Applicant Response: CPRA agrees to Conservation Recommendation 5.

6. The Service recommends development of a detailed Monitoring and Adaptive Management (MAM) Plan to inform operational decisions in order to minimize adverse impacts where possible. The MAM Plan should be developed through coordination with the Service, NMFS, and other resource agencies. At a minimum, the MAM Plan should address the following issues:
   a. Receiving area water levels should be monitored to minimize any potential adverse impacts such as inundation impacts (refer to Services' recommendation 5, which should be included as part of the MAM plan).
   b. The operational plan should include provisions for water level triggers to mitigate effects from coastal flood advisories during operation.
   c. Implementation of water quality sampling for concentrations of nutrients and dissolved oxygen prior to and during operation to help determine impacts from diverted water on nutrient concentrations and resulting water quality effects.
   d. Concentrations of EPA Priority Pollutants and Contaminants of Concern (COC) should be sampled in fish and shellfish from the outfall area and Mississippi River prior to and following operation to determine potential adverse effects to fish and wildlife. The frequency, intensity, and potential expansion of the sampling should be predicated upon containment levels detected (refer to the Services' Recommendation 4 which should be included in the MAM plan).
   e. There should be monitoring of below- and above- ground biomass to understand inundation and salinity effects on wetland health.
   f. Measurement of sediment accretion (water bottom and on the marsh surface) and bulk density should be conducted throughout the receiving area to provide the data needed to optimize sediment delivery and distribution to receiving area wetlands.
   g. MAM plan results (i.e., sedimentation, fishery, water quality monitoring, etc.) should be used to refine and improve future operations (refer to the Services' Recommendation 3).

   Applicant Response: CPRA agrees to Conservation Recommendation 6 and has worked closely with the Service, NMFS, and other resource agencies to develop a MAM plan that satisfies the components of this Recommendation.

7. The Service recommends adaptively managing the diversion outfall area to minimize stage increases and to maximize distribution and capture of suspended sediments within the immediate outfall area. This is needed to prevent the loss of diversion efficiency should diverted water attempt to circumvent the wetlands and flow directly into Wilkinson Canal or the Barataria Bay Waterway rather than flow over marsh where it will do the most good and ensure achieving project goals. Dredged material associated with achieving this recommendation should be beneficially used to create, restore, or enhance marsh within the basin or surrounding areas.
   Applicant Response: CPRA agrees to Conservation Recommendation 7.

8. A report documenting the status of implementation, operation, maintenance and adaptive management measures should be prepared every three years by the managing agency and provided to the USACE, the Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Louisiana Department of Natural Resources, Louisiana Coastal Protection and Restoration Authority, and the Louisiana Department of Wildlife and Fisheries. That report should also describe future management activities and identify any proposed changes to the existing management plan.
   Applicant Response: CPRA agrees to Conservation Recommendation 8.

9. Further detailed planning of project features and any adaptive management and monitoring plans should be developed in coordination with the Service and other State and Federal natural resource agencies so that those agencies have an opportunity to review and submit recommendations on work addressed in those reports and plans.
   Applicant Response: CPRA agrees to Conservation Recommendation 9 and the MAM plan referenced in Conservation Recommendation 6 includes provisions on governance that establish the suggested inter-agency coordination.

10. The pallid sturgeon is found in the Mississippi River and is adapted to large, free-flowing turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Entrainment associated with the diversion of river water to coastal estuaries is a potential effect that should be addressed in coordination with the Service. The Service recommends consultation under the Endangered Species Act (ESA) with this office for pallid sturgeon.
    Applicant Response: CPRA agrees to Conservation Recommendation 10.

11. West Indian manatees occasionally enter Louisiana coastal waters and streams during the warmer months (i.e., June through September). During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and state law. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with manatees, although passively taking pictures or video

would be acceptable. For more detail on avoiding contact with manatees refer to the Endangered and Threatened Species section of this document and contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.
Applicant Response: CPRA agrees to Conservation Recommendation 11.

12. If implementation of the proposed action has the potential to directly or indirectly affect the red knot, piping plover, and eastern black rail or their habitat, further consultation with this office will be necessary.
Applicant Response: CPRA agrees to Conservation Recommendation 12.

13. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. During project construction, a qualified biologist should inspect the proposed construction site for the presence of documented and undocumented wading bird colonies and bald eagles.
    a. All construction activity during the wading bird nesting season (February through October 31 for wading bird nesting colonies, exact dates may vary) should be restricted within 1,000 feet of a wading bird colony. If restricting construction activity within 1,000 feet of a wading bird colony is not feasible, CPRA should coordinate with FWS to identify and implement alternative best management practices to protect wading bird nesting colonies.
    b. During construction activities, if a bald eagle nest is within or adjacent to the proposed project area, then follow the bald and golden eagle guidelines found on-line at https://www.fws.gov/library/collections/bald-and-golden-eagle-management to determine whether disturbance will occur and/or an incidental take permit is needed.
Applicant Response: CPRA agrees to Conservation Recommendation 13.

14. The Service recommends that CPRA and the USACE contact the Service and LDWF for additional consultation if: 1) the scope of 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 designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made or finalized.
Applicant Response: CPRA agrees to Conservation Recommendation 14.

If, after further consultation with CPRA, USACE, and LDWF, the FWS modifies these recommendations in the future, the modified recommendations shall automatically supersede the recommendations set forth herein without the need to update this Mitigation Plan.

4.7. Magnuson–Stevens Fishery Conservation and Management Act

Under the Magnuson–Stevens Fishery Conservation and Management Act (MSA), NMFS approves, implements, and enforces fishery management plans (FMPs) that are developed and prepared by regional fishery management councils.[xvii] FMPs must identify EFH for each life stage of the managed fish species based on certain guidelines, minimize adverse fishing effects on EFH, and identify other actions to encourage the conservation and enhancement of EFH.[xviii] EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."[xix] Once designated, the MSA requires that federal agencies consult with NMFS regarding actions that may adversely affect EFH.[xx]

The MSA consultation obligation is triggered when a federal action "may adversely affect" identified EFH.[xxi] EFH consultations evaluate potential adverse effects of actions separately from any proposed compensatory mitigation, even though the net effect of a particular project could be considered neutral or even positive for EFH if sufficient compensatory mitigation is attached to the action.[xxii] Where consultation is required, NMFS must provide EFH conservation recommendations (which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH), and the federal agency must respond to the recommendations, but is not required to follow them or to ensure that its action will not adversely affect EFH.[xxiii]

The USACE contacted NMFS regarding EFH consultation in December 2019 to notify NMFS that the Project may impact EFH. The USACE provided an EFH assessment and requested EFH consultation with NOAA in February 2021. NMFS issued a response to the EFH consultation in June 2021, in which NMFS concurred with USACE's findings regarding EFH and provided conservation recommendations. This documentation, including the conservation recommendations, are provided in Appendix N of the FEIS. If, after further consultation with CPRA and USACE, NMFS modifies these recommendations in the future, the modified recommendations shall automatically supersede the recommendations attached in Appendix N of the FEIS.

4.8. Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) prohibits the taking and importation of marine mammals and marine mammal products unless the taking or importation is authorized or exempt. Under certain circumstances, NMFS and FWS may waive the requirements of the MMPA for species under their jurisdictions so as to allow the taking, or importing of any marine mammal, or any marine mammal product.

Congress passed the Bipartisan Budget Act of 2018, Public Law 115-123 (BBA-18), which recognized the consistency of the Project, among other CPRA projects, with the findings and policy declarations in Section 2(6) of the MMPA. The BBA-18 included a requirement that the Secretary of Commerce, as delegated to the Assistant Administrator of the NMFS, issue a waiver of the MMPA moratorium and prohibitions for the Project. As directed by Congress, on March 15, 2018, NMFS issued the waver pursuant to BBA-18 and Section 101(a)(3)(A) of the MMPA: "National Marine Fisheries Service hereby issues this waiver pursuant to title II, section 20201 of the Bipartisan Budget Act of 2018 and section 101(a)(3)(A) of the MMPA for the three named projects, as selected by the 2017 Louisiana Comprehensive Master Plan for a Sustainable Coast. The requirements of sections 101(a) and 102(a) of the MMPA do not apply to any take of marine mammals caused by and for the duration of the construction, operation, or maintenance of the three named projects."

BBA-18 also required the State of Louisiana, in consultation with the Secretary of Commerce (delegated to NMFS), to the extent practicable and consistent with the purpose of the Project, to minimize impacts on marine mammal species and population stocks and monitor and evaluate the impacts of the Project on such species and population stocks. The specific measures to be implemented as part of the Project are set forth in Section 6.3.6 below.

4.9. National Historic Preservation Act

The National Historic Preservation Act (NHPA) and its implementing regulations[xxiv] set out the requirements and process to identify and evaluate historical resources, determine effects on these resources, and resolve adverse effects on properties eligible for the National Register of Historic Places (NRHP) that occur as a result of the federal agency's permitted undertaking. Where adverse effects are found, consultation among the federal agency, applicant, and consulting parties, including the Advisory Council on Historic Preservation (ACHP) in some cases, is pursued to develop avoidance alternatives or mitigation measures to resolve adverse effects.[xxv]

The USACE sent a letter of introduction and invitation to informally begin the NHPA consultation process on October 21, 2016. The USACE also made participating requests to the following Tribal Nations: Alabama Coushatta, Caddo Nation of Oklahoma, Chitimacha, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw, Mississippi Band of Choctaw, Muscogee Nation, Seminole Nation of Oklahoma, Seminole Tribe of Florida, Tunica-Biloxi Tribe of Louisiana. The Alabama Coushatta, the Caddo Nation of Oklahoma, and the Choctaw Nation of Oklahoma are participating. In 2017, the USACE initiated formal consultation between the ACHP, SHPO, and participating Tribal Nations.

The USACE consulted with the SHPO and Federally-recognized Tribal Nations to identify concerns and determine survey requirements for Section 106 compliance. All consulting parties agreed to a Construction Impacts Area of Potential Effect (APE) of approximately 3,095 acres that encompasses the footprint of all Project features and an Operational Impacts APE of approximately 70,630 acres within the Barataria Basin.

A Phase I cultural resources survey was conducted from August to November 2019 in both the Construction Impacts and Operational Impacts APEs. Phase II National Register of Historic Places eligibility testing was conducted at one site (16PL107) in the Construction Impacts APE from January to March 2022. The cultural resources surveys found:

1) The majority of the 31 previously recorded archaeological sites within the Operational Impacts APE are submerged due to forces including subsidence and erosion, and the

identifiable portions do not contain qualities of significance or integrity and therefore, these sites are considered not NRHP-eligible; and

2) Four (4) previously-recorded archaeological sites within the Operational Impacts APE retain integrity and have been determined to be historic properties eligible for listing in the NRHP (Sites 16JE2, 16JE3, 16JE11, 16JE147); and
3) Two (2) new archaeological sites were identified in the Operational Impacts APE, but only one (Site 16JE237) retains integrity and is being treated as NRHP eligible; and
4) Numerous archaeological and architectural features within 16PL107 Locus 1 in the Project construction limits which contribute to Site 16PL107's significance. The portion of 16PL107 in the Project construction limits of the Construction Impacts APE has been determined eligible for listing in the NRHP; and
5) One (1) previously identified archaeological site within the Construction Impacts APE (Site 16PL269) was determined not eligible for listing in the NRHP.

The USACE determined that the Project would have an adverse effect on NRHP-eligible and NRHP-potentially eligible resources. The Section 106 Consultation concluded with execution of a Programmatic Agreement. The Programmatic Agreement is provided in Appendix K of the FEIS and attached as Appendix A to this Final Mitigation and Stewardship Plan.

5. PROJECT OPERATIONS, OBJECTIVES, AND BENEFITS

The purpose of Project is to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion in the Barataria Basin that will reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, fresh water, and nutrients to support the long-term viability of existing and planned coastal restoration efforts. The intent of sediment diversions, such as the Project, is to maximize development of new wetlands and increase the health of or sustain existing wetlands. Sediment diversions will best meet the objectives of capturing sediment and building wetlands when located and designed to maximize capture and distribution of coarse-grained sediment. Sediment diversions are designed at a discharge capacity (specific to the location) sufficient to mobilize and entrain (via turbulence in the water column) the appropriate range of sediment sizes, as well as draw material from the more sediment-rich portions of the riverbed (CPRA 2011; Allison et al. 2014).

The Project is designed to provide large-scale wetland restoration benefits while promoting and maintaining an estuarine characteristic within the Basin. The Project's operations plan as analyzed triggers the opening of the gates when the Mississippi River gage in Belle Chasse reaches 450,000 cfs and reduces the flow to a maximum base flow of up to 5,000 cfs when the gage falls below 450,000 cfs. This operation plan allows for diversion operations that capture the high sediment loads associated with rapidly rising river discharges and thus (1) more effectively allows for distribution of fine-grained and coarse-grained sediments, which in turn promotes the long-term sustainability of existing coastal resources that are currently degraded, (2) effectively addresses relative sea-level rise, and (3) effectively promotes the infilling of shallow open water areas. Following initiation of operations, CPRA will adaptively manage the Project consistent with the Monitoring and Adaptive Management Plan (MAM Plan or MAMP), which is Appendix R-2 to the Final EIS. See Section 7.1 for additional details.

The Project would maintain a background (base) flow of up to 5,000 cfs to protect, sustain, and maintain newly vegetated or recently converted fresh and intermediate habitats near the diversion outflow. The base flow maximizes wetland benefits, relative to a future without sediment diversion or an operation plan with no base flow after 50 years. The base flow effectively promotes the long-term sustainability of existing marshes and sustainability of newly created wetland habitats.

At the end of 40-years of operation, the Project is projected to create and sustain approximately 17,100 acres of wetland habitat in the Barataria Basin when compared to the No Action Alternative. However, these wetland benefits are happening against a backdrop of significant land loss in the basin and across the region due to subsidence and sea-level rise, so that even as diversion operations are supporting wetland sustenance and creation, some acreage would be lost over time due to these ongoing processes. At the end of the 50-year analysis period, the Project is projected to create and sustain approximately 12,700 acres of wetland habitat in the Barataria Basin when compared to the No Action Alternative.

In addition to these wetland benefits, the Project will also result in the following habitat/aquatic species benefits: increase submerged aquatic vegetation coverage and biomass, increased shallow bottom habitat, net increase in structured essential fish habitat, moderate benefits to largemouth bass, moderate benefits to red drum, moderate benefits to gulf menhaden, minor benefits to bay anchovy, negligible to minor benefits to white shrimp and negligible to minor benefits to blue crab.

6. AVOIDANCE, MINIMIZATION, MITIGATION AND STEWARDSHIP MEASURES

6.1. Avoidance and Minimization Measures

The Project was designed and selected among other alternatives to minimize incidental environmental impacts, while achieving wetland benefits described above. The alternatives evaluated in detail under the NEPA environmental review include structural alternatives, including sediment diversions with different variable flow rates (50,000 and 150,000 cfs), and alternatives that include marsh terracing outfall features.

CPRA has committed to implement Best Management Practices (BMPs) to minimize the impacts associated with the construction and operation of the Project on each element of the environment (i.e., protection of land, water, fish and wildlife, and cultural resources). These BMPs are described in Appendix B to this Mitigation Plan.

6.2. Clean Water Act Section 404 Compensatory Mitigation

This section of the Mitigation Plan identifies compensatory mitigation to offset unavoidable adverse impacts to jurisdictional waters of the United States, including wetlands and special aquatic sites.

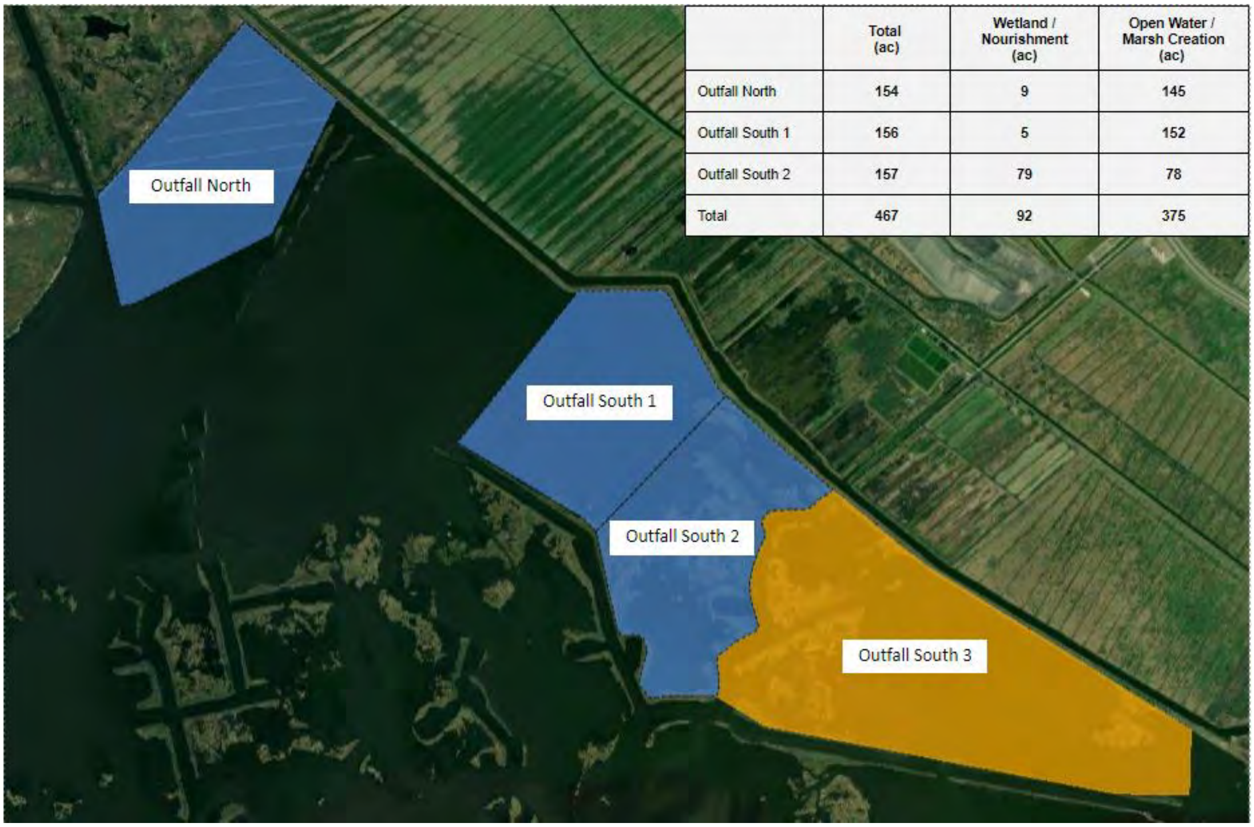
6.2.1. Wetlands and Jurisdictional Waters

Impacts. The Project would directly impact 182.9 acres of jurisdictional wetlands and 305.6 acres of waters of the U.S, however, wetlands created or sustained by the Project will be significantly greater than wetlands negatively impacted. Any permanent losses will be offset by wetland creation associated with the Project. Other wetland impacts are discussed in Chapter 4.6 of the Final EIS.

Mitigation. As discussed above, the Project itself is projected to create and sustain approximately 17,100 acres of tidal wetland habitat in Barataria Basin through operation of the diversion over a forty year operation period, which would thereafter decline due to the impacts of sea-level rise and subsidence. In addition to the wetland benefits built into the Project, CPRA will mitigate direct impacts (construction excavation and placement) to wetland soils through beneficial use placement, which will occur concurrent with construction impacts.

The construction footprint by design is constrained to minimize excavation and fill activities in the Mississippi riparian wetland area. It is anticipated that the limited quantity of wetland soil requiring excavation would result in dredge material displacement, processing, and use in upland construction. Excavation of the conveyance channel could result in excess upland and wetland soils that would need disposal. Nearby disposal areas include abandoned borrow pits that were excavated for Post-Katrina HSDRRS levee construction. See Figure 1. These abandoned borrow pits will be filled to address pre-existing impacts to the landscape and congruent with landowner and Parish interests. Also, in the area of the outfall transition feature, CPRA has designated three beneficial use placement areas, totaling approximately 770 acres, currently occupied by open water in the basin. These areas will be used for placement of suitable upland or wetland soils that will become available during construction and subsequent maintenance dredging. CPRA plans to place approximately two million cubic yards of suitable material in these areas to create 375 acres and nourish 92 acres of emergent marsh habitat concurrent with Project construction (Figure 3); this would be equivalent to a projected 402 net acres of direct benefits (or, 158 average annual habitat units) over 50 years.

In the Basin, the selected construction access routes—to allow access channels for vessels, equipment, and material transport—have been designed to avoid or minimize wetland impacts to the greatest extent practicable, along with minimizing the excavation footprint and subsequent volume of material displaced. The placement of soils in areas adjacent to channel excavation will be done in a manner to minimize the disruption of water circulation. Prior to construction completion, the material would be left in place as habitat enhancement or backfilled into the impacted, temporary access channel.



	Total (ac)	Wetland / Nourishment (ac)	Open Water / Marsh Creation (ac)
Outfall North	154	9	145
Outfall South 1	156	5	152
Outfall South 2	157	79	78
Total	467	92	375

Figure 3. Locations of the beneficial use areas proposed for marsh creation and nourishment (Outfall North, Outfall South 1, Outfall South 2). The Outfall South 3 is reserved as a future beneficial use area for outfall maintenance dredged material placement for habitat creation.

6.3. Other Mitigation and Stewardship Measures

The purpose of the mitigation set forth in this section of the Mitigation Plan is to ensure that the Project is not contrary to the public interest, pursuant to Section 404 of the CWA and Sections 10 and 14 of the Rivers and Harbors Act. Mitigation measures have been developed to address certain impacts identified in the NEPA DEIS and in the public interest review. These are measures that CEMVN could consider including as conditions to any Section 404/10 permit or Section 408 authorization for the Project, but they are not required as compensatory mitigation to address the impacts of the Project on wetlands or other waters of the U.S.

6.3.1. Impacts to Navigation

Impacts. Based on basin-wide modeling, the accumulation of sediment may affect navigation channel depths over time. Project impacts to navigation are projected to be primarily limited to changes in bed elevation (aggradation) that may occur in the Barataria Bay Waterway federal navigation channel and other frequently used privately-owned canals, such as Wilkinson Canal. Other non-federal channels and facilities (oil and gas facilities, oil and gas canals, privately owned water bottoms, marinas) near these channels can be assumed to also experience increased sedimentation. It should be recognized that maintenance of navigation in the outfall area will be subject to private property rights, as the preponderance of existing canals, other waterways, and water bottoms are under private ownership. Further, as the delta channels evolve, new channels could support vessel access, but access would be subject to individual user and property owner's rights.

Mitigation. CPRA will undertake the following actions to mitigate impacts to navigation within the Project area.

- CPRA will undertake project specific Adaptive Management (AM) for the operation of the Mid-Barataria Sediment Diversion in regard to data collection, monitoring, and implementation of AM decisions. Monitoring will assess the Project's effect on bathymetry, consider required or authorized elevations, and operations and maintenance of the navigation channel. Details regarding this monitoring are set forth in Section 3.7.1.1.7 of the MAM Plan.
- To the extent the Barataria Waterway aggrades to a degree that inhibits navigation as a result of Project operations, CPRA will take one or more of the following actions to mitigate the identified Project impact:
    - adjust operations of the Project,
    - conduct maintenance dredging of the Waterway to provide sufficient depths for the safe transit of watercraft or to maintain authorized depths for navigation, or
    - implement outfall management measures to limit the loss of sediments to the waterway.
- To the extent that Project operations lead to aggradation within Wilkinson Canal[1] to a degree that inhibits navigation, and as long as Wilkinson Canal is being used for that purpose, CPRA will take one or more of the following actions to mitigate the identified Project impact:
    - adjust operations of the Project,
    - with approval from the underlying landowner, conduct maintenance dredging of the canal to provide sufficient depths for the safe transit of watercraft or to maintain authorized depths for navigation, or
    - provide alternative boat access to Myrtle Grove and Woodpark communities (e.g., as shown in Figure 4.13-2 in EIS Section 4.13 Socioeconomics).

CPRA does not intend to dredge any of the other privately-owned canals, waterways, or water bottoms in the Basin that may be impacted by the Project. The purpose of the Project is to create and maintain marshes in the Basin, and the continued dredging of private canals or private property (e.g., water bottoms) contributes to the loss of marshes the Project is seeking to

[1] Wilkinson Canal is a privately owned canal, and CPRA has recognized that the canal is used by the public as well. Given its current use and activity, CPRA recognizes its importance to local users, but CPRA cannot presume future use patterns or private intentions. Given the uncertainty of where and when impacts could occur with sedimentation and the nature of private property rights, CPRA must adopt an Adaptive Management approach regarding decisions to maintain navigability of the Canal; thus, improving and maintaining an alternate access route is proposed as a mitigation option depending on the time and location of impacts.

maintain. See EIS Sections 3.6.2.2, 4.2.3.2, 4.2.4.2, 4.6.5.1, and 4.25. Further, the majority of private canals where sedimentation is projected to occur comprise inactive abandoned oil and gas facilities and wells that have been plugged and abandoned.

In addition, CPRA has proposed the following measures to address concerns about navigation impacts in the Mississippi River during Project construction. These measures have been forwarded to the U.S. Coast Guard for their review and input.

- CPRA will coordinate the location of Mississippi River Aids to Navigation (ATONS) associated with the MBSD structure with the USCG. The ATONs will be visually inspected each day and the operability recorded in the Daily Report and would be maintained for the duration of the Project.
- Whenever flow through the structure is started or stopped, on-site personnel shall notify the USCG via a Navigation Bulletin so that traffic is informed of the Project's operating condition.
- Before raising or lowering any gate at the entrance to the diversion channel, the operator should check the vicinity of the inflow, conveyance and outflow channels for boats, fishermen and swimmers and alert them to clear the area. Methods for these alerts may include horns, lights and/or audio messages.

The final mitigation and stewardship measures related to navigational impacts in the Mississippi River will be included in the USACE permit/authorization, if one is issued. CPRA will update the Mitigation Plan to reflect any changes to these conditions included in that permit/authorization, if one is issued.

6.3.2. Property Impacts

Impacts. Property related impacts from the Project are described in detail in Chapter 4 Sections 4.13 and 4.20 of the Final EIS. The following subsections provide a brief overview of the affected communities and the properties within those communities, the anticipated impacts of the Project on tidal flooding[2] in these communities, the outreach efforts undertaken to develop mitigation strategies, and the resulting mitigation and stewardship measures.

Overview of Communities in the Project Area. The properties in the tidal floodplain are subject to high rates of land subsidence and sea level rise, which has resulted in an increased frequency and overall duration of tidal flooding. With the implementation of the Project, low-lying properties of the communities outside flood protection will be subject to an increased annual

[2] For purposes of this analysis, "tidal flooding" is comparable to "nuisance flooding" as defined by NOAA. Nuisance flooding refers to low levels of water that do not pose significant threats to public safety or cause major property damage, but can disrupt routine day-to-day activities, put added strain on infrastructure systems such as roadways and sewers and cause minor property damage. Nuisance flooding is also synonymous with high tide or minor flooding and is increasingly common due to years of relative sea level increases (Sweet et al., 2018; https://repository.library.noaa.gov/view/noaa/17403).

frequency and duration of nuisance flooding events as compared to the No Action Alternative. The impact area is projected to encompass the lower portion of Bayou Barataria to Happy Jack (see Figure 4), which includes the communities of Myrtle Grove, Woodpark, Suzie Bayou, Deer Range, Lake Hermitage, Grand Bayou, and Happy Jack, and to a lesser extent communities in the vicinity of Lafitte (i.e., Lower Lafitte, Goose Bayou polders).

The properties in this area occur in a *Coastal High Hazard Area*[3] and are subject to high rates of land subsidence and sea level rise. Since the properties occur outside of levee protection, they are exposed to at least 8 or more of the 11 identified flood hazards[4] (Figure 5). Not including tropical systems, the low-lying properties of each of the communities currently experience multiple annual flood events from combined astronomical and meteorological tides. Most parcels in this area have low-lying land at grade that is approximately 1 foot above the mean high tide (land elevation = 2 ft NAVD88[5]). See Figures 11 through 16 in the Coastal Water Surface Elevation Report for information regarding projected tidal flooding impacts without the Project (Final EIS, Appendix P. Part P2).

Figure 4. Communities and subdivisions subject to potential inundation with the Project and the maximum extent of inundation impacts (yellow line).

[3] Coastal High Hazard Area – an area of special flood hazard along an open coast and any other area subject to high velocity wave action from storms or seismic sources (https: //repository.library.noaa.gov/view/noaa/17403).
[4] See definition of Coastal Flood Hazard Composite (https://coast.noaa.gov/data/digitalcoast/pdf/flood-exposure-faq.pdf).
[5] Source: All South Consulting Engineers elevation survey, 2019; USGS LiDAR Digital Elevation Model, 2013.

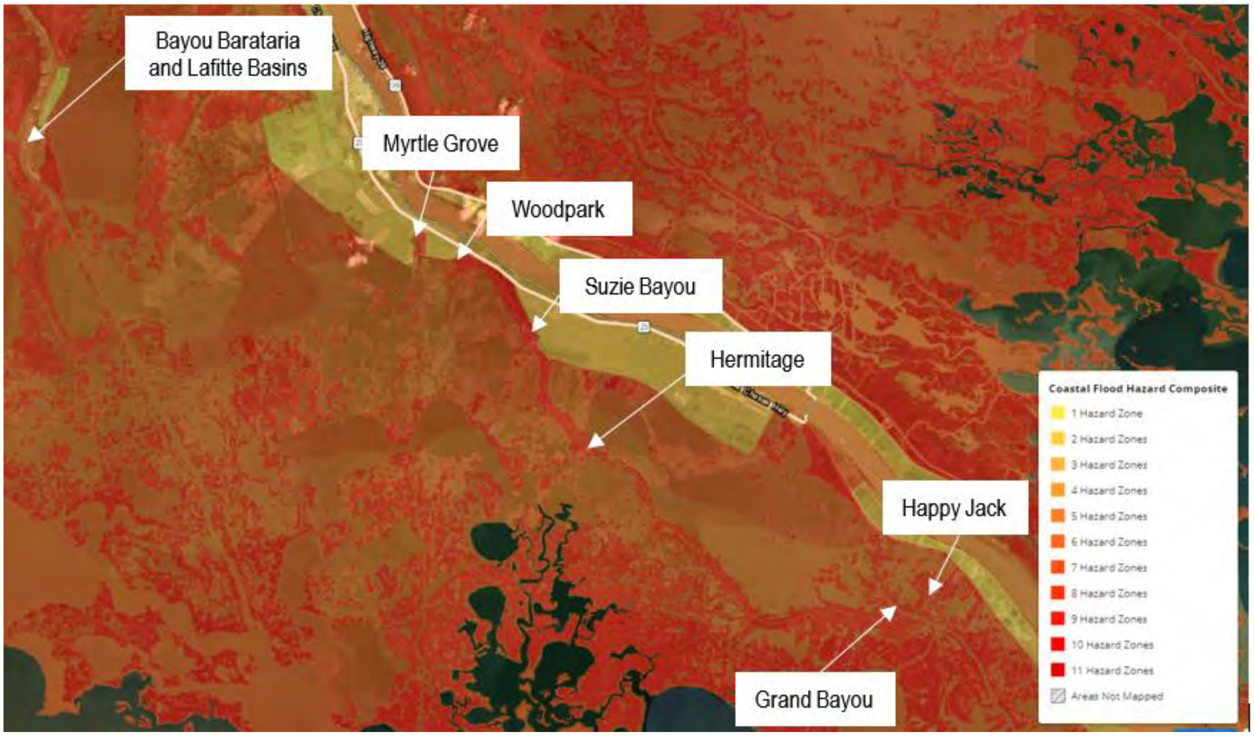


Figure 5. The communities and subdivisions subject to potential inundation with the Project are largely designated as Coastal High Hazard Areas. Image and data from the NOAA Coastal Flood Exposure Mapper (https://coast.noaa.gov/digitalcoast/tools/flood-exposure.html).

Types of Properties and Improvements. These communities are road accessible private subdivisions[6] supplied with municipal water, electricity, and other utilities. Most of the communities were originally developed without municipal water and sewerage. Newer developments such as the Myrtle Grove Marina Estates Subdivision and Happy Jack have municipal wastewater treatment, whereas the other communities rely on individual septic units. The communities are generally subdivided into private lots improved with residences and campsites. In some cases, residences occupy leased land. Some of the existing or newer construction may comply with Plaquemines Parish Floodplain Management Regulations[7] (or other state or local regulations that prescribe standards for the purpose of flood damage prevention and reduction); improvements on some properties may pre-date or be inconsistent with those regulations. For all properties in these communities, vehicular access to the properties is between approximately 10-11 feet below the FEMA Base Flood Elevation (BFE), and thus is at high risk in any given year for flooding from tidal or tropical cyclone events. Public property

[6] Except for Grand Bayou, which is a water-based village near the end of Grand Bayou Way.

[7] The floodplain management regulations include zoning ordinances, subdivision regulations, building codes, health regulations, and special purposes ordinances.

in the area is generally comprised of roads, lanes, and drainage canal rights-of-way that are maintained by Plaquemines Parish.

Impacts to Properties. As explained in the Final EIS (Section 4.20.4.2) and supporting technical appendices, the low-lying properties in these communities outside flood protection will be subject to an increase in water levels, which would increase the annual duration (i.e., number of days per year[8]) of tidal flooding with the operation of the Project. These flooding impacts consist of inundation to roads, driveways, parking areas, non-habitable structures at grade, and potential strain on support services (e.g., drainage and/or septic systems). For more information about these impacts, see Table 4.20-2 and Figure 4.20-3 to Figure 4.20-6 in the Final EIS (Section 4.20.4.2), and Appendix P, Part P2.

Process for Developing Mitigation and Stewardship Measures. Based on the impact projected from the Project reported in the EIS, CPRA undertook a multi-step process to solicit public input and to identify and refine the mitigation and stewardship measures. These steps included:

- Solicited public input (benefits, impacts, mitigation measures) through CPRA's Coastal Connections (2016 – ongoing);
- Reviewed impact projections based on technical analysis reported in the EIS (see Appendix P to the Final EIS);
- Developed preliminary mitigation measures to address, offset, or minimize the impacts projected from Project operations (reported in the Draft Mitigation and Stewardship Plan published as Appendix R1 in the Draft EIS);
- Solicited additional detailed input from affected communities on the proposed mitigation and stewardship measures (see further description below); and
- Completed a technical evaluation of mitigation and stewardship measures, which led to the community-specific mitigation measures presented herein.

Public Input on Mitigation Measures. CPRA held twenty-three (23) meetings in the communities south of the diversion outfall outside of levee protection (from Myrtle Grove to Happy Jack and Grand Bayou) between February and August 2021 to solicit feedback regarding its proposed mitigation and stewardship measures. In addition to meetings held in the communities to have direct interaction with residents, several of these meetings were held with smaller groups of stakeholders or elected officials who represent these communities and constituencies to solicit feedback.

In addition to soliciting feedback through meetings, CPRA solicited feedback regarding its proposed mitigation and stewardship measures through a survey (available in person, online, and mailed via U.S. Mail). The survey was completed by 302 total respondents as of November 2021. The largest number of respondents live in Myrtle Grove (62 respondents), followed by Happy Jack (56 respondents), Hermitage (41 respondents), Woodpark (24 respondents), Grand Bayou (22 respondents), Suzie Bayou (20 respondents), and Deer Range (18 respondents). Thirty

[8] The annual duration of flooding is estimated comparing the number of days (With Project – No Action) above the specific flood threshold for the community.

respondents indicated they live elsewhere in places such as Buras, Belle Chasse, Gretna, and Port Sulphur. The highlights of the feedback from respondents include the following:

- 134 respondents (44.4 percent) have made changes to their homes to mitigate flood risks.
- 32.5 percent of total respondents (98) say they will stay in their homes even if the flooding gets worse because of the Project.
- Respondents are most interested in CPRA paying property owners for losses in property values from flooding (178), elevating roadways or utilities (155), followed by elevating homes and structures (142), and to a lesser degree, reducing flooding of their septic/sewer systems and other utilities (124).

Surveys also solicited other ideas and solutions to address flooding impacts of the Project from each community. The mitigation ideas provided to CPRA consisted of buyouts, financial support, raising bulkheads, elevating lots, floodgates, levees, closing pipeline canals, and barrier island restoration (or, other wetland restoration projects).

Flood Impact Mitigation and Stewardship Measures. Definitions. To help in understanding the flooding impacts and proposed mitigation and stewardship measures, the following terms are used in this Plan:

> *Flood Threshold Elevation* – The elevation within the community where tidal waters begin to exceed the ground elevation resulting in flooding. These threshold elevations are based on measurements taken within each community and reflect existing local conditions. See Appendix P, Part P2 of the EIS.
>
> *Project Impact and Project Impact Water Surface Elevation (PIWSE)* - This is the difference in the maximum water surface elevation (WSE) between the No Action Alternative and with Project scenario; this difference in WSE is leads to increased frequency and duration of inundation. From the Final EIS analysis, a sustained, high discharge operation scenario[9] provided the basis for projecting the inundation impacts with Project operation. This difference is the maximum impact within the analyzed hydrograph year. In addition, CPRA selected near term values (i.e., WSEs for earlier decades within the period of analysis), which is the period projected to experience the largest difference between the No Action Alternative and with Project scenario. As identified in the Final EIS, Appendix P2, the Project Impact decreases with time due to Relative Sea Level Rise. For example, in the Myrtle Grove area, the PIWSE is the Flood Threshold Elevation + the Project Impact (e.g., in Myrtle Grove: 1.7 ft + 1.3 ft = 3.0 ft NAVD88). The PIWSE is the minimum elevation to which improvements would need to be made to offset the impacts of water inundation resulting from Project operations.

[9] The Mississippi River 2011 flood year scenario resulted in a long duration and high discharge diversion operation to evaluate maximum impacts to WSE.

Mitigation Standard Elevation (MSE) – The standard elevation to which CPRA will provide mitigation/stewardship measures in each community. The MSE exceeds the PIWSE, i.e., additional benefit above the Project Impact is provided.

Community	**Existing Conditions Flood Threshold Elevation (NAVD88)**	**Project Impact (FWP – FWOP WSE Difference) (ft)**	**Project Impact Water Surface Elevation (PIWSE) (NAVD88)**	**Mitigation Standard Elevation (NAVD88)**
Myrtle Grove, Woodpark	1.7 ft	1.3 ft	3.0 ft	4.0 ft or greater
Suzie Bayou, Deer Range, Lake Hermitage	1.5 to 2.0 ft	≤ 1.0 ft	2.5 to 3.0 ft	
Grand Bayou, Happy Jack	1.5 ft	0.5 ft	2.0 ft	

Determination of Mitigation Standards and Criteria. The PIWSE provided a starting point for determining the elevation necessary for structural improvements, such as elevating a road, dock, or residence to offset Project Impacts. From there, CPRA developed the Mitigation Standard Elevation (MSE) of 4.0 ft NAVD88 or greater considering the Project Impact, the communities, and feasibility. The rationale for selecting this MSE included:

- It provides a single, robust elevation that can be applied to each of the communities that mitigates against flooding impacts due to the Project as well as non-Project related flood risk reduction, e.g., low level tropical storm surge;
- It exceeds the PIWSE and thus provides an additional flood risk reduction benefit above the projected Project Impact (mitigation/stewardship measure constructed to elevation 4.0 feet while the Project Impact is limited to elevation 2.0 to 3.0 feet); and,
- It extends the time available to property owners to further adapt to an anticipated future of increased flooding from sea level rise and land subsidence.

Property owners within these communities will be eligible for mitigation and stewardship measures based on the Project Impact on the community and/or individual property owner. For example, septic tank systems effluent pipes or fields below the PIWSE would be eligible for replacement/rehabilitation.

Table 1
Number of days per year that mean Water Levels are projected to Exceed the local Flood Threshold (FT)
Under No Action, Applicant's Preferred Alternative and Applicant's Preferred Alternative with Mitigations

Community	**2020's (short-term)**			**2040's (medium-term)**			**2060's (long-term)**		
	Existing (No Action)	With Project (Applicant's Preferred)	With Project (Applicant's Preferred) + mitigation	Existing/ Future without the Project (No Action)	With Project (Applicant's Preferred)	With Project (Applicant's Preferred) + mitigation	Existing/ Future without the Project (No Action)	With Project (Applicant's Preferred)	With Project (Applicant's Preferred) + mitigation
Myrtle Grove FT +1.75	24	143	0	127	247	1	315	364	10
Woodpark FT +2.0	10	75	0	66	176	1	294	364	10
Suzie Bayou FT +2.0	10	75	0	66	176	1	325	339	10
Hermitage FT +1.5	33	123	0	198	285	0	333	352	6
Grand Bayou Happy Jack FT +1.5	17	64	0	199	248	0	333	339	1

All elevations are in ft, NAVD88. Mitigation standard elevation (all communities) = +4.0 ft, NAVD88
Source: Analysis of Delft 3D Water Surface Elevation data, 2011 Mississippi River Hydrograph, Water Institute (2019), CPRA (2020)

Table 1 explains the projected number of days that the mean water levels are projected to exceed the Flood Threshold in the communities south of the Project outfall to Grand Bayou and Happy Jack under three scenarios: (i) existing conditions and future conditions without the Project: (ii) future conditions with the Project in operations, but no additional mitigation; and (3) future conditions with the Project in operation and the mitigation measures set forth below in place.

This table demonstrates that the mitigation measures provide benefit that exceeds the projected Project Impact. In Myrtle Grove, the construction of the project and CPRA's construction of mitigation measures are anticipated to reduce flood risk below what is anticipated under the No Action Alternative. In the other communities, the construction of the Project and CPRA's construction of the mitigation measures are anticipated to allow better access to properties than what is anticipated under the No Action Alternative. In terms of impacts to particular properties in those communities, CPRA's compensation payments will allow property owners, at their discretion, to implement measures on their property to reduce flood risk below what is anticipated under the No Action Alternative.

Mitigations by community. The proposed mitigation and stewardship measures for the affected communities (Myrtle Grove, Woodpark, Suzie Bayou, Deer Range, Lake Hermitage, Happy Jack, and Grand Bayou) reflect the measures that best address: 1) the unique circumstances and variability of affected properties (e.g., their varied layouts and improvements); 2) projected impacts based on data analysis (see Table 1); and 3) the design and feasibility assessments that have been completed at this stage in the process.

Based on the EIS impact determinations and public input, CPRA has identified the following mitigation and stewardship measures:

- Road and lane improvements: CPRA will elevate publicly maintained roads or lanes that are currently below the PIWSE to the Mitigation Standard Elevation, and make corresponding road drainage improvements.
- Boat dock/boat house improvements: CPRA will provide property owners with funds sufficient to elevate boat docks and boat houses that are currently located below the PIWSE to the Mitigation Standard Elevation.
- Septic or sewerage treatment system improvements: In communities that rely on septic systems, CPRA will improve on-site septic systems impacted by Project operations that are located below or discharge below the PIWSE so that they are located at or above the MSE. In communities with community sewer systems, CPRA will improve and/or flood proof central sewerage elements (e.g. lift stations). Both measures are intended to ensure system function and treatment performance with increased water levels from the Project.
- Project Servitude Agreements (compensation): In exchange for monetary compensation, CPRA will acquire from affected property owners a permanent right known as a Project Servitude. That Project Servitude will allow CPRA to flow water over the property owner's property at heights and durations that are greater than would be in the case in the future without the Project. The Project Servitude will be recorded against title to the property and will run with the land. CPRA will attempt to negotiate with the affected

landowner to acquire the Project Servitude. If the CPRA and the landowner were unable to reach a negotiated agreement, CPRA would exercise its eminent domain authority to purchase the servitude~~s~~. CPRA will compensate those landowners for the value of the Project servitude. A property owner would be able to use the funds received in exchange for the servitude to implement flood mitigation measures, for example, raising the lot elevation or improving a bulkhead.
- Bulkhead improvements: In limited communities (Myrtle Grove), CPRA will improve the existing bulkhead along a property's edge abutting the Basin to the Mitigation Standard Elevation (in some cases, higher). This bulkhead will reduce the number of days that protected properties will experience tidal flooding.
- Elevating residences: Where the lowest floor of the living area of a residence is at or below the PIWSE, CPRA will provide the property owner funds sufficient to elevate the residence to, at a minimum, the Mitigation Standard Elevation.
- Voluntary individual buyouts: CPRA may consider purchasing an impacted property outright (i.e., in fee) if requested by the owner. Decisions about whether to purchase a property would be made on a case-by-case basis depending on the particular circumstances.

These measures will be further refined during mitigation implementation following Project approval and funding; implementation will include:

- Mitigation planning, design, and permitting;
- Engagement of property owners eligible for one or more of the mitigation and stewardship measures;
- Refine eligibility criteria for structures for improvement;
- Detailed design of improvements (roads, drainage, septic, bulkheads);
- Project Servitude details;
- Property appraisal standards and Uniform Relocation Act compliance; and,
- Clarify where CPRA would implement versus property owner.

Combinations of the mitigation and stewardship measures will be implemented in each of the affected communities as explained below. CPRA has taken a different approach to the mitigation and stewardship measures in Myrtle Grove than in the other affected communities. This is due to several factors. First, the drainage and road systems are principally different in Myrtle Grove than the other communities, such that drainage and road systems in Myrtle Grove are the low points (below mean water level) where water is collected and then drained via a pump station. In general, road systems of the other communities are the high points and designed to drain by gravity directly toward the closest receiving body (e.g., ditch, bayou, canal, or marshland). Second, Myrtle Grove is closest to the diversion outfall and is projected to experience the greatest change in water levels due to Project operations. Third, the existing layout of a continuous bulkhead/berm system around the Myrtle Grove Marina Estates Subdivision forms the primary barrier against flooding of the public access roads, property, road and utilities serving the community. Thus, improving the elevation of the existing bulkhead in Myrtle Grove will provide benefits to the entire community. Other communities have unique layouts and variable construction and topographic differences that arise at the individual parcel scale. As such, comprehensive road improvements and offering compensation through Project Servitudes best allows individuals to make their own, necessary flood adaption improvements.

Also, CPRA is not proposing any tidal flooding mitigation in Lafitte as part of this Mitigation Plan. In the vicinity of Lafitte, there are two polders (Lower Lafitte and Goose Bayou) that are projected to experience an increase in water level with the Project (less than or equal to 0.5 ft). Impacts to properties in these areas are not projected to occur during the early years of the Project, but impacts are projected to occur in later years if no flood protection improvements were implemented. See Figures 18, 21 and 24 in Appendix P, Part P2 of the EIS. To prevent flood impacts due to the Project, CPRA is facilitating the funding and providing technical support to the Lafitte Independent Levee District to advance the construction (advertisement for construction bids are scheduled for late 2022) of tidal flood protection (elevation ~ 7.5 ft) for both polders.[10] These Projects would be completed prior to the operation of the Project.

- *Myrtle Grove*.

  CPRA will implement the following mitigation and stewardship measures (as explained above) in the Myrtle Grove Marina Estates Subdivision prior to initiating operation of the Project:

  - Improving/replacing boat docks, and boat houses;
  - Improving/replacing bulkheads; and
  - Voluntary individual buyouts.

  By raising the bulkhead around the Myrtle Grove Marina Estates Subdivision, CPRA will reduce the number of days that properties in Myrtle Grove Marina Estates Subdivision experience tidal flooding compared to the No Action Alternative. Boat docks and boat houses will be improved or replaced to maintain functionality with the increases in water surface elevation.

  For any improvements constructed by CPRA, CPRA will obtain the necessary permits prior to initiating construction. For purposes of Section 404 of the CWA (33 USC 1344), CPRA expects that it will be able to permit these measures using one or more regional general permits or nationwide permits. These permits may require additional consultation(s) (e.g., NHPA Section 106, ESA, EFH) if triggered by their conditions. They may also trigger additional mitigation, which CPRA will complete as part of implementing the measure. CPRA will complete construction or other implementation (for measures not requiring construction) of these measures prior to initiating operation of the Project.

[10] Goose Bayou (Penn Levee, BA-0223) is currently identified in the Draft Fiscal Year 2023 Annual Plan (https://coastal.la.gov/wp-content/uploads/2022/01/AP-FY-23.pdf). Funding allocation for the Lower Lafitte polder is under coordination as of Jan 2022.

- *Woodpark, Suzie Bayou, Deer Range, Lake Hermitage, Happy Jack, and Grand Bayou*.

  CPRA will implement the following mitigation and stewardship measures in Woodpark, Suzie Bayou, Deer Range, Lake Hermitage, Happy Jack, and Grand Bayou prior to initiating operation of the Project:

  - Providing funds to property owners to improve/replace their boat docks and boat houses;
  - Improving/raising access roads;
  - Improving/replacing septic/sewerage systems;
  - Providing Project servitudes;
  - Providing funds to property owners to elevate their residences; and
  - Voluntary individual buyouts.

  By raising the access roads into each of these communities, CPRA will reduce the number of days that properties in these communities would not have access compared to the No Action Alternative conditions and improve access for emergency services (e.g., police and fire). Also, by funding the elevation of homes whose living areas is currently below the PIWSE, CPRA will reduce the incidence of damages to residences within these communities compared to the No Action conditions. Similarly, by improving/replacing the sewerage systems to address increases in water surface elevation, CPRA will improve water quality in the Basin compared to No Action conditions. CPRA would not elevate the lots or bulkheads within these communities, and instead would compensate landowners through a Project Servitude. Compensation paid to property owners may be used for flood adaptation improvements to their properties.

  For any improvements constructed by CPRA, CPRA will obtain the necessary permits prior to initiating construction. For purposes of Section 404 of the CWA (33 USC 1344), CPRA expects that it will be able to permit these measures using one or more regional general permits or nationwide permits. These permits may require additional consultation(s) (e.g., NHPA Section 106, ESA, EFH) if triggered by their conditions. They may also trigger additional mitigation, which CPRA will complete as part of implementing the measure. CPRA will complete construction or other implementation (for measures not requiring construction) of these measures prior to initiating operation of the Project. In the case of home elevations, the property owner will be expected to obtain any necessary permits and complete the improvements.

- *Additional Measures for Grand Bayou*.

  CPRA engaged in direct outreach with leaders of the community of Grand Bayou to identify additional specific mitigation and stewardship measures that support the community. Based on the results of that outreach, CPRA added additional mitigation and stewardship measures for Grand Bayou, including:

- Floating gardens;
- Community connecting sidewalks; and
- Backfilling and ridge restoration project (project funded for E&D through NFWF and CPRA; CPRA has received funding for construction).

More details regarding these mitigation and stewardship measures are set forth in Section 6.3.8 below.

6.3.3. Aquatic/Fisheries Impacts

Impacts to Oysters and Oyster Fisheries. The oyster resources within the Basin are projected to see declines in both the No Action Alternative and the Project related to loss of habitat primarily driven by changes in the estuary's salinity structure. The oyster fishery is expected to experience major, permanent, adverse impacts sooner under the Project relative to the No Action Alternative, primarily driven by Project-related reductions in salinity within the Basin. This determination considers expected impacts on oyster abundance as well as the anticipated response from commercial fishers. The potential impacts of fecal coliform contamination from introduced Mississippi River water could also have a major, adverse impact on beneficial uses related to oyster harvest. However, Project-related changes in the salinity structure within the lower Basin may also allow for re-habilitation of historic oyster growing areas that are currently non-supportive and may help mitigate impacts to other areas. Because these areas would be located further away from the Project outfall area than current oyster seed grounds, they would also be less susceptible to fecal coliform impacts.

Mitigation. CPRA will implement measures to both mitigate for the loss of oyster habitat within the Basin as well as the potential impacts to the oyster fishery within the Basin, including potential water quality impacts that could restrict oyster harvest. Any potential mitigation to the oyster resource is of benefit to the oyster industry and is expected to mitigate for the potential effects of the Project. Furthermore, given the dynamic conditions of any estuarine system, and the uncertainty around future conditions, some of the mitigation measures will rely on data from the MAM Plan to appropriately site and scale the measure based on post-operational conditions.

CPRA will implement the stewardship measures listed below for impacts to oysters. As the EIS identified the potential for the Project to result in disproportionate impacts to some low income and minority commercial oyster fishers, CPRA is developing options to tailor these measures to ensure they reach those populations. This is further discussed in Section 6.3.8 below.

- *Establish New Public Seed Ground in Lower Barataria Basin*
  Currently there are three public oyster areas within the Barataria Basin, the Hackberry Bay Seed Reservation and the Little Lake and Barataria Bay Seed Grounds. Given the current salinity regime, only the Hackberry area experiences oyster recruitment and growth on a recurring basis with some years showing no production due to suppressed salinities. The Little Lake Seed Ground salinities are too low except during significant periods of drought, and the Barataria Bay Seed Ground salinities are elevated to a degree

that promotes deleterious impacts from disease and predation. Predictive modeling indicates that conditions within the Hackberry seed ground may be impacted such that the POSR may not consistently support commercially viable populations of oysters in the future with Project operations. Conversely, modifications to the salinity regime of the lower Basin may allow for reestablishment of oyster recruitment and growth within the historically fished areas of the lower Basin. This mitigation measure would address the loss of a public oyster area with the potential establishment of a new area in the lower Basin if future conditions allowed. While modeling indicated that this new area will likely be in the Southwest quadrant of the Basin, post-operational monitoring is necessary to determine the best location. Therefore, the MAM Plan will include that after evaluation of the Hackberry area post initial Project operation, and with a favorable evaluation of lower Basin salinities and fecal coliform contamination, a new Public Seed Ground (or reservation) will be established on the state-owned water-bottoms within the Barataria Basin. This will include either the relocation of native cultch materials or the provision of new cultch material to establish the oyster beds.

This public seed ground will be established after operations have occurred for a sufficient length of time, considering initiation of operations, river flows in initial years of operations and other factors necessary to collect sufficient monitoring data to establish a reasonable baseline for the revised salinity regime in the basin. If no suitable conditions are found in lower Barataria Basin, this public seed ground would be sited in the nearest suitable area, with input from oyster fishers and oyster industry representatives.

The Louisiana Department of Wildlife and Fisheries will be the lead agency for siting and construction of this seed ground and will include oyster fishers in the construction, if possible. Oyster shell or other native materials will be used for establishing the seed grounds, if available. Total cost for this mitigation action is estimated at $4,000,000.

- *Enhance Public and Private Oyster Grounds*. This program will have three primary components:

    - Cultch or spat/shell will be used to enhance public areas adjacent to Barataria Basin (Terrebonne, Pontchartrain and/or Breton Sound basins) prior to and after commencement of diversion operations.
    - For 10 years after Project operations commence, or until funds are expended, affected state leaseholders will be reimbursed for cultch or spat/shell used to rehabilitate leases in the lower Barataria Basin both prior to and after the commencement of diversion operations.
    - Affected state leaseholders will be reimbursed for cultch or spat/shell placed on new leases within Barataria Basin or in other suitable areas prior to and after the commencement of diversion operations.

  Oyster fishers will be used to support bedding and transplanting efforts on public grounds. Eligibility in this program will be based on trip tickets from Barataria Basin, other supporting documentation, state issued lease ownership and considerations of equity based on level of impact. A portion of the funding from this program will initially be reserved for oyster fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project (see discussion under Section 6.3.8 below). This program will commence prior to the commencement of diversion operations and continue after operations commence. Total cost for this mitigation action is estimated at $15,000,000.

- *Create or Enhance Broodstock Reefs*
  Historically, Louisiana estuaries have had an adequate supply of oyster larvae to replenish reefs that were impacted by natural and anthropogenic events. However, modification to the estuaries altered hydrology in ways that have isolated oyster subpopulations. To mitigate for potential future adverse changes in hydrology, circulation, and overall habitat from the MBSD Project, broodstock reefs will be used to provide a larval supply to areas either separated hydrologically, or located in a salinity regime that does not result in an annual recruitment event. Through monitoring under the MAM Plan, hydrologic data will be assessed to understand the salinity regime within the Basin after Project operations commence, and density and abundance estimates of the Basin oyster resource will be used to determine the need for and potential location of these broodstock reefs. Broodstock reefs will be established after operations have occurred for a sufficient length of time, river flows in initial years of operations and other factors necessary to collect sufficient monitoring data to establish a reasonable baseline for the revised salinity regime in the basin. These reefs will be located, where possible, in shallow or intertidal areas to enhance that resource as well as protect new reefs from predators. The Louisiana Department of Wildlife and Fisheries will lead this effort and will utilize Barataria Basin oyster fishers for placement of reefs, using trip-tickets and other evidence for eligibility. Cost of this program is estimated at $4,000,000.

- *Alternative Oyster Aquaculture*
  To adjust to changing coastal conditions new techniques will be initiated or expanded to assist the oyster industry in remaining sustainable into the future. One such technique is the use of alternative oyster culture (AOC) opportunities. This technique allows for the cultivation of oysters while taking into account the possibility of natural and anthropogenic changes to an estuary. In Louisiana, the technique most often associated as alternative culture is that of "off-bottom" culture.

  Off-bottom culture of oysters is done within floating or suspended containers that provide protection from predation and siltation as well as the give the operator ability to move to different growing areas in response to episodic events or longer-term changes in salinity.

  The State of Louisiana recognizes AOC as an area of the oyster industry that can help diversify the oyster industry and add a level of sustainability as the industry adjusts to a changing coast. Specifically, to best mitigate the potential effects of the MBSD Project on the oyster fishery within the Barataria Basin, specific components of an AOC Program will include some or all of the following:

1. *Introduction and Training*
   Establish a training program and information exchange for oyster industry members interested in transitioning/entering AOC activities. This program would introduce industry members to the tools, techniques, laws, and other necessary information necessary to participate in the AOC sector.
2. *Startup Assistance*
   Small grants would be made available to procure equipment necessary to enter the AOC alternative oyster aquaculture industry, including seed oyster production.
3. *Hatchery establishment/enhancement*
   Grants would be provided for establishing or enhancing hatcheries to provide a consistent seed supply for establishing and maintaining a robust AOC growing community.
4. *Designated Use Areas*
   The State recognizes that siting and permitting may be a barrier to entry in alternative oyster culture. Under this strategy, areas on state-water bottoms would be designated specifically for use by oyster growers engaged in AOC and permitted as such by the State. While it would be the intent to locate these areas within the impacted Basin, future conditions will dictate the availability and location. Site selection may also include locations in adjacent Basins with suitable conditions.

Funds under this program would be available prior to the diversion commencing operations. A portion of the funding from this program will initially be reserved for fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project. See discussion in Section 6.3.8 below for details on this reservation program. The cost of this program is estimated at $8,000,000.

- *Marketing*
  The State, through the Louisiana Department of Wildlife and Fisheries, working with guidance from the Louisiana Oyster Task Force, will assist in the marketing needs of oyster fishers in the Barataria Basin. Funds for this marketing program will be available prior to the diversion commencing operations. The total cost for this program is $1,000,000.

Impacts to Finfish Fisheries. Impacts assessed as a result of the Project vary between species. However, with the exception of flounder and spotted seatrout, the Project is predicted to have negligible impacts on the vast majority of commercially important fishes and in many cases trend to positive impacts. While the overall Project impact to the saltwater commercial finfish industry is anticipated to be small, the State will nevertheless enhance marketing efforts intended to address any impacts. This enhanced marketing effort will also help to mitigate effects in other fisheries as fishermen may choose to switch to saltwater and freshwater finfish after operation of the Project.

Mitigation.

- *Marketing*
  The finfish industry has long realized that effective marketing is invaluable to the adaptability and sustainability of the industry. Historically, the finfish industry has utilized marketing to aid in the exploitation of new resources adjusting to changes along Louisiana's coast. The State, through the Louisiana Department of Wildlife and Fisheries, working with guidance from the Louisiana Finfish Task Force, will assist in the marketing needs of fisheries impacted in the Barataria Basin as well as to help transition to other species if abundance patterns change. Funds for this marketing program will be available prior to the diversion commencing operations. The cost of this program is $1,000,000.

Impacts to Crab Fishery. The Project is not anticipated to negatively impact Louisiana's crab fishery. Project operations are projected to benefit blue crab resources. Nevertheless, the State will offer two forms of stewardship to support the crab fishery.

Stewardship Measures.

- *Marketing*
  The State, through the Louisiana Department of Wildlife and Fisheries, working with guidance from the Louisiana Crab Task Force, will assist in the marketing needs of blue crab fishers in the Barataria Basin. Funds for this marketing program will be available prior to the diversion commencing operations.

- *Gear Funding*
  The State will make funds available for improvements to crab fishing gear through a grant program to be administered by the Louisiana Department of Wildlife and Fisheries, the Louisiana's Seafood Future Program, and industry partners. Eligibility requirements for this program will require use within the project area and may include information from trip tickets and vessel licenses.

  The total cost for both elements of this program is $1,000,000.

Impacts to Shrimp Fishery. The Project is projected to have a major, adverse permanent impact on the brown shrimp resource and a negligible to minor beneficial permanent impact on the white shrimp resource. Together these two species account for almost all of the shrimp landed from the Project Area. Given the resultant impacts to the individual species, and the reliance of fishermen on both species, the EIS concludes that the overall Project effect determination is a moderate to major permanent adverse impact to the commercial shrimp fishery. This is largely driven by the predicted reduction in brown shrimp abundance and uncertainty around the offset of increased white shrimp production.

Mitigation. Proposed mitigation strategies for shrimp are directed at the fishery rather than the resource. As the EIS identified the potential for the Project to result in disproportionate impacts to some low income and minority shrimp fishers, CPRA will implement measures to ensure they reach communities with environmental justice concerns that may be disproportionately impacted by the Project. This is further discussed in Section 6.3.8 below.

- *Vessel/Facility Improvements*
  The analysis in the Final EIS projects that the brown shrimp distribution pattern will likely shift down basin, and overall abundance may be reduced. When discussing how the industry might best adjust to coastal change and restoration projects (LSF 2019) vessel and gear modifications were repeatedly mentioned as strategy to help mitigate those changes. Equipping a vessel with new assets such as refrigeration can both extend the time the vessel can transit to and remain on the fishing grounds (or fish new areas) or allow for a better-quality product that results in a higher price. In addition, changing gear types on existing vessels (for example, from skimmer to trawl), or using substitute gears that increase efficiency and lower overall operating costs (for example, from nylon trawl to spectra trawl), would help mitigate impacts of the Project to shrimpers. Several commenters on the Draft EIS also noted that updates and improvements to dock facilities would provide significant benefits to the overall shrimp industry.

  The State will make funds available for these types of improvements through a grant program to be administered by the Louisiana Department of Wildlife and Fisheries, the Louisiana's Seafood Future Program, and industry partners. The grant program will be available for vessel improvements (such as refrigeration or gear improvements), to help fund acquisition of new vessels, or to update and improve dockside facilities. Eligibility requirements for this program will require use within the project area and may include information from trip tickets and vessel licenses, with a goal of equitably apportioning grants to address potential impacts. A portion of this funding will be initially reserved for fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project. (See Section 6.3.8 below.) Additionally, to help address access issues to the mitigation programs, a portion of the funding will be reserved to assist fishers and dock owners with the application process. Funds for this initiative will be available before and after diversion operations commence for up to 10 years or until the funds are expended. The cost of this program is anticipated to be $15,000,000.

- *Marketing*
  The Louisiana Shrimp Industry routinely describes marketing as the one of the primary needs for the industry. Competition from imports suppresses domestic shrimp demand and price and places an overwhelming stress on the industry. To mitigate for additional stresses potential changes in brown shrimp abundance may have, marketing would be

used to help increase market-share of domestic shrimp. Specific targets could include marketing of the Barataria white shrimp resource similar to the success had in other estuaries of Louisiana (see Vermilion Bay). This program will be administered by the Louisiana Department of Wildlife and Fisheries with guidance from the Shrimp Task Force. The cost of this program is anticipated to be $2,000,000.

- *Assistance with Federal Considerations*
  Several Draft EIS commenters noted that some of the restrictions imposed by NOAA/NMFS, for example, the Federal Shrimp Permit Moratorium, and the shrimp trade imbalance, negatively impact Louisiana shrimpers' ability to compete in the marketplace. The State will work with NOAA/NMFS on the upcoming review of the Federal Shrimp Permit Moratorium, as well as in other ongoing efforts, to ensure Louisiana shrimpers' perspectives are factored into the decision-making process.

Overall Fisheries Mitigation.

- *Workforce and Business Training*
  A common mitigation strategy mentioned within various sectors of the commercial fishing industry is workforce training. Under several survey activities workforce training and business training are listed as ways to either transition into new employment or enhance revenue within current employment, respectively. The State, working through the Louisiana Economic Development, the Louisiana Workforce Commission, local colleges, trade schools and other partners, will develop a workforce and business training program to provide business training to enhance current business operations and provide training in new skills for individuals that want to transition to new employment opportunities. This training would be made available to qualified participants[11] within the commercial fishing industry. A portion of this program would be reserved for fishers who are part of an identified community with environmental justice concerns that may be disproportionately impacted by the Project. The funds under this program would be available before diversion operations commence. The total cost of this program is anticipated at $2,000,000.

- *Subsistence Fishing Access*
  There are a number of subsistence fishers that access the Project Area. While impacts on subsistence fishing resources are not anticipated to be significant, the State will provide funding to enhance subsistence fishing opportunities. Funds in this program will be used to increase shore-based subsistence fishing in both Barataria Basin and along the Mississippi River prior to initiation of Project operations. Funds in this program may also be used to improve boat launch access. These funds will be used in Plaquemines Parish, and the program will be administered jointly by Plaquemines Parish and the state prior to the initiation of Project operation. The total cost of this program is anticipated at

[11] For purposes of this program, qualified participants would include fishers who are able to demonstrate a recent history of fishing in Barataria Basin through trip ticket data.

$1,000,000. Details regarding implementation of this measure are set forth in Section 6.3.8 below.

- *Project Operational Considerations*
  Initial operations of the project will be closely monitored to assess changes within the Barataria Basin system. Data from these initial operations, along with consultations with experts and fishers, will allow the State to refine and optimize project operations to achieve project success while minimizing impacts where practical.

- *Enhanced Resource Sampling*
  The State will continue the enhanced sampling effort put into place to characterize the baseline condition of the Barataria Basin as well as enhance monitoring to assess project-related changes. Information from this enhanced sampling effort will then be used to inform Project operational strategies that will meet project success objectives while minimizing impacts where practical.

Implementation of Aquatic Stewardship Measures. Table 2 below summarizes the various fisheries mitigation and stewardship measures that will be implemented as part of the Project. Where available, information is included as to timing, duration, potential linkages to existing programs, anticipated amounts and the entity(ies) associated with the day-to-day implementation of the activity. CPRA is also outreaching to the fishing community through a survey (similar to the survey used for to solicit feedback on the mitigation proposed for tidal flooding impacts, see discussion in Section 6.3.2 (Public Input on Mitigation Measures)) to request their input on the details and implementation of these fisheries measures. The results of those surveys may lead to refinements to these measures, but the general categories of measures and total funding allocation will remain as set forth herein. CPRA will continue to advance the implementation details for each measure.

Table 2.

Measure	*Location*	*Implementation Period*	*Program Status*	*Project Associated Funding*	*Implementing Entity*
Establishment of Reefs within Public Seed Grounds	Barataria Basin or adjacent areas identified by industry	Operation	New	$4,000,000	LDWF
Enhance Public and Private Oyster Grounds	Barataria/ Outside	Construction/ Pre-operation	New program adapted from previous programs	$15,000,000	LDWF

Create or Enhance Broodstock Reefs	Barataria	Operation	New program but companion to NRDA program	$4,000,000	LDWF
Alternative Oyster Culture (AOC) *Introduction and Training*	Barataria/ Outside	Pre-operation and Operations	New program building off existing statewide effort	$8,000,000	Louisiana Seafood Future
Alternative Oyster Culture (AOC) *Startup Assistance*,	Barataria/ Outside	Pre-operation and Operations	New program building off existing statewide effort		Louisiana Seafood Future
Alternative Oyster Culture (AOC) *Designated Use Areas*	Barataria/ Outside	Pre-operation and Operation	New program building off existing statewide effort		Louisiana Seafood Future
Marketing to Support the Oyster Industry	Industry	Pre-operation and Operation	New Program informed by industry	$1,000,000	Louisiana Seafood Future
Marketing to Support the Finfish Industry	Industry	Pre-operation and Operation	New Program informed by industry	$1,000,000	Louisiana Seafood Future
Marketing and Gear Improvements to Support the Crab Industry	Industry	Pre-operation and Operation		$1,000,000	Louisiana Seafood Future; LDWF
Grant Program for Shrimp Vessel/Facility Improvements	Basin/ Industry	Pre-operation and Operation	New, based on previous successful programs	$15,000,000	Louisiana Seafood Future
Marketing to Support the Louisiana Shrimp Industry	Industry	Pre-operation and Operation	New Program informed by industry	$2,000,000	Louisiana Seafood Future

Subsistence Fishing	Basin and River	Pre-Operation	New Program with stakeholder input	$1,000,000	CPRA
Workforce and Business Training for Commercial Fishers	Basin/ Industry	Pre-operation	New	$2,000,000	TBD

The funds identified above will be fully committed for these measures to address Project related impacts. To the extent the dollars identified for a particular measure are not used by that measure, they will be reassigned to another measure.

To extent these measures will be implemented by an agency other than CPRA, CPRA will enter into a contract with the implementing agency specifying the implementation plan, including the schedule, duration and funding for the measure. CPRA has an established history of such arrangements for other programs (e.g., agreement with LDWF for implementation of Oyster Strategic Restoration and Rehabilitation Plan (OSRRP)).

6.3.4. ESA-Listed Species

Impacts. Impacts to ESA-listed species from construction and operations of the Project are described in detail in the Biological Assessment and in the Draft EIS Chapter 4 Section 4.12. Formal consultation with FWS and NMFS resulted in issuance of two separate Biological Opinions, one from each agency.

Effects determination for six of the ten listed species and designated critical habitat are *Not Likely to Adversely Affect* or *No Effect.* Effect determinations for the remaining four species (pallid sturgeon, green sea turtle, Kemp's ridley sea turtle, and loggerhead sea turtle) are *Likely to Adversely Affect* and include:

(1) Minor adverse impacts to pallid sturgeon from underwater noise associated with pile driving in the river during construction.
(2) Minor to moderate impacts to pallid sturgeon due to loss of individuals through entrainment by the diversion structure during operations.
(3) Minor adverse impacts to green, Kemp's ridley, and loggerhead sea turtles due to reductions in certain prey species and increased negative interactions with commercial shrimp fishing due to the spatial shift in shrimp fishing effort due to the Project.

Conditions and Recommendations. The Biological Opinions include Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs) to avoid and minimize effects to listed species and designated critical habitat. CPRA anticipates that those RPMs and T&Cs will be conditions of any Corps permit or LA TIG funding decision and will undertake the RPMs and implement the T&Cs identified in the Services' Biological Opinions for the Project. If those Biological Opinions are modified in the future through re-initiation of consultation, any modified RPMs and T&Cs shall automatically supersede those RPMs and T&Cs included in the Biological Opinions referenced herein.

6.3.5. Non-ESA Listed Fish and Wildlife

Impacts. The MBSD Project anticipates benefiting the Barataria Basin with a basin wide net increase of 12,684 marsh acres and near field (e.g., close proximity to the outfall) increase of 13,151 marsh acres (3,848 Average Annual Habitat Units (AAHUs)) over the 50-year period of analysis. The near field area (13,151 acres) focuses on a smaller lower-salinity portion of the basin (primarily an area of wetland gain) near the diversion outfall. The larger basin benefits (12,684 net acres) include the lower basin brackish and saline marsh losses, which offsets some of the fresh/intermediate gains seen in the diversion outfall area resulting in an overall smaller net wetland gain across the basin than when compared to the near field area alone.

The Project would directly impact 193.1 acres of jurisdictional wetlands and 225 acres of vegetated shallows (SAV) and other waters of the U.S. Of the 193.1 acres (-102 AAHUs) of total permanent direct wetland impacts, 26.1 acres (-14.9 AAHUs) are of bottomland hardwood forest, 163.4 acres (-66.9 AAHUs) are of wet pasture, and 3.6 acres (-20.3 AAHUs) are of scrub/shrub. The Project is expected to benefit (nourish and restore) 13,151 acres (3,848 AAHUs) of marsh in the Barataria Basin. Project benefits of wetland creation and nourishment offset the permanent loss in existing wetland function from Project construction.

Because sediments, freshwater, and nutrients transported by the Mississippi River would be diverted up river from the Birdfoot Delta of the Mississippi River, the Birdfoot Delta would experience an additional projected indirect loss of 2,891 acres of wetlands by 2070 when compared to the No Action Alternative. Changes in land area in the Birdfoot Delta between the Applicant's Preferred Alternative and the No Action Alternative would be relatively minor (3 to 6 percent in operational years 2030 to 2060). The expected total project benefits would far outweigh the indirect negative impacts to the Birdfoot Delta. However, of the loss to the Birdfoot Delta, 926 acres of marsh is projected to be lost in the Delta NWR and 37 acres on the PAL WMA because of the reduced sediment being delivered to the area.

See also the Fish and Wildlife Coordination Act recommendations set forth in Section 4.6 above, which are fully incorporated here.

6.3.6. Marine Mammals

Impacts to Bottlenose Dolphins. Impacts on the Barataria Bay Estuarine System (BBES) stock under the Project action alternatives include: (1) immediate and permanent, major, adverse impacts on survival from low salinity throughout the BBES stock area; (2) adverse effects on health and reproduction from multiple stressors including low salinity exposure, wetland loss in the BBES stock area (also occurring under the No Action Alternative), lower temperatures, an increased risk of HABs, and the residual effects from the DWH oil spill; and (3) based on the estimated decreases in survival rates, there may be a substantial reduction in population numbers. Thus, the Project is projected to have permanent, major, adverse impacts on BBES dolphins. The measures noted below will be implemented by NOAA and partners on behalf of CPRA in recognition of the anticipated impacts to bottlenose dolphins.

Operational Minimization Measures. CPRA will examine operational strategies to minimize, to the extent practicable and consistent with the purposes of the Project, the Project's impacts on bottlenose dolphins. Given the dynamic conditions of any estuarine system, and the uncertainty around future conditions, the minimization measures will rely on the MBSD MAM Plan to inform future implementation.

State-wide Stewardship Measures. CPRA will also support non-operational stewardship measures to reduce existing and future threats to Bay/Sound Estuary (BSE) and coastal dolphin stocks throughout and adjacent to Louisiana coastal waters. While these measures may not minimize impacts from the Project on BBES dolphins, they could enhance individual dolphin survival from other anthropogenic stressors. These measures will also improve understanding and management of Louisiana dolphins.

- *Statewide Stranding Program*
  A statewide stranding program for a 20-year period to begin immediately following current funding expiration in 2026 will be provided. Stranding response in Louisiana would improve the survival and health outcomes of marine mammal populations injured by the DWH spill, especially coastal and estuarine stocks of bottlenose dolphins. Enabling a more rapid response to a live stranded cetacean will increase that animal's chance of survival by reducing the time spent on the beach, reducing stress on the animal, providing rapid treatment and, if appropriate, transport to an authorized rehabilitation facility for additional treatment and care. In addition, this program will increase the quality and quantity of data that can be collected from dead stranded cetaceans, by decreasing decomposition time on the beach and ensuring that fresher carcasses are recovered for necropsy. This will improve the ability to diagnose causes of illness and death in cetaceans to better understand natural and anthropogenic threats, which will inform restoration planning, monitoring and adaptive management.

- *Human Interaction/Anthropogenic Stressor Reduction*
  CPRA will reduce existing and future stressors to bottlenose dolphins statewide, including within Barataria Bay, in several ways:
    - Reduce bottlenose dolphin mortalities from rod and reel fishing gear,
    - Reduce intentional injury and mortality (e.g., shooting) to bottlenose dolphins,
    - Reduce illegal feeding of bottlenose dolphins, and
    - Evaluate the potential impacts of noise, vessels, and other direct threats to identify and implement stewardship measures designed to address these threats.

- *Contingency Fund for Stranding Surge, Unusual Mortality Events (UME), or Episodic Mortality Event Response*

  As described in the FEIS, survival rates of BBES dolphins are likely to be greatly reduced upon operation of the Project. To respond to the expected increase in dolphin strandings, CPRA will establish funds for stranding surge capacity in Barataria Basin. The national UME Contingency Fund is extremely limited and is used to respond and investigate UMEs nationally. Additional funds for a Barataria Basin Stranding Surge, UME, or Episodic Mortality Event Response will be made available upon onset of operations for immediate use in or be reimbursable to the stranding network.

6.3.7. Essential Fish Habitat

Impacts. Impacts to EFH as managed under the Magnuson-Stevens Act from construction and operations of the Project are described in detail in the Essential Fish Habitat Assessment and in the Final EIS Chapter 4 Section 4.10.3.3 and Section 4.10.4.3. Impact to EFH and managed species include:

(1) Temporary to permanent, negligible to minor impacts from construction due to structure placement, dredging, and turbidity and sedimentation.
(2) Major beneficial changes from conversion of more ubiquitous soft bottom habitats to higher value submerged aquatic vegetation and marsh habitats within Barataria Basin.
(3) Moderate adverse impacts in the birdfoot delta from loss of marsh habitat.
(4) Minor adverse impacts on reef fish from changes in prey species (gray snapper) and salinity and nursery habitat (lane snapper).
(5) Major adverse impacts to brown shrimp and oysters from decreased salinities.

Conservation Recommendations. Formal consultation on EFH with NMFS resulted in the identification of the following EFH Conservation Recommendations:

(1) The MAMP should clearly identify variables and conditions to be monitored and describe the monitoring protocols. The MAMP should also identify specific management alternatives including, but not limited to alternate flow rate, frequency, timing and duration, and an effective decision making regime to modify project management if monitoring and subsequent analyses indicate diversion operations are not providing the desired outputs, or are causing unexpected or unwanted effects to resources of concern.
(2) CPRA should continue investment in ecosystem and individual species models development and refinement for their use in comparing alternatives in the MAMP.

These measures have been included in the MAMP for the Project, Appendix R2 to the Final EIS.

6.3.8. Environmental Justice

Impacts. Impacts to Environmental Justice populations from the Project are described in detail in Chapter 4 Section 4.15 of the Final EIS, and briefly summarized below.

Construction Impacts

The Project is projected to have minor to moderate adverse construction-based impacts during the approximately 5-year construction period on properties in the immediate vicinity (about 0.5 mile) of the construction footprint, including portions of the community of Ironton, which is predominantly (97%) African American. This includes impacts to air (construction dust), noise (pile driving), and land-based transportation (traffic congestion from construction trucks/vehicles and construction worker vehicles).

Operations Impacts

The Project is projected to have minor to major impacts on populations near the Project immediate outfall area (within 10 miles to the north and 20 miles to the south) outside of levee protection due to increases in tidal flooding and storm hazards. These impacts may be disproportionately high and adverse for some communities with environmental justice concerns, including low income and minority populations, to the extent these populations are uniquely vulnerable to tidal flooding and storm hazards. The effects would be most pronounced within the first two decades of operation, after which time, impacts would be more minor as compared to the No Action Alternative. All tidal flooding impacts would be reduced to minor by 2070, when the dominant driver of tidal flooding would be relative sea-level rise.

The Project is also projected to adversely impact communities with environmental justice concerns, including low-income and minority populations engaged in commercial and subsistence fishing and dependent on adversely impacted fisheries in the Barataria Basin. These impacts may be disproportionately high and adverse depending on the degree of engagement and dependence by these populations on these fisheries.

Mitigation.

Consistent with CEQ's guidance regarding outreach and engagement to communities with environmental justice concerns[12], CPRA engaged in additional outreach to populations potentially impacted by the Project to seek their input on mitigation and stewardship measures. A summary of that outreach is included in Chapter 7 of the Final EIS. Based on CPRA's evaluation of the projected impacts of the Project, combined with the input received on the draft mitigation measures, CPRA has developed the following mitigation and stewardship measures to assist community members potentially affected by the Project.

[12] For purposes of the Mitigation Plan, the term "communities with environmental justice concerns" refers to communities overburdened by pollution as identified in Executive Order 12898 of February 11, 1994 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*). Those communities include communities of color, low-income communities, and Indigenous communities. The term also includes communities identified as "disadvantaged" from the Office of Management and Budget's interim implementation guidance for the Justice40 Initiative (July 20, 2021), available at https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf.

Construction Impacts

CPRA will implement a number of BMPs to minimize the construction based impacts, including:

A. ROAD CROSSINGS AND ACCESS POINTS
   i. Maintain safe and accessible conditions at all road crossings and access points during construction. Details regarding implementation of this measure will be coordinated with and approved by the Louisiana Department of Transportation. A copy of that plan will be appended to this Mitigation Plan when available.
   ii. Minimize the use of tracked equipment on public roadways. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions.

B. DUST MANAGEMENT
   i. Water or chemical dust suppressants will be used to control dust released during land clearing and grading and on dirt roads and material stockpiles to minimize the release of dust.

In addition, recognizing the unique vulnerability of the Ironton community, CPRA will, prior to the start of construction, engage a community liaison whose position will include receiving and responding to concerns from Ironton community members regarding Project construction impacts. This will include access to CPRA, via means such as a telephone hotline, email address, etc., where Ironton community members will be able to directly contact CPRA's community liaison.

In addition, prior to the start of construction, CPRA will develop a Community Communications Plan to assist with communications with community members. It will include a plan for periodic meetings with representatives from the Ironton community, as well as a plan for disclosure of the upcoming construction schedule and anticipated construction activities during that period. A copy of that Plan will be appended to this Mitigation Plan when available prior to commencement of construction, and may be revised as appropriate throughout the construction process.

Operations Impacts

Subsistence and recreational fishing. To address identified potential for disproportionately high and adverse impacts to subsistence oyster and brown shrimp fishing, CPRA will provide public access opportunities within the Barataria Basin and Mississippi River Basin. This is intended to address effects on proximity of resources for both consumptive and non-consumptive use. These effects will be primarily addressed through the provision of public shoreline access and watercraft launching around the project area to assist recreational and subsistence fishing. No later than 24 months prior to the anticipated commencement of operations of the Project, CPRA will convene a community working group to identify preferred locations for these new access points. CPRA will invite community representatives to participate in this working group, and will provide special outreach to individuals and communities that rely on fishing in the Basin for subsistence aimed at ensuring their participation. Based on the input received from this community working group, CPRA will identify and develop one or more additional public shoreline access points for fishing and/or boat launching.

Commercial fishing impacts. CPRA recognizes that certain individuals and communities with environmental justice concerns, including low income and minority populations, may experience unique vulnerabilities that may include difficulty switching to other industries due to economic challenges, age, educational or training background, and cultural or language barriers. These populations may also be less likely or able to relocate to other geographic areas for alternative employment opportunities due to economic or cultural reasons. Species substitution may require traveling long distances or investing in expensive new equipment, which adds costs that may be challenging for low-income and minority fishers.

In an effort to respond to these unique vulnerabilities, CPRA will reserve a portion of each of the following mitigation and stewardship programs for individuals from identified communities with environmental justice concerns that may be disproportionately impacted by the Project: shrimping vessel and gear improvement grants, enhancing public and private oyster seed grounds, Alternative Oyster Culture, and overall fisheries workforce and business training. CPRA will engage representatives from community-based non-profit organizations to assist in providing information to community members regarding available programs, to assist in developing eligibility criteria to utilize in approving program recipients, and to assist potential applicants in completing any application processes.

Following Project approval and funding and prior to Project operations, CPRA will implement an outreach plan targeting fishers from identified communities with environmental justice concerns to ensure they learn about and are able to access these programs. This plan will include:

1) coordination with local community organizations to advertise these programs and to assist fishers from identified communities with environmental justice concerns with completing the applications needed to participate in these programs; and
2) engaging an outreach coordinator to assist in implementation of the plan, including:
   a) targeted advertising,
   b) working with individual applicants to complete the application materials,
   c) follow-up with individuals to ensure they receive the benefits of the program,
   d) monitoring and reporting of the numbers of fishers identified from identified communities with environmental justice concerns who utilize the program, and
   e) the percentage of program resources that are utilized by fishers from identified communities with environmental justice concerns each year.

Water Level/Inundation Impacts. CPRA will provide mitigation for projected increases in water level and corresponding increases in tidal flooding as explained in Section 6.3.2 above. CPRA recognizes that low income and minority community members may experience unique vulnerabilities that make it more difficult to respond or adapt to Project impacts, such as residing in sub-standard housing, having limited access to information about emergencies and hazard responses, as well as economic and social obstacles to relocating, finding housing, commuting to employment opportunities, or responding to environmental damage to homes and businesses.

In an effort to ensure that identified communities with environmental justice concerns affected by the projected water level increases are informed about and have an equal opportunity to access the benefits of the mitigation and stewardship programs, CPRA will engage an outreach coordinator to:

a) develop and implement targeted outreach,
b) inform impacted community members of available programs and resources,
c) work with individuals to assist them in pursuing benefits and completing the necessary materials,
d) follow-up with individuals who are selected for benefits to ensure that they receive the benefits of the programs,
e) monitor and report the number of community members who utilize the programs, and
f) the amount and percentage of program resources utilized annually.

CPRA intends to follow the Uniform Relocation Act when engaging with any property owner or tenant who requests to relocate due to concerns about the impacts of Project operations on water levels prior to Project operations.

In addition, CPRA recognizes that Grand Bayou is a unique tribal community with deep connections to the natural environment. It is the ancestral village of the Atakapas-Ishak/Chawasha Tribe, and most of the residents are members of the Tribe. CPRA engaged in direct outreach with leaders of the community of Grand Bayou Indian Village to identify specific mitigation and stewardship measures that support the community. Based on the results of that outreach, CPRA added additional mitigation and stewardship measures for Grand Bayou, including:

- Floating gardens (funded through NRDA)
    - Large, waterproof boxes designed to serve as a raised garden bed in close proximity to resident's home. Provides suitable planting ground for vegetables, plants, etc. that will float during flood season and prevent plant inundation.

- Community connecting sidewalks (funded through NRDA)
    - Raised boardwalks connecting residents' elevated homes, community center, boat launches, etc. that will serve similar function to sidewalks and provide improve pedestrian connectivity for residents of the Grand Bayou community. These raised pathways for walking will allow continued access and increase community walkability during flood season.

- Grand Bayou Canal backfilling and ridge restoration project (project funded for E&D and construction)
    - o The project would restore wetlands and ridge habitat adjacent to the Grand Bayou Community through canal backfilling and ridge restoration. Plans include restoring wetland hydrology through canal backfilling and restoring approximately 50,000-linear feet of coastal upland habitat to provide wave and storm surge attenuation along Grand Bayou and Bayou Grand Cheniere, including for the Grand Bayou community. The ridge restoration component of this project is adjacent to the DWH Trustee funded Bayou Grand Cheniere Ridge and Marsh Restoration Project. See figure depicting the project features in Appendix C.

With regard to the backfilling and ridge restoration project (third bullet above), CPRA pursued and received grant funding from the National Fish and Wildlife Foundation (NFWF) through their National Coastal Resilience Fund to conduct preliminary design for this project. NWFW granted this funding request in November 2021. Numerous canals have been constructed over the years through the marsh around the Grand Bayou community. Canal backfilling has successfully been used in coastal Louisiana to return canal spoil banks into canals to mitigate damage caused by construction of the canals. This project would create or restore approximately 1,500 acres of wetlands and roughly 50,000 linear feet of habitat, restore natural hydrology, and provide wave and storm attenuation along Grand Bayou and Bayou Grand Cheniere. The CPRA will collaborate with representatives from the community of Grand Bayou in the planning and development of the project including site investigations (bathymetric, topographic, geotechnical, pipeline, and cultural resources surveys), preliminary design, and robust outreach. CPRA requested and received funding for construction of this project as part of its 2022/2023 Annual Plan.

Ironton is located behind the USACE NOV-NFL levee and, therefore, would not be impacted by changes in tidal flooding resulting from the Project. The Final EIS, however, states that negligible to minor increases in levee overtopping could affect the community of Ironton inside the NOV-NFL system. CPRA is not proposing specific mitigation to address or offset this negligible to minor increased risk because this potential increased risk does not accrue until Project operations have resulted in the development of a delta (wetlands and marsh) in the area outside the NOV-NFL levee adjacent to Ironton (circa 2040), and because this risk was identified for only one of the 100-year storm scenarios modeled. However, to help Ironton prepare for and mitigate flood risk from storms generally, CPRA will designate a liaison to work with residents in Ironton prior to commencing operations of the Project on community preparedness for storm-based flooding and damage.

Communications. As part of the above measures, CPRA will provide, at no cost to the requester, language services to ensure that individuals with limited English proficiency can meaningfully participate in CPRA’s programs and activities, including those described above.

6.3.9. Cultural Resources

Impacts. Impacts to Cultural Resources from the Project are described in detail in Chapter 4 Section 4.23 of the Final EIS, and are briefly summarized below.

USACE determined, and consulting parties concurred, the Project will have an adverse effect on one (1) historic property in the Construction Impacts APE (Locus 1 within Site 16PL107), four (4) historic properties (archeological sites) eligible for the NRHP located within the Operational Impacts APE (Sites 16JE2, 16JE3, 16JE11, 16JE147), and one (1) additional archeological site in the Operational Impacts APE the eligibility of which has not been determined but which is being treated as NRHP eligible (Site 16JE237).

Examples of potential direct impacts on these historic properties during Project operations would include burial from sediment deposition and erosion resulting from changes in flow velocity. Given the large size and submerged nature of much of the Operational Impacts APE, as well as the multiple other processes affecting these submerged areas (such as subsidence, erosion, and channel dredging), it is not possible to fully separate the Project-caused impacts on historic properties from those impacts caused by subsidence, erosion and other processes unrelated to the Project, particularly over the 50-year analysis period in the EIS.

Mitigation. CPRA, USACE, federal agency members of the LA TIG, SHPO, federally-recognized Tribal Nations, and the ACHP consulted pursuant to Section 106 of the NHPA regarding the effects of the Project on historic properties in the APE. The consulting parties developed a Programmatic Agreement (PA) for the Project. With regard to Locus 1 of 16PL107 in the Project construction limits within the Construction Impacts APE, the consulting parties agreed that a treatment plan will be developed and appended to the PA.

For the Operational Impacts APE, the PA includes an alternative mitigation plan, agreed to by CPRA, to resolve adverse effects. That alternative mitigation plan includes a regional ethnohistory of Native American settlement in the southeastern coastal Louisiana region (Barataria Basin, Breton Sound Basin, and Pontchartrain Basin). The analysis conducted as part of the Alternative Mitigation Plan would include an examination of the archaeological record at the regional level as well as oral and archival sources. The plan would: (1) mitigate for the lack of cohesion among the archaeological record, scholarly literature on Native American history, and the available vital/archival records; (2) produce a series of documents and/or maps for participating Tribes to improve consultation with federal agencies in specific areas of Tribal interest within the alternative mitigation plan study area; and (3) make Tribal history available to the public online and in the classroom.

The PA also includes the agreed upon plan for monitoring Project impacts on cultural resources within the Operational Impacts APE which are included in the MAM Plan, as well as an unanticipated discoveries plan. The PA was executed by [*TBD*] concurrent with the Final EIS or Record of Decision (ROD) and is attached as Appendix A.

7. PLAN IMPLEMENTATION

7.1. Performance, Monitoring, Maintenance, and Adaptive Management

Evaluation metrics and implementation guidance and goals are identified in the MAM Plan, developed by the LA TIG. Performance evaluation metrics and parameters are also adopted for the Project to ensure that the Project is achieving its intended restoration benefits.

Such performance metrics and parameters will help determine if the Project and the related mitigation are achieving the overall objectives of the Project and this Plan. These standards are based on attributes that are objective and verifiable by field measurements and analysis. Data collection and analysis will be based on methods established and/or approved by CPRA using established best-practices.

The MAM Plan also identifies monitoring, maintenance, and adaptive management requirements to ensure that mitigation components and the Project restoration objectives are achieving the performance standards. Certain mitigation measures contained in the Mitigation Plan will be specifically contained within the MAMP. Once construction is underway, CPRA will be responsible for monitoring per the MAMP and implementation of any required mitigation.

If monitoring reports comparing progress on mitigation and stewardship measures to performance standards indicate progress for any USACE required mitigation is falling short of the identified performance standards, consultation with the USACE would be initiated regarding the need for adaptive management.

A table summarizing the mitigation and stewardship measures set forth herein is in Section 4.27 of the Final EIS.

8. FINANCIAL ASSURANCES

If the *Deepwater Horizon* Louisiana Trustee Implementation Group decides to fund the Project, each component of this Mitigation and Stewardship Plan will be funded as part of the LA TIG's funding decision unless otherwise specified.

APPENDIX A

NHPA Section 106 Programmatic Agreement

Placeholder pending final agreement

APPENDIX B

MBSD Construction Best Management Practices

CPRA Mississippi River Mid-Basin
Sediment Diversion Program

ENVIRONMENTAL PROTECTION PLANNING DOCUMENT FOR THE CONSTRUCTION OF MID-BARATARIA SEDIMENT DIVERSION

PREPARED BY: CPRA
PROJECT: Mid Barataria Sediment Diversion
DATE: February 4, 2022

PURPOSE AND SCOPE

This document provides a preliminary list of Best Management Practices (BMPs) that would be implemented during construction of the Mid Barataria Sediment Diversion. CPRA (or its Contractor's; hereafter referred to as CPRA) will implement each of these BMPs to the maximum extent practicable.

CPRA will develop an Environmental Protection Plan (EPP) that includes each of these BMPs and details, for each component of the environment, the procedures and measures for environmental protection during the construction of the project. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive materials; and other pollutants.

CPRA shall provide as part of the EPP a list of all Federal, State and local environmental laws and regulations which apply to the construction operations. The Plan shall detail the action which the contractor shall take to comply with all applicable Federal, State and local laws and regulation concerning environmental protection and pollution control and abatement, as well as any additional specific requirements. The EPP would also delineate the required environmental monitoring plan for compliance of various environmental regulations.

The EPP will include an approved Spill Control Plan, Waste Management Plan, Contaminant Prevention Plan, and Environmental Inspection Plan. Other plans that will be developed and are related to environmental protection include: Site Safety and Health, Accident Prevention, Organization and Authority, and Personnel Training.

BMPs here are presented in the following sections: 1) Protection of Land Resources; 2) Protection of Wetlands and Water-based Resources; 3) Protection of Fish and Wildlife Resources, and 4) Protection of Cultural Resources.

SECTION 1: PROTECTION OF LAND RESOURCES

I. GEOGRAPHIC APPLICABILITY

The Protection of Land Resources applies to upland areas of the Project, which predominantly occur between the Mississippi River Levee (MRL) and existing NOV back levee(s). Wetland and waterbody features of the Mississippi River and Barataria Basin are addressed in the Wetland and Water Resources section.

II. ENVIRONMENTAL INSPECTION

A. CPRA will ensure that the number and experience of inspectors assigned to the Project shall be appropriate for the size of the construction area, the level of activity, and the number/significance of resources affected.

Inspectors are responsible for:

B. Inspecting construction activities for compliance with the requirements of the Environmental Protection specifications and plans, other environmental permits and approvals, and environmental requirements in landowner easement agreements;
C. Identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance;
D. Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction;
E. Verifying the location of signs and highly visible flagging marking the boundary of sensitive resource areas (e.g., cultural resource sites);
F. Identifying erosion/sediment control and soil stabilization needs in all areas;
G. Ensuring that erosion control devices are properly installed and determining the need for additional erosion control devices;
H. Inspecting and ensuring the maintenance of temporary erosion control measures;
I. Ensuring the repair of ineffective temporary erosion control measures;
J. Verifying that dewatering activities are conducted according to the Storm Water Pollution Prevention Plan (SWPPP);
K. Ensure that temporary construction areas are returned to surrounding conditions;
L. Keeping records of on-site compliance with environmental protection specifications;
M. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase; and
N. Verifying accepted material disposal locations and practices.

III. PRECONSTRUCTION PLANNING

A. CONSTRUCTION WORK AREAS

i. All construction work areas will be identified (e.g., project construction boundary, temporary construction right-of-way, work space areas, material storage, contractor yards, borrow and disposal areas, and access roads) that would be needed for safe construction.
ii. The development of a Stormwater Pollution Prevention Plan (LAR100000 Storm Water Discharges from Construction Activities of 5 Acres or More; NPDES, LDEQ) will be developed during the preconstruction planning phase.

B. INTERIOR DRAINAGE SYSTEMS

i. CPRA will develop a *Maintenance of Drainage Plan* that will ensure that the existing level of drainage be maintained during Project construction in areas bounded by the MRL and existing NOV back levee(s).

C. ROAD CROSSINGS AND ACCESS POINTS

i. Plans will be developed for safe and accessible conditions at all roadway crossings and access points during construction and restoration.
ii. Project access points with ingress and egress to state highways will be approved by Louisiana Department of Transportation and Development (LDOTD).

D. DISPOSAL AND HAZARDOUS SUBSTANCES PLANNING

i. The methods and locations for the regular collection, containment, and disposal of excess construction materials and debris (e.g., timber, mats, garbage) throughout the construction process will be specified in a Waste Management Plan.
ii. For work activities (such as painting, metal finishing, etc.) that will involve bringing hazardous chemicals, hazardous substances or hazardous materials onto the project site, the Contaminant Prevention Plan will specify practices for hazard communication, safe storage, waste identification and disposal. Licensed contractors will be responsible for removing and disposing hazardous materials.

iii. For work activities that pose a risk of an oil or hazardous substance spill, a Spill Control Plan will include the procedures, instructions, and reports to be used in the event of an unforeseen spill, including:
    1. Party responsible for implementing and supervising the containment and cleanup;
    2. Training requirements of personnel and methods of accomplishing the training;
    3. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified;
    4. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency;
    5. The materials, methods, and procedures to be used for expeditious contaminant cleanup; and
    6. The reporting process of any spills or hazardous substance releases and who will follow up with complete documentation.

IV. CONSTRUCTION

A. APPROVED AREAS OF DISTURBANCE

i. Project-related ground disturbance shall be limited to the construction footprint. In the event temporary rights of way need to be established for construction (e.g., additional area or route), these will be subject to all applicable survey and permit requirements, and landowner easement agreements.

B. TOPSOIL

i. Topsoil will be stockpiled and re-incorporated into the levee or work areas to enhance vegetation establishment.

C. INTERIOR DRAINAGE SYSTEMS

i. The Maintenance of Drainage Plan will specify how flow collected from the existing drainage system affected by the construction of the project shall be collected and diverted into the existing or new operational downstream drainage system.

ii. The installation, maintenance, and operation of drainage will be designed to: 1) collect and dispose of all storm water entering directly into the construction area, and 2) prevent flow in the downstream portion of the drainage system from backing into the work area.

iii. Monitoring of rain events and water levels in drainage ditches will be implemented.

D. ROAD CROSSINGS AND ACCESS POINTS

i. Maintain safe and accessible conditions at all road crossings and access points during construction.
ii. Minimize the use of tracked equipment on public roadways. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions.

E. DUST MANAGEMENT

i. Water or chemical dust suppressants will be used to control dust released during land clearing and grading and on dirt roads and material stockpiles to minimize the release of dust

F. TEMPORARY EROSION CONTROL

CPRA will implement and pursue all measures required in the SWPPP to control soil erosion, and the resulting sediment, to the extent necessary, to prevent sediment from leaving the construction servitude and prevent pollution of any water body caused by the runoff from the areas of construction activities.

i. Erosion and Sediment Controls

1. The construction-phase erosion and sediment controls should be designed to retain sediment on-site to the maximum extent practicable.
2. The best practicable technology currently available will be designed, installed and maintained such that erosion and sediment controls minimize the discharge of pollutants, which requires: 1) control of storm water volume and velocity to minimize soil erosion in order to minimize pollutant discharges; and, 2) control storm water discharges, including both peak flow rates and total storm water volume to minimize channel and stream bank erosion and scour in the immediate vicinity of discharge points.
3. Structural measures to divert flows from exposed soils, retain flows or otherwise limit runoff and the discharge of pollutants from exposed areas to the degree attainable may

include but are not limited to: silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins.

4. All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, or incorrectly, the permittee must replace or modify the control for site situations.
5. If sediments escape the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment).
6. Sediment must be removed from sediment traps or sedimentation ponds as required by design.
7. Trapped sediment must be removed from a silt fence as required by the design in accordance with the manufacturer's specifications.
8. Material storage areas (also including overburden and stockpiles of dirt, borrow areas, etc.) used solely for the project are considered a part of the project and shall be addressed in the storm water pollution prevention plan.
9. Provide and maintain natural buffers around waters of the state, direct storm water to the vegetated areas and maximize storm water infiltration to reduce pollutant discharges, unless infeasible.

ii. Seeding and Mulching

1. Temporary erosion control including ground cover establishment will be described in a Sodding, Seeding, and Mulching specification, which will require that seed and sod sources are free of noxious species.
2. Mulch may be applied on levee slopes concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion.
3. Mulch can consist of weed-free straw or hay, wood fiber hydro-mulch, erosion control fabric, or some functional equivalent.
4. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch

binders within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

5. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

V. CONSTRUCTION CLOSE-OUT

A. CLEANUP

i. Commence cleanup of construction debris and temporary erosion control measures in areas where work activities have been completed.
ii. Complete final grading, topsoil replacement, and installation of permanent erosion control structures. When access is no longer required, travel lanes must be removed, and the temporary construction right-of-way restored.
iii. Grade the construction right-of-way to provide positive drainage.
iv. Remove construction debris from all construction work areas.
v. Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

B. FINAL STABILIZATION AND REVEGETATION

i. Final stabilization practices may include but are not limited to: establishment of permanent self-sustaining perennial vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, and other appropriate measures.
   1. Vegetation establishment will follow the guidelines and project specific criteria as established by CPRA and USACE-MVN Agency Technical Review teams.
   2. CPRA will consult with USACE and other specialists regarding the selection and establishment of grass species along the conveyance channel levees.

ii. Soil Additives
   1. Fertilize and or use pH modifiers in accordance with project specifications.

iii. Seeding or Sodding Requirements

1. Perform seeding of permanent vegetation within the recommended seeding dates.
2. Seed all disturbed soils within the construction footprint but outside of the Project facilities permanent footprint as soon as practical.
3. Use seeding methods (broadcast, drill, or hydro) that best apply to the existing conditions to achieve the target establishment coverage.

C. SOIL COMPACTION MITIGATION

i. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted.
ii. Severely compacted soils associated with temporary construction right-of-way outside of the construction boundary may include deep tillage or aeration to relieve compaction.

VI. POST-CONSTRUCTION ACTIVITIES AND DOCUMENTATION

A. MONITORING AND MAINTENANCE

i. Conduct follow-up inspections of all disturbed areas, as necessary, to determine the success of revegetation.
ii. Continue revegetation efforts until revegetation is successful.
iii. Monitor and correct problems with drainage systems resulting from construction in agricultural areas until restoration is successful.

B. DOCUMENTATION

Records shall be maintained that identify:

i. Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
ii. Acreage treated;
iii. Dates of backfilling and seeding;
iv. Names of landowners requesting special seeding treatment and a description of the follow-up actions;
v. The location of any subsurface drainage repairs or improvements made during restoration; and
vi. Any problem areas and how they were addressed.

SECTION 2: PROTECTION OF WETLAND AND WATER-BASED RESOURCES

I. GEOGRAPHIC APPLICABILITY

The Protection of Wetland and Water Resources applies to in-water construction activities in wetlands and waters of the United States influenced by the Mississippi River (MR) and the Gulf of Mexico in the Barataria Basin (Basin).

II. ENVIRONMENTAL INSPECTION

A. CPRA will ensure that the number and experience of inspectors assigned to the Project shall be appropriate for the size of the construction area, the level of activity, and the number/significance of resources affected.

Inspectors are responsible for:

B. Inspecting construction activities for compliance with the requirements of Environmental Protection construction specifications and plans, other environmental permits and approvals, and environmental requirements in landowner easement agreement;
C. Identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance;
D. Verifying that the limits of authorized construction work areas and locations of access are known and are acknowledged throughout construction;
E. Verifying the location of signs and highly visible flagging mark vessel construction work area and vessel access routes;
F. Identifying erosion/sediment control needs in all areas;
G. Ensuring sediment containment, temporary or permanent soil stabilization devices are properly installed, maintained, and repaired to the design specifications;
H. Keeping records of on-site compliance with environmental protection specifications; and
I. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

III. PRECONSTRUCTION PLANNING

A. A Waste Disposal Plan will be developed that identifies the methods and locations of disposal of materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., and ensures that harmful debris will not enter ditches, rivers, bayous, canals, groundwater, and thus prevent the use of the area for recreation or present a hazard to wildlife.

B. A Spill Control Plan for in-water vessels and personnel will be developed that meets state and federal requirements and identifies the responsibilities for structuring operations in a manner that reduces the risk of spills and accidental exposure of fuels or hazardous materials to waterbodies and wetlands. The Plan will specify procedures for:
    i. Party responsible for implementing and supervising the containment and cleanup;
    ii. Training requirements of personnel and methods of accomplishing the training;
    iii. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified;
    iv. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency;
    v. The materials, methods, and procedures to be used for expeditious contaminant cleanup;
    vi. The reporting process of any spills or hazardous substance releases and who will follow up with complete documentation.

C. Disposal of Excavated Materials for Beneficial Use
    i. CPRA and Contractor responsibility for dredge material evaluation of possible contaminants of soil excavated from the conveyance channel and Outfall Transaction Feature (OTF) to be used for beneficial placement:
    ii. CPRA is responsible for the reasonable identification and evaluation of all Hazardous, Toxic and Radioactive Waste (HTRW) contamination within the vicinity of the Project (the conveyance channel and the OTF).
    iii. CPRA will provide a Phase I Environmental Site Assessment report prior to the Draft Environmental Impact Statement (DEIS) that will evaluate whether there is reason to believe the proposed dredge or fill material is or is not a carrier of contaminants (or material meets the testing exclusion criteria).
    iv. The construction Contractor will also comply with the applicable permits or regulations and will be obligated to obtain a Phase I Environmental Site Assessment (ESA) report within at least 6 months prior to construction.
    v. Regulations apply to cease construction if suspected HTRW materials encountered.

D. Vessel Access
   i. The route for construction vessels and work boats will be identified with temporary channel markers during construction.
   ii. Water bottom assessment surveys will be conducted to identify oyster beds.
   iii. Minimum depths of water above the bottom will be determined so that bottom resources are not impacted.
   iv. Vessel operators will operate along approved routes.

IV. IN-WATER CONSTRUCTION (MISSISSIPPI RIVER AND BARATARIA BASIN)

A. NOTIFICATIONS
   i. CPRA will notify the navigation sector of the United States Coast Guard providing the type and location of construction activities in the Mississippi River, so that a Local Notice to Mariners (LNM) can be issued.

B. CONSTRUCTION IN THE RIVER
   i. Aboveground and submerged construction of structures will require excavation and fill activities.
   ii. River bed or batture soils may be used for land- or water-based construction purposes. Excavation of bar sands may be used for land- or water-based project construction (e.g., fill material for cofferdam cells). During construction or de-construction the native fill will be resuspended to the river.
   iii. Removal of existing revetment will be reused or disposed of in an approved site.
   iv. Deep soil mixing (using bentonite/cement slurries/other) will be stabilized within the earth and any excess material or runoff will be collected, dewatered, and disposed.
   v. In cases of an imminent tropical cyclone, the cofferdam enclosure area will be filled with water from the river for safety purposes. Following storm passage, the enclosure will be de-watered to the river.

C. CONSTRUCTION IN THE BASIN
   i. General

   Beneficial Use Areas (BU Areas) have been located for excess soil placement. The route for vessel access and the excavation/placement areas have been located.

ii. Excavation and Fill—Vessel Access
    1. Vessel Access: Excavation of waterbottoms may occur in navigable waters, private canals, sediment infilled natural bayous, and emergent wetlands to allow shallow draft vessel access, which could include tugs, scows, and barges with mounted equipment and/or materials.
    2. Where vessel access dredging of waterbottom sediments is required, the excavation and disposal methods will be designed to minimize hydrologic disruption, and when feasible, restore intertidal habitat.
    3. Excavation and subsequent disposal of soils excavated for access channel could include:
        a. temporary disposal (side cast, temporary containment cells);
        b. backfilling of artificial canals;
        c. shallow water or wetland nourishment (thin spray, hydraulic dredge); or
        d. wetland creation.

iii. Excavation and Fill— BU Areas
    1. The excavation of the conveyance channel and the OTF will result in excess sediments that may be placed in the basin waterbottoms in the BU Areas.
    2. Existing natural or artificial features (e.g., canal spoil banks, marsh edge) may be used to retain pumped sediments. The construction of containment dikes may be necessary to limit sediment loss. Upon completion of filling, dikes may be gapped to maintain tidal exchange.
    3. The placement of fill material will avoid high elevation stacking and instead result in settled elevations that are conducive to shallow water or emergent wetland habitat.

SECTION 3: PROTECTION OF FISH AND WILDLIFE RESOURCES

I. GEOGRAPHIC APPLICABILITY

The Protection of Fish and Wildlife Resources applies to in-water and land-based construction activities, which would occur in the Mississippi River, Barataria Basin, Project construction limits and buffer areas adjacent to the construction limits as required.

II. ENVIRONMENTAL INSPECTION

A. CPRA will ensure that the number and experience of inspectors assigned to the Project shall be appropriate for the size of the construction area, the level of activity, and the number/significance of resources affected.

Inspectors are responsible for:

B. Inspecting construction activities for compliance with the requirements of Environmental Protection construction specifications and plans, other environmental permits and approvals as described herein;
C. Verifying and maintaining limits of authorized construction work areas and access routes (e.g., appropriate signage, or markers/flagging) throughout construction;
D. Executing the proper protocols for reporting or notifications to resource agency personnel;
E. Keeping records of on-site compliance with environmental protection specifications;

III. PRECONSTRUCTION PLANNING

A. CPRA will verify that Environmental Specifications and Special Provisions issued to the Contractor are current, accurate, and complete prior to construction.
B. CPRA will ensure that required fish or wildlife field surveys are executed prior to construction.
C. CPRA will consult with USFWS prior to land-based vegetation clearing to identify beneficial practices to minimize impacts to migratory birds.

IV. IN-WATER OR LAND-BASED CONSTRUCTION MEASURES/REQUIREMENTS

A. LOCATION CHANGES: Regarding location changes, modifications to construction areas, new information regarding presence or impacts to species, the USFWS recommends that CPRA and the USACE contact the Service and LDWF for additional consultation if: 1) the scope of 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 designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made or finalized.

B. PILE DRIVING: A pile-driving plan to guide pile-driving operations will be developed. The plan will identify locations, approximate timing, and installation methods including any noise attenuation methods. This plan is required as part of the Endangered Species Act Consultation with US Fish and Wildlife Service and is intended to reduce potential impacts to listed species.

C. DREDGING: Should dredging (cutterhead/suction dredge) activities be necessary in the Mississippi River, the cutterhead must remain completely buried in the bottom material during dredging operation. If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate will be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased. During dredging, the pumping rates will be reduced to the slowest speed possible while the cutterhead is descending to the channel bottom.

D. NESTING BIRDS: Prior to construction, a qualified biologist shall inspect the proposed construction site for the presence of documented and undocumented wading bird colonies and bald eagles. All construction activity during the wading bird nesting season (i.e., February through October 31) should be restricted within 1,000 feet of a wading bird colony[1]. If restricting construction activity within 1,000 feet of a wading bird colony is not feasible, CPRA shall coordinate with FWS to identify and implement alternative best management practices to protect wading bird nesting colonies. During construction activities, if a bald eagle nest is 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. The evaluation may be conducted online(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.

E. PALLID STURGEON: The pallid sturgeon is found in the Mississippi River. CPRA and the USACE will coordinate with the Service to develop a Fish Monitoring and Removal Plan for pallid sturgeon. This plan will need to be completed and Service approved prior to the construction of the cofferdam and/or combi wall. Live sturgeon captured in the structure or cofferdam or combi wall area should be tagged and returned to the river.

F. WEST INDIAN MANATEE[2]: The West Indian manatee may be present in the project vicinity. The Contractor shall instruct all personnel associated with the project of the potential presence of manatees in the area, and the need to avoid collisions with these animals. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the USFWS ESA and the MMPA. The Contractor will be responsible for any manatee harmed, harassed, or killed as a result of construction activities not conducted in accordance with these specifications. Special Operating Conditions If Manatees Are Present in the Project Area: (1) If a manatee(s) is sighted within 100 yards of the project area, all appropriate precautions shall be implemented by the Contractor to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee is closer than 50 feet to moving equipment or the project area, the equipment shall be shut down and all construction activities shall cease to ensure protection of the manatee. Construction activities shall not resume until the manatee has departed and the 50-foot buffer has been re-established. (2) If a manatee(s) is sighted in the project area, all vessels associated with the project shall operate at "no wake/idle" speeds at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom, and vessels shall follow routes of deep water whenever possible. Boats used to transport personnel shall be shallow-draft vessels, preferably of the light-displacement category, where navigational safety permits. (3) If siltation barriers are used, they shall be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment. (4) Manatee Signs. Prior to commencement of construction, each vessel involved in construction activities shall display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8-1/2-inch x 11-inch reading, "CAUTION: MANATEE HABITAT/IDLE SPEED IS REQUIRED IN CONSTRUCTION AREA." In the absence of a vessel, a temporary 3-foot x 4-foot sign reading "CAUTION: MANATEE AREA" shall be posted adjacent to the issued construction permit. A second temporary sign measuring 8-1/2-inch x 11-inch reading "CAUTION: MANATEE HABITAT. EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION" shall be posted at the dredge operator control station and at a location prominently adjacent to the issued construction permit. The Contractor shall remove the signs upon completion of construction. Manatee Sighting Reports: Any sightings of manatees, or collisions with a manatee, shall be reported immediately to the CPRA. The CPRA will report and coordinate with the U.S. Fish and Wildlife Service Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

G. BASIN DREDGING AND IN-TRANSIT VESSEL REQUIREMENTS: The Contractor will be required to adhere to:
   i. PROTECTED SPECIES CONSTRUCTION CONDITIONS[3], May 2021, NOAA Fisheries Southeast Regional Office SERO Protected Resources Division (PRD)

ii. NOAA-NMFS VESSEL STRIKE AVOIDANCE MEASURES[4], May 2021, and NOAA Fisheries Southeast Regional Office (SERO) Protected Resources Division (PRD).

SECTION 4: PROTECTION OF CULTURAL RESOURCES

This section is a Draft until construction measures for cultural resources protection are finalized between CPRA and the consulting parties for the Programmatic Agreement.

The following sections provide an overview of CPRA's information on the Unanticipated Discovery Plan.

Unanticipated Discovery Plan (Draft Programmatic Agreement): All inspectors have the responsibility to monitor the construction sites for potential cultural/archaeological remains throughout construction. If any cultural materials (such as arrowheads, ceramic sherds, bricks, worked wood or bone, metal, or glass objects) or other potential historic properties are encountered, then the construction contractor will immediately halt all construction activity at the location of discovery and a fifty (50) foot buffer zone will be defined in all directions and appropriate measures to protect the find from further disturbance will be identified and implemented. CPRA will supply a Secretary of Interior (SOI)-qualified archaeologist to evaluate the discovery and make a written recommendation to CEMVN on the nature and eligibility of the discovery. If the discovery is recommended eligible or of undetermined eligibility, and the CEMVN agrees, then CEMVN and CPRA will assess whether the discovery can be avoided. If the discovery can be avoided, CPRA will implement measures to avoid the discovery.
If abandoned cemeteries, unmarked graves, or human skeletal remains are found during construction, a stop work order will be issued, and CPRA will comply with the Louisiana Unmarked Human Burial Sites Preservation Act (R.S. 8:671-681). CPRA will notify local law enforcement and the Division of Archaeology within the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development by telephone to assess the nature and age of the human skeletal remains within twenty-four (24) hours of the discovery of unmarked human remains and will accompany local law enforcement personnel during all field investigations. If the appropriate local law enforcement official determines that the remains are not a crime scene, and the remains are more than 50 years old, LDOA has jurisdiction over the remains. In no instance will human remains be removed from the discovery site until jurisdiction has been established. In cases where the LDOA assumes jurisdiction and the remains are determined to be American Indian, LDOA will consult with Tribes, CEMVN, and CPRA to determine the appropriate course of action.

[1] https://www.fws.gov/southeast/pdf/guidelines/colonial-water-birds-and-wading-birds-louisiana.pdf
[2] https://www.fws.gov/southeast/pdf/guidelines/standard-manatee-conditions.pdf
[3] https://media.fisheries.noaa.gov/2021-06/Protected_Species_Construction_Conditions_1.pdf?null
[4] https://media.fisheries.noaa.gov/2021-06/Vessel_Strike_Avoidance_Measures.pdf?null

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[i] 33 C.F.R. § 320.4.
[ii] 33 C.F.R. § 320.4.
[iii] 33 C.F.R. § 320.4(r).
[iv] 40 C.F.R. § 230.93(a)(1).
[v] 33 C.F.R. Part 332; 40 C.F.R. Part 230.
[vi] 40 C.F.R. § 230.93(a)(1).
[vii] 40 C.F.R. § 230.93(e).
[viii] 40 C.F.R. § 230.93(e).
[ix] 33 U.S.C. § 408(a).
[x] USACE, EC 1165-2-200 (2018), available at, https://www.publications.usace.army.mil/Portals/76/Publications/EngineerCirculars/EC_1165-2-220.pdf?ver=2018-09-07-115729-890.
[xi] 50 C.F.R. § 402.14(g)(3), (4).
[xii] 50 C.F.R. §402.02.
[xiii] 50 C.F.R. § 402.14(i).
[xiv] 16 U.S.C. § 662.
[xv] 16 U.S.C. § 662 ("The reporting officers in project reports of the Federal agencies shall give full consideration to the report and recommendations of the Secretary of the Interior and to any report of the State agency on the wildlife aspects of such projects, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits.").
[xvi] 1981 Fish and Wildlife Service Mitigation Policy, 46 Fed. Reg 7644-7663 (Jan. 23, 1981). FWS adopted the 1981 guidance for personnel involved in making recommendations to protect or conserve fish and wildlife resources, including under the Fish and Wildlife Coordination Act.
[xvii] 16 U.S.C. § 1852(h)(1). The applicable regulations define "council" as including the Secretary, as applicable, when preparing certain FMPs. 50 C.F.R. § 600.810(a).
[xviii] 16 U.S.C. § 1853(a)(7).
[xix] *Id*. § 1802(10). The FMPs must include a textual description of the EFH as well as maps that display the geographic locations of EFH, explicitly distinguish EFH from non-EFH areas, and any habitat areas of particular concern. 50 C.F.R. §§ 600.815(a)(1)(iv)(B) & (a)(1)(v).
[xx] 16 U.S.C. § 1855(b)(2). While state agencies are not required to consult with NMFS on state actions that may adversely affect EFH, NMFS is required to provide EFH conservation recommendations for any state action that would adversely affect EFH. *Id*. § 1855(b)(4)(A); 50 C.F.R. § 600.925(c)(1).
[xxi] 16 U.S.C. § 1855(b)(2).
[xxii] NMFS, Essential Fish Habitat Consultation Guidance, Version 1.1 (2004).
[xxiii] 16 U.S.C. § 1855(b)(4).
[xxiv] 36 C.F.R. part 800.
[xxv] 36 C.F.R. § 800.6.

Attachment 3: Dolphin Intervention Plan

Dolphin Intervention Plan: A framework for potential marine mammal interventions related to the Mid-Barataria Sediment Diversion Project

(CPRA Project Number BA-O153)

This Dolphin Intervention Plan for the Mid-Barataria Sediment Diversion (MBSD) Project (the Project) provides a strategy and best practices for marine mammal interventions. This Plan is by nature a living document and never "final". This Plan will be "draft" at least until if, and if so when, the US Army Corps of Engineers (USACE) New Orleans District issues the permits and authorizations required for the Project and the Louisiana Trustee Implementation Group (LA TIG) decides to fund the Project. The State of Louisiana Coastal Protection and Restoration Authority (CPRA), at that point, will then work with the National Oceanic and Atmospheric Administration (NOAA) to add any Compliance Monitoring requirements contained in those permits related to marine mammal interventions to this Plan and make any decisions on implementation of any of the aspects of this framework.

1. Purpose and Goals

The purpose of the Dolphin Intervention Plan is to outline a framework for potential intervention activities and the process for decision making that may be used to respond to free-swimming, live dolphins that are ill; behaving abnormally; injured; in poor condition/health; or are at risk for injury, illness, or death due to adverse environmental changes in the Barataria Basin, Louisiana. Models project that the Project will result in substantial morbidity and mortality of dolphins in the Barataria Bay Estuarine System stock, including 585 dolphin mortalities (95 percent confidence interval [CI]: 131 to 1459) in the first year of operations alone and loss of 96% of the entire population (95 percent CI: 80% to 100%) by the end of the Project (Thomas et al. 2021). Obviously, no set of dolphin mitigation/intervention activities could entirely offset such an impact, however, the resources available (including trained and qualified personnel, equipment and supplies, budget, and time) need to be deployed in a strategic manner in order to be as effective as possible. The goals of this intervention framework for dolphins in the Barataria Basin are to reduce illness, pain, and suffering, as well as collect scientific information that may inform operational mitigation actions and adaptive management of the monitoring and response activities.

This Dolphin Intervention Plan for the Project will follow the Small Cetacean Intervention Best Practices (and other associated appendices) developed as part of the 2022 Marine Mammal Health and Stranding Response Program (MMHSRP) Programmatic Environmental Impact Statement (PEIS) to the best extent practicable, but may include modifications to meet the specific needs for MBSD interventions. This intervention framework includes activities above and beyond normal emergency response activities, either due to the scale or nature of the activities (such as rescues of dolphins in their usual habitat but when the conditions within that habitat are affected by the low salinities from the Project; remote treatment of free-swimming dolphins that are not entangled or victims of a boat strike; or broader-scale hazing or translocations). Interventions may require no additional action beyond those in the MAM plan, or include such activities as remote sample collection, assessment, and/or treatment; capture and release, rehabilitation, and/or translocation of free-swimming individual(s); and/or capture and euthanasia of sick or injured, free-swimming animals.

1.1. Background

In 1992, the MMHSRP, under the National Marine Fisheries Service (NMFS), was established by Congress under Title IV of the Marine Mammal Protection Act (MMPA). The goals of the program are to: collect and disseminate health and health trend data for marine mammals in the wild; correlate the health and health trends of marine mammals in the wild with biological, chemical, and physical environmental data; and to coordinate effective responses to marine mammal unusual mortality events (UMEs). As part of the work of the MMHSRP, the program develops best practices and guidance; maintains MMPA, Endangered Species Act (ESA), Convention on International Trade in Endangered Species (CITES) permits, and NOAA Institutional Animal Care and Use Committee (IACUC) authorizations; and maintains a PEIS that addresses responses and research activities nationally (NOAA 2021). Through these permits, the program authorizes qualified individuals to conduct interventions on small cetaceans (such as the bottlenose dolphins living in and near the Barataria Basin) as either response activities for animals with health concerns or as scientific studies on health conditions in order to reduce injuries or risks. The MMHSRP published best practice guidelines for free-swimming, distressed small cetacean interventions prior to onsite release, translocation, or admission to rehabilitation (NOAA 2021).

1.2. Legislation Pertinent to Non-ESA Small Cetaceans

Marine Mammal Protection Act (MMPA): The MMPA, signed into law in 1972, prohibits the "take" of marine mammals, which includes harassing or disturbing these animals, as well as harming or killing, unless such take is specifically exempted in the statute or authorized. The MMPA divides responsibility for marine mammal species between the Secretary of Commerce, who oversees NMFS, and the Secretary of the Interior, who oversees the U.S. Fish and Wildlife Service (USFWS). NMFS has jurisdiction over cetacean (including the dolphins living in and near the Barataria Basin) and pinniped species (with the exception of walrus), and USFWS has jurisdiction over walrus, polar bear, sea otters, and manatees. The 1992 amendments to the MMPA included Title IV of the MMPA, which established the MMHSRP under NMFS to collect and disseminate information about the health trends in marine mammal populations through the collection of data from strandings, bycatch, subsistence harvest, and research. The PEIS best practices support these efforts and focus on data collection from small cetacean interventions using the Network or other authorized personnel.

On February 9, 2018, Congress passed the Bipartisan Budget Act of 2018 (Budget Act), Public Law 115-123, which included a requirement that the Secretary of Commerce, as delegated to the Assistant Administrator of the National Marine Fisheries Service (NMFS), issue a waiver of the Marine Mammal Protection Act (MMPA or Act) moratorium and prohibitions for three specific

Louisiana wetland restoration projects, including the MBSD. Specifically, Section 20201 in title II of the Budget Act directs the Secretary of Commerce to issue a waiver pursuant to section 20201 and section 101(a)(3) of the MMPA for three projects included in the 2017 Louisiana Comprehensive Master Plan for a Sustainable Coast. Specifically, in Congress' recognition of their consistency with the findings and policy declarations in section 2(6) of the MMPA, the Budget Act directs the Secretary to issue a waiver for the Mid-Barataria Sediment Diversion, the Mid-Breton Sound Sediment Diversion, and the Calcasieu Ship Channel Salinity Control Measures projects from the requirements of sections 101(a) and 102(a) of the MMPA for the duration of the construction, operation, and maintenance of the projects. NMFS issued the waiver on March 15, 2018. Section 20201 of the Budget Act further indicates that, upon the issuance of the waiver, the State of Louisiana (State) shall, in consultation with the Secretary of Commerce: (1) To the extent practicable and consistent with the purposes of the projects, minimize impacts on marine mammal species and population stocks, and (2) Monitor and evaluate the impacts of the projects on such species and population stocks.

1.3. Intended Uses of Best Practices

NMFS and the Marine Mammal Stranding Network (the Network) have developed protocols and procedures for responding to live marine mammals stranded or otherwise in distress to ensure the health, welfare, and safety of human responders, animals, and the public (NOAA 2021). These protocols balance the need for standardized procedures while allowing flexibility to address the specific needs of different situations for diverse species and habitats, as well as unforeseen circumstances. In particular, this Intervention Framework will rely on the recommendations in (but not limited to) Appendix XII to the PEIS (Small Cetacean Intervention), Appendix X (Cetacean and Pinniped Transport), Appendix XIII (Euthanasia), Appendix XV (Mass Strandings), and Appendix XXI (Small Cetacean Entanglement). For more information on general stranded marine mammal rescue and rehabilitation, the reader should consult references such as *Marine Mammals Ashore* (Geraci *et al.* 2005) and the *CRC Handbook of Marine Mammal Medicine* (Gulland *et al.* 2018). Human and animal safety are the top priorities for NMFS and the Network, and these two entities evaluate many factors before making a decision to intervene. Each event is unique and requires the consideration of multiple aspects, some predictable (which are addressed below) and some unpredictable.

However, it is important to emphasize that MBSD interventions may require specific needs and modifications to the best practices. Operations of interventions will be handled based on the Incident Command System (ICS) standardized by the National Incident Management System (NIMS) and adjusted (with additional guidelines) for marine mammals and oil spill response by Ziccardi et al. (2015), with the Dolphin Resource Team working closely with the MMHSRP and the NOAA Southeast Stranding Program (Southeast Regional Office/Southeast Fisheries Science Center). Although these guidelines were developed specifically for oil spill response, the general structures and guidelines are applicable to the management of other marine mammal-related emergency situations (such as UME response and the responses to the projected freshwater impacts from the Project).

2. Planning Strategy for Interventions

2.1. Authorization and Training

Dolphin interventions in and around the Barataria Basin will be conducted under the MMHSRP's MMPA/ESA permit, a Stranding Agreement (for live strandings or out-of-habitat animals), or the MMPA 109(h) authority for local, state, and federal officials. The permit and Stranding Agreement activities fall under the MMHSRP's PEIS. Even though the specific Barataria Basin intervention activities will most likely be conducted under the MMHSRP's MMPA/ESA permit due to their complexity and risks, any dolphin intervention in the Barataria Basin should follow the ICS structure, including being discussed with the State Stranding Coordinator, Southeast Regional Stranding Coordinator(s) (RSC), and MMHSRP headquarters (HQ) staff in the planning and implementation phases as appropriate. Additionally, the Network, Dolphin Resource Team, and associated staff who have been authorized by NMFS to conduct monitoring, response, and interventions must have the training, experience, equipment, and necessary support to safely and humanely conduct those specific dolphin activities. In some cases, particularly if interventions include more than one animal, the Network and Dolphin Resource Team may also rely on partners such as local, state, and federal employees (including law enforcement, police, fire department, USFWS, and the U.S. Coast Guard), aquaria, non-governmental organizations, academic, and other appropriately trained and capable individuals/groups to assist.

To maintain safety and increase the capacity to conduct interventions, authorized Dolphin Resource Team and Network personnel will provide opportunities for apprenticeships or assistant roles to develop additional personnel with the necessary hands-on expertise, as well as conduct community outreach for more general assistance. Specific training issues or requirements may also exist for certain activities (e.g., in-water dolphin research or response captures outside of the Barataria Basin).

2.2. Strategy for Development of Intervention Activities

The initial intervention planning will occur in phases, either in parallel or sequentially. However, some activities to benefit planning can begin as soon as possible. Consistent data collection and diagnostic analyses will occur (according to veterinary discretion) in live animal interventions for out-of-habitat dolphins, entanglement response, and live strandings as a part of ongoing MMHSRP-led response efforts. These data will be synthesized for discussions in Phase 1 planning efforts.

<u>Phase 1:</u> In the first 18-24 months of the pre-operational period, planning activities will consist of a series of workshops with a wide variety of subject matter experts (SMEs) in dolphin health, research, low salinity exposure, hydrology, dolphin welfare, population and abundance, and biology. These SMEs will evaluate a suite of potential intervention activities ranging from remote monitoring to hands-on capture, rehabilitation, release/translocation, and/or euthanasia. The assessments would consider such issues as health risks; human safety; animal welfare; likelihood of success in reducing illness, pain, and suffering; risk to the individual and

population(s) affected by these intervention activities; likelihood of increasing scientific understanding and improving future interventions/assessments; feasibility; benefits to individual and population; and enhancement of survival and/or resilience. The SMEs will also develop recommendations for how to triage cases when the number of animals in need of intervention is greater than the available personnel/resources can reasonably manage (see, for example, Figure 1). In addition, the workshop participants may also discuss data gaps that might improve our interventions and/or inform operational mitigation evaluations. Finally, Phase 1 may identify possible studies, including pilot studies, that might address those data gaps.

Phase 2: During the pre-operational period and/or in the first year/years of the post-construction period, pilot projects or studies may be initiated to investigate dolphins in the Barataria Basin that are exposed to low salinity waters for various periods of time using recommendations from Phase 1. The pilot studies will be developed based on the discussions and recommendations of the SME workshops and further evaluated with input from SMEs.

Phase 3: In the post-construction period (with particular emphasis on the first years of operations, and in areas likely to have the lowest salinities and the longest exposures), interventions will be implemented as informed by the monitoring and stranding programs, using intervention funds and personnel as needed.

3. Potential Intervention Activities

3.1. Overview

There are many considerations that go into the decision of when and how to respond to free-swimming small cetaceans in distress. Based on past interventions with out-of-habitat dolphins, the following are a general progression of possible intervention actions, listed from least to most intensive/invasive. Combinations of these may be used for future out-of-habitat dolphins, including storm surge displaced animals, in the Barataria Basin as well as for MBSD-related interventions in which the animal is in adverse environmental conditions or exhibiting poor health. Intervention decisions and implementation will require rapid access to biological and environmental data and predictions/forecasts to identify intervention triggers, as well as for adaptive management of the dolphin monitoring program.

3.2. Behavioral Observations (Remote)

In each case/event, animals should be assessed through physical, behavioral, and environmental observations. The Dolphin Resource Team, as part of their monitoring effort, will undertake observations on groups and individuals throughout the year and throughout the basin. Based on specific environmental or animal triggers, additional observations may be needed for specific groups or individuals to identify any intervention actions needed. These targeted observations will enable better decision-making for the appropriate course of action for that particular individual or group of individuals (refer to Small Cetacean Intervention Best

Practices for individuals and the Mass Stranding Best Practices for information on groups of animals), but these observations will also provide important information for future cases.
For these observations, a standardized remote health assessment form will be used. All data will be linked to the dolphin photo-id catalog number whenever possible, and the data entry and management will be integrated with the Dolphin Resource Team activities. In an emergency case (e.g., an animal in imminent danger of death, such as an anchored animal), immediate intervention (following approval from NMFS) may be necessary.

3.3. Sample Collection (Remote)

Remote samples may be collected to provide additional data on the health of an individual, to aid in intervention decision-making. Samples that may be remotely collected may include, but are not limited to:

- Remote collection of floating feces for parasite identification, hormones, etc.
- Remote collection of breath via pole or UAS for microbiology, hormones, etc.
- Remote collection of skin and blubber via biopsy dart for genetics, epigenetics, omics, sex, hormones, pathogen screening/microbiome, contaminants, etc.
- Remote collection of blood for a variety of analyses

3.4. Herding/hazing/deterrence

While more commonly used to prevent mass strandings of small cetaceans, herding or deterrence actions may be appropriate for single or small groups of dolphins for short distances and brief periods of time. Various methods of deterrence or hazing can be used by experienced individuals, including:

- Vessel action, close approaches, percussive slaps on the water, which can be attempted from non-motorized watercraft such as stand up paddleboards and kayaks, as well as motorized vessels (e.g., boats, jet ski)
- Pingers, playbacks, or other acoustic devices (e.g., diver recall sirens)
- Hukilau, Oikomi pipes, streamers, non-entangling nets, and bubble curtains

For a more in-depth discussion of various non-lethal deterrence options, see NMFS Marine Mammal Non-Lethal Deterrence Guidance.

4. Remote Treatments

The development of remote treatments will leverage the ongoing work to develop remote delivery protocols, tools, and techniques for sedation of free swimming small cetaceans. As part of a NOAA John H. Prescott Marine Mammal Rescue Assistance Grant Program grant, Mote Marine Laboratory's Stranding Investigations Program is developing a remote sedation protocol and delivery device for free-swimming small cetaceans. This is a response to the increasing number of cases where existing small cetacean intervention tools are inappropriate or not possible. These tools and protocols will make inaccessible free-swimming small cetaceans more accessible for safer interventions.

The Mote Marine Laboratory's Stranding Investigations Program team has initiated a multi-step process for developing remote sedation as a potential tool for small cetacean interventions, to ensure that it is safe and effective, culminating in standardized protocols accepted by the National Marine Fisheries Service (e.g., IACUC and NMFS permitting office protocols), modeled on the existing Pinniped Remote Sedation Entanglement Response Capture Protocol and similar protocols being finalized for large whales. The steps include the establishment of an international SME working group to assist in the design of the development and testing, initiate the testing, evaluation of delivery devices, development of pilot projects, and development of protocols and procedures including training for deployment of remote sedation. The delivery mechanism for sedation will also open the path for remote delivery of antibiotics and other drug administration to free swimming cetaceans. The MBSD intervention strategy may utilize these tools and protocols once they are developed.

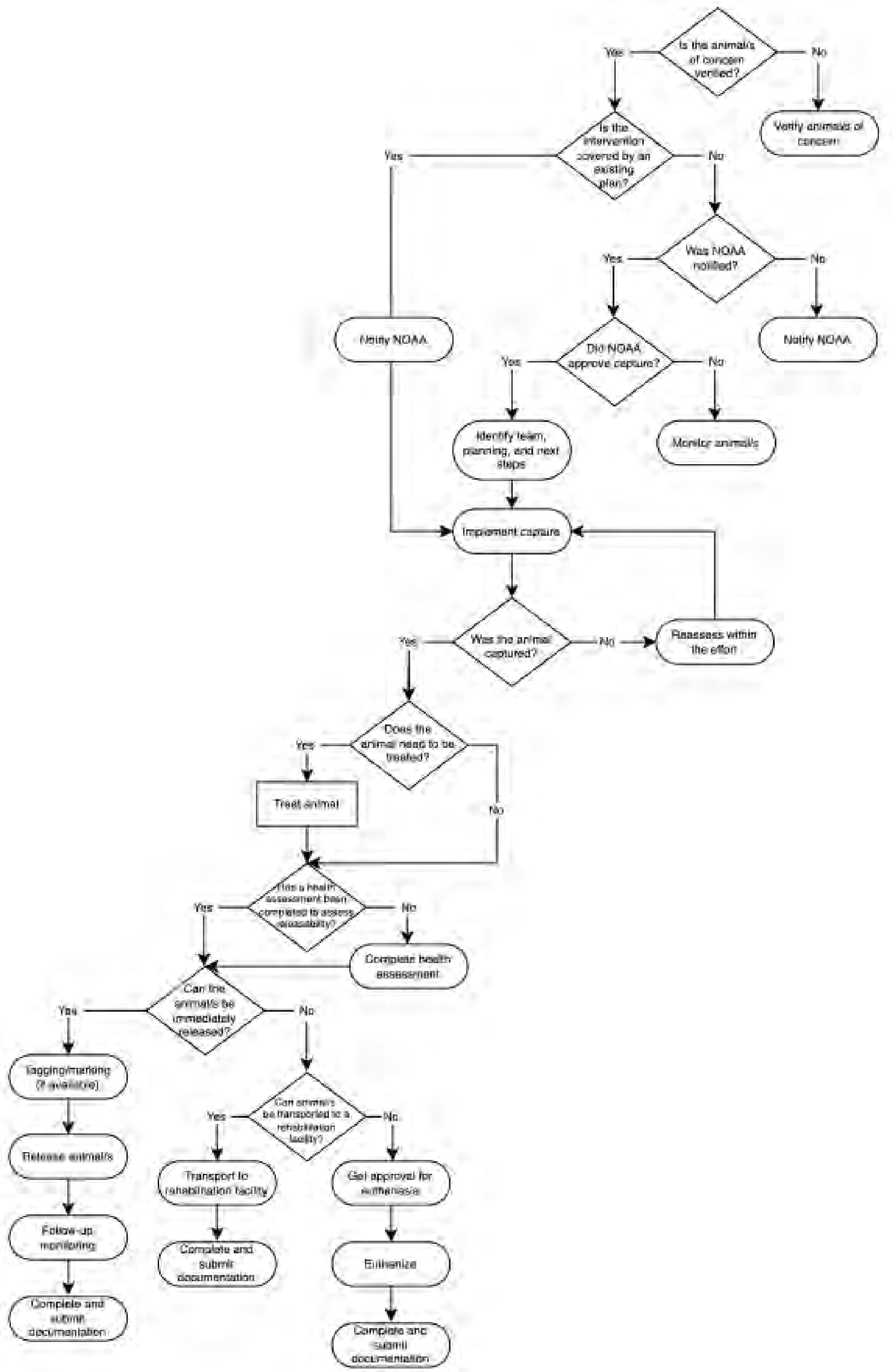

Figure 1: Potential Decision/Process Matrix for Dolphin Interventions. Diagram is provided as an example of what the SME working group will develop in Phase 1.

4.1. In-Water Capture

If a distressed cetacean is determined to have a life-threatening condition or is not likely to survive in its current habitat, a live capture may be warranted. This activity will require the availability of trained personnel, necessary resources, and safety considerations for both responders and the animal. The decision on when, where, and how to intervene needs to be approved by the RSC and MMHSRP HQ staff (following ICS procedures, e.g., Figure 1), and if needed, will include an intervention plan and follow an established protocol for the triage of cases when more than one animal requires a response. There are four potential methods for capture of small cetaceans: soft-tail line, hoop net, encircling net, or hand-set nets. For details for these procedures refer to the PEIS best practices (e.g., Appendix XII or XXI).

After the animal is captured, a thorough examination will be performed by an experienced marine mammal veterinarian. The animal may also receive appropriate treatment, such as removal of entangling gear, administration of medications, and marking/tagging if release is imminent. Following the examination, the appropriate course of action should be determined by the attending veterinarian and capture lead, in consultation with other experienced personnel and NMFS. Options may include immediate release, release in an alternate location, keeping the animal for rehabilitation prior to future release, and euthanasia. Project-specific criteria for this triage process, including the timing and location of releases, will be developed by the Core team and the SME workshops. Special consideration will be given for the potential capture and translocation of social groups, based on pilot projects and evaluations by outside experts for feasibility, safety, and other considerations. If animals are released, plans should be considered for follow-up monitoring of the individual.

5. Animal Disposition Options

Once the animal(s) are in hand, there are four options for the animal disposition: 1) immediate release (*in situ* or after translocation to alternate release site; with or without treatment), 2) short term rehabilitation and release (with tag) into same area or translocated to areas with healthier habitat; 3) longer term rehabilitation (release at a later date), and 4) euthanasia.

5.1. Immediate *in situ* Release or Translocation and Release

Per the best practices in the PEIS, immediate release is an option if the following factors are met:

- The animal is healthy or medically stable, and able to function normally as determined by the NMFS, capture lead, and the Network veterinarian (on-site or via phone consultation). Certain situations (*e.g.*, hurricanes) may have time constraints which may not allow for consultation with veterinarians and the only option may be transport/immediate release;
- Social requirements can be met (*e.g.*, maternal care for young)
- It is highly recommended the animal be marked or tagged in some manner prior to release (only by trained individuals), using NMFS-approved methods such as:

- Marking – paint stick/crayon marking;
- Notching or freeze-branding of the dorsal fin; or
- Tagging - a roto tag or cattle ear tag or a single-pin radio or satellite tag (if available).

The animal may be released *in situ* if:

- Environmental conditions are favorable;
- The animal is unlikely to strand/re-strand; and
- The capture location is near the animal's natural habitat.

The animal may be translocated to a different site and released immediately if:

- A different release site is a more suitable site for release;
- The animal is manageable and adequate logistical support is available, including transport vehicles; and
- The new site is believed to improve the chances of a successful release for the captured cetacean, and reduce the likelihood of re-stranding.

5.2. Rehabilitation

Rehabilitation, per 50 CFR 216.3, is defined as "treatment of beached and stranded marine mammals taken under section 109(h)(1) or 112 (c) or imported under section 109(h)(2) of the MMPA, with the intent of restoring the marine mammal's health and, if necessary, behavioral patterns." An authorized animal care facility provides treatment with the goal of releasing the animal back to the wild. Short-term (i.e., <96 hours) rehabilitation in temporary pools may be an option, as well as longer term rehabilitation in more permanent, authorized rehabilitation facilities. Short- and long-term rehabilitation facilities are authorized by NMFS and require a Stranding Agreement.

5.3. Euthanasia

The decision to euthanize a small cetacean is made in consultation with the RSC and other individuals (following the ICS) and the procedure must be conducted by one of the following:

- a Network veterinarian;
- an experienced, trained, and authorized Network member;
- an appropriately trained local, state, tribal, or federal law enforcement, or wildlife/animal control agent; or
- a non-marine mammal veterinarian in consultation with an experienced Network or federal veterinarian.

Euthanasia is an option when:

- The veterinarian determines that euthanasia is the most humane course of action, given the animal's prognosis. For example:
  - The animal is deemed to be critically injured or ill with little chance of recovery;

- The animal is suffering or unlikely to survive if released; and/or
- It is necessary to end the suffering of an animal.

- No rehabilitation facilities are available and immediate release is deemed inhumane or unlikely to succeed.

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Attachment 4: Louisiana Trustee Implementation Group Project Implementation Work Plan for Mid-Barataria Sediment Diversion Project

Louisiana Trustee Implementation Group
Project Implementation Work Plan for Mid-Barataria Sediment Diversion Project

This *Deepwater Horizon* (DWH) Implementation Work Plan outlines the tasks and activities to be undertaken to implement the Mid-Barataria Sediment Diversion Project (Project) authorized by the Louisiana Trustee Implementation Group (LA TIG) in the Louisiana Trustee Implementation Group Final Phase II Restoration Plan #3.2 (RP #3.2) and corresponding Record of Decision (ROD). The Louisiana Coastal Protection and Restoration Authority (CPRA) is the designated Implementing Trustee for the project. NOAA will be a co-implementing Trustee for purposes of supporting selected stewardship and MAM activities in accordance with Section 9.5 of the TC SOPs and as described in the RP #3.2 and this Implementation Work Plan.

ACTIVITIES

PROJECT IMPLEMENTATION

1. Activities and responsibilities. All activities necessary for project implementation inclusive of, but not limited to activities described in RP #3.2 and the ROD, such as additional engineering tasks, agency administrative costs, final land rights, final environmental consultations, clearances and permitting, bid phase services, construction inspection and monitoring and construction. CPRA will be responsible for all construction related activities on the project as outlined in RP #3.2 and the ROD.

2. Funding. The funding source for contracting, construction, monitoring, oversight, and mitigation is DWH Natural Resource Damage (NRD) funds, up to a total expenditure of $2,260,000,000. CPRA will be responsible for any remaining implementation costs.

3. Timeframe. CPRA will be responsible for construction-related activities. Construction is anticipated to take approximately 60 months.

OPERATIONS AND MAINTENANCE

1. Activities and responsibilities. The operation and maintenance of the Project are the responsibility of CPRA unless otherwise stated herein.

2. Funding. The funding source for routine operation and maintenance activities will be CPRA.

3. Timeframe. CPRA will conduct reasonable and appropriate operation and maintenance with respect to this Project for the life of the Project, beginning at the completion of construction of the project as described in RP #3.2. The anticipated inspection and maintenance activities and schedule for the various Project features are explained in the table below:

Project Feature	**Inspection Schedule**	**Maintenance Action**
Gantry Crane	Annually	
Bulkhead Gate	Daily	Greased at least once every 60 days
Floodwalls	Annually	
Levees	Once every 3 years	Grass cutting performed as needed

Project Feature	**Inspection Schedule**	**Maintenance Action**
Sedimentation Monitoring	Annually	Diversion flushing or maintenance dredging
Private Aids to Navigation	Daily	
Monolith Settlement	Annually	
Bulkhead Gate Monoliths	Weekly	
Protection Cell/Dolphins	Daily	
Inverted Siphon	Monthly	Cleared of unwanted debris, slide gates lubricated, bar screens cleared of debris
Inverted Siphon	Semi-Annually	Depth probing for subsurface silt/debris then removal, flushing after a significant rainfall event
NOV Drainage Structure	Monthly	Cleared of debris, flap hinges lubricated
Power Distribution Equipment	Annually	
Conductor and cable terminations	Once every 5 years	
Receptacles and devices	Once every 5 years	Cleaned or replaced
Exterior Receptacles	Annually	Cleared or replaced
Light Fixtures and Lighting Controls	None	Repaired or replaced immediately
Grounding Systems	Annually	Immediate correction
Generators and Transfer Equipment	Exercised weekly	In accordance with manufacturer's recommendations
Generators and Transfer Equipment	Tested monthly under load	In accordance with manufacturer's recommendations
Generators and Transfer Equipment	Annual load-bank tested at 100% output rating	In accordance with manufacturer's recommendations
Site Utilities	Constant	Immediate repair
Firewater System	Monthly	As soon as possible
Infrastructure inspection of the security lighting systems	Once every 5 years	Lighting fixed immediately
Boat Ramps	As needed	As needed

MONITORING

Activities and responsibilities. CPRA, and where applicable NOAA, shall perform pre-operations monitoring and shall monitor the project consistent with the project Monitoring and Adaptive Management Plan (MAMP) and Trustee Council Standard Operating Procedures (TC SOPs), report out to the TIG at least annually (or when any specific issue warrants notification). As required, pre-operations (baseline) monitoring will take place during project construction and prior to the onset of diversion operations. The rationale for collection of specific data parameters and the specific data collection methods (spatial extent and temporal frequency of collection, analysis methodologies) will be consistent with those stated in the MAMP (Attachment 1) unless otherwise noted.

Within 6 months of the initial LA TIG project funding decision, and each year thereafter consistent with annual planning cycle in the MAMP, CPRA will host a workshop of the adaptive management team. As an outcome of the workshop, the Adaptive Management Team will develop and update a recommended monitoring outlook for the following three years as well as finalize annual recommendations (including MAMP revisions, changes to operations, data collection, or other adaptive modifications) to the Operations Team. At five-year intervals, the Adaptive Management Team will additionally perform a comprehensive synthesis of monitoring data and evaluation of management options, and will submit to the Operations Team a report that describes progress towards reducing identified Critical Uncertainties to address Learning Strategies, and recommendations for adaptive management actions, MAMP revisions, and operational changes. For both the annual and the multi-year reports, the Operations Team will consider all recommendations and integrate accepted recommendations into the Draft Annual Operations Plan. Recommendations that are modified or rejected in whole or part will be included in the Draft Annual Operations plan with an explanation of why the recommendations were not fully incorporated.

All agencies and partners involved in data collection will make all monitoring data (whether preliminary or final) available to the Adaptive Management Team members upon request as well as all reports and analysis products. The Data Management Team and monitoring teams will strive to finalize data, reports and, analysis products 4 weeks prior to the annual Adaptive Management Workshop in order to ensure the most recent data is used at the workshop.

MITIGATION AND STEWARDSHIP MEASURES

CPRA shall implement all actions included in the Mitigation and Stewardship Plan, consistent with the implementation strategies and timelines included in the attached Plan (RP #3.2 Appendix B and included here as Attachment 2).

BUDGET

As noted in Final Restoration Plan #3.2, the LA TIG intends to limit any LA TIG contribution to the overall project to $2.26 billion. This contribution will include funding for MAM, mitigation and stewardship measures, and the remainder for general project implementation. In accordance with the Resolution, total project funding of $108,600,000 to NOAA and $2,151,400,000 to CPRA will be made available over a multi-year period. The annual funding need and availability will be managed by NOAA and CPRA and presented to the TIG on regular intervals. Dates, durations, and cash flow demand rates are subject to change. Table 1 below provides the anticipated funding withdrawal schedule. Funds in years FY29 and beyond will be made available each year at a rate of 1/4 of the FY29 and beyond allocation.

Table 1 ***(All numbers in the $1,000s)***

PURPOSE	FY23	FY24	FY25	FY26	FY27	FY28	FY29 and beyond	Totals
NOAA-Withdrawal Schedule								
NOAA	$6,020	$4,420	$9,100	$3,270	$8,180	$12,480	$65,130	**$108,600**
NOAA - Mitigation and MAM Allocation								
MITIGATION	$5,400	$3,800	$4,400	$2,500	$7,400	$11,900	$26,600	$62,000
MAM	$620	$620	$4,700	$770	$780	$580	$38,530	$46,600
CPRA - Withdrawal Schedule								
CPRA	$330,000	$565,000	$110,000	$270,000	$320,000	$223,520	$332,880	**$2,151,400**
CPRA - Mitigation & MAM Allocation								
GENERAL PROJECT	$266,500	$511,500	$57,000	$216,100	$266,000	$165,800	$275,100	$1,758,000
MITIGATION	$60,000	$50,000	$50,000	$50,000	$50,000	$50,000	$6,000	$316,000
MAM	$3,500	$3,500	$3,000	$3,900	$4,000	$7,720	$51,780	$77,400
Total Annual Withdrawal								
Total Annual Withdrawal	$336,020	$569,420	$119,100	$273,270	$328,180	$236,000	$398,010	**$2,260,000**

Funding allocations for MAM, mitigation and stewardship measures, and general project implementation are also presented in Table 1. The above table represents an initial estimate of withdrawals and will be updated based on actual withdrawals, expenditures, projected expenditure rates, Estimates at Completion (EACs), and other NRDA resolutions/obligations/actual expenditures. The Trustees will update Table 1 at least annually. Trustee approval will be documented through meeting minutes. NOAA and CPRA should on a quarterly basis, or when requested by the Trustees, provide an analysis of project expenditures and anticipated future funding withdrawals, as well as projected TIG funding needs for other planned and anticipated restoration planning and implementation activities. NOAA and CPRA will manage the funds to the total dollar amount and the not to exceed allocations as listed in Table 1, as updated.

The withdrawal amounts for NOAA in Table 1 include funds for the NOAA Restoration Center to improve ecosystem models, as recommended by NOAA as part of the Magnuson Stevens Fishery Enhancement Act Essential Fish Habitat consultation. With regard to those funds, NOAA shall work collaboratively with CPRA in determining the strategies that will be employed to improve those models. CPRA approval of the scope, budget and timeline is required before any ecosystem modeling efforts are commenced in reliance on these funds.

The withdrawal amounts for NOAA in Table 1 also include funds for NOAA to undertake certain monitoring and stewardship efforts related to dolphins, as described in the MAMP and the Mitigation and Stewardship Plan. NOAA will be undertaking those efforts on CPRA's behalf, in collaboration with CPRA. NOAA shall report the status of its implementation with regard to dolphin monitoring and stewardship on an at least an annual basis. CPRA approval is required before each annual withdrawal for dolphin monitoring and stewardship is commenced. If at any time NOAA's dolphin monitoring and stewardship efforts are not undertaken consistent with, and under the timelines specified in, the MAM and Mitigation and Stewardship Plans, CPRA shall have the option, to be exercised at CPRA's discretion, to redirect funding for those items to CPRA for implementation of those activities.

REPORTING REQUIREMENTS/DELIVERABLES

1. Project Implementation. CPRA will provide financial and implementation project status to the LA TIG at regularly scheduled LA TIG meetings (and at least biannually), upon discovery of any significant changes to the project or its schedule, and as requested. Reporting Requirements for project implementation will continue as long as the implementing Trustees are expending DWH NRD funds on the Project. At any time, the LA TIG may request CPRA, and where applicable NOAA, to provide a status update on implementation and monitoring of the Project. Upon request and justification by CPRA, and as consistent with the TC SOPs, the LA TIG may grant flexibility in meeting the reporting requirements of this Implementation Plan. CPRA will update project records in DIVER at least annually, and as needed following the TC SOPs, throughout the planning, construction, and post-construction and operational phases. These updates will include, but are not limited to, the following: contracting actions, financial expenditures, environmental compliance, planning and construction milestones and outcomes, and long-term activities, including monitoring and operations, management, maintenance, and mitigation and stewardship, as applicable.

2. Project Monitoring and Reporting.

a. DIVER Restoration Portal Reporting: CPRA and NOAA will upload MAM activities and corresponding documents annually in the DIVER Restoration Portal. This will include information on the monitoring parameters, performance criteria (if applicable), monitoring duration and frequency, etc.
b. Mid-Basin Sediment Diversion Project Annual Operations Plan: Information and lessons learned from the previous year will be considered when adjusting the operations plan for each upcoming year. The CPRA Operations Management Team will draft an annual operations plan to be presented to the Stakeholder Review Panel and at public meetings to solicit comments, perspectives, and insights. Following any revisions to this Plan, the Plan will be finalized and submitted to CPRA's Executive Director for approval. Once developed, these reports will be posted onto CPRA's Coastal Information Management System (CIMS) website, as well as uploaded to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.
c. Annual Operations Performance Reports: These reports, developed by the Project Data Management Team, will be limited to a summary of the Project Effectiveness monitoring data available in October of any Calendar Year, immediately following the end of a Water Year. Once developed, these reports will be posted onto CPRA's Coastal Information Management System (CIMS) website, as well as uploaded to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.
d. Annual Mitigation and Stewardship Measures Implementation Plan: Each year the CPRA Operations and Management Team will develop a Mitigation and Stewardship Measures Implementation Report that explains the activities undertaken by CPRA or its designees during the prior year to implement the mitigation and stewardship measures for which CPRA or its designees are responsible as set forth in the Mitigation and Stewardship Plan. Each year the NOAA teams responsible for implementing NOAA led mitigation and stewardship measures will develop a Mitigation and Stewardship Measures Implementation Report that explains the activities undertaken during the prior year to implement the mitigation and stewardship measures for which NOAA is responsible as set forth in the Mitigation and Stewardship Plan. Once developed, CPRA and NOAA will upload their reports to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.
e. Annual Operations, Maintenance & Monitoring Reports: The Operations Management Team will develop Annual O&M Reports of Water Year Project Effectiveness and Status & Trends Data that include, but are not limited to, data collection results, attributable outcomes, operations information, maintenance updates, additional project features progress towards reducing identified Critical Uncertainties to address Learning Strategies and recommendations from the Adaptive Management Team for Adaptive Management actions, MAMP revisions, and operational changes from the previous year's operations. These reports will provide a summary of the monitoring data collected during the water year regarding Project Operations and river and basin responses. Some descriptive and initial statistical analyses will be conducted on the water year data. However, more robust analyses will be relegated to the Multi-Year Report. Once developed, CPRA will solicit input from stakeholders and the public; once finalized, CPRA will post these reports to the CIMS website, as well as upload them to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.

f. Annual Dolphin Intervention Plan Report. Each year the NOAA team responsible for implementing the Dolphin Intervention Plan will develop a Dolphin Intervention Plan Implementation Report that explains the activities undertaken during the prior year to implement the Dolphin Intervention Plan. Once developed, NOAA will upload this report to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.
g. Multi-Year Monitoring and Adaptive Management Reports: The Adaptive Management Team will develop the report to provide a comprehensive analysis of Project Effectiveness and Status &Trends Data during the duration of the project; progress towards reducing identified Critical Uncertainties to address Learning Strategies, and recommendations from the Adaptive Management Team for Adaptive Management actions, MAMP revisions, and operational change. To the extent practicable, the interim and final MAM reports will be consistent with the MAM report template in the Deepwater Horizon TIG MAM Manual. Once developed, CPRA will solicit comments from the Stakeholder Review Panel, followed by a 30-day public review period. Once finalized, CPRA will post these reports to the CIMS website, as well as upload them to the DIVER Explorer and Trustee Council websites, and the LA TIG will be notified of the availability and location.
h. National Historic Preservation Act Annual Report: A report documenting the results of the annual reconnaissance survey, developed by CPRA, will be provided to all Consulting Parties within 30 days after completion of the survey. CPRA shall share annual survey results only after USACE New Orleans District (CEMVN) has been allowed to review proposed language and redact any specific location data for the historic properties or new findings or other sensitive data under applicable law and regulations.
i. US Fish & Wildlife Service Coordination Act Annual Report: An annual report outlining data specific to USFWS-managed resources in the Barataria Basin. CPRA intends for this report to represent a subset of, but otherwise largely mirror the level of analysis in, the Annual OM&M Reports. The final format, content, and review process for this report will be developed by CPRA and USFWS.
j. Louisiana Trustee Implementation Group Annual Report: CPRA, and cooperating entities, will develop an annual report to the LA TIG outlining data specific to NRDA natural resources in the Barataria Basin. CPRA intends for this report to represent a subset of, but otherwise largely mirror the level of analysis in, the Annual OM&M Reports. The final format, content, and review process for this report will be developed by CPRA and the LA TIG.

3. Project Expense Accounting and Reimbursement. On an annual basis, the Trustees will provide an accounting and reconciliation of Project expenditures, which will track the amount of LA TIG funds expended on the Project and the amount of funds provided by CPRA that were expended on the Project. This accounting and reconciliation process will be structured to allow CPRA to expend funds it provides in the first instance, with later reimbursement from LA TIG funds, where LA TIG funds are not available for particular items at the time of expenditure. This accounting and reconciliation process also will be structured to allow the Trustees to expend LA TIG funds in excess of the budgeted amounts for certain items (including but not limited to

payment of Claims[1] related to certain budget items) or in excess of the total net amount of LA TIG funds approved by the LA TIG, with later reimbursement from CPRA-provided funds. These accounting and reconciliation procedures will be designed and implemented to achieve the joint objectives of (1) paying for Project costs as needed to timely implement the Project, and (2) using LA TIG funds for up to $2.26 billion of Project costs and using CPRA-provided funds for all Project costs exceeding $2.26 billion. The Trustees will develop and implement an accounting and reconciliation process to implement this provision.

4. Data Management. All data collected and analyzed as part of this project will be stored on either CPRA's CIMS website (https://cims.coastal.louisiana.gov/default.aspx) and/or NOAA's DIVER tool. CPRA and NOAA will submit Project data to CIMS and/or DIVER as soon as possible and no more than one year from when data are collected. NOAA will provide a link to CIMS in the DIVER Restoration Portal.

5. Letter of Completion. Within 45 days of completion of all requirements specified in this work plan CPRA will submit a letter of completion to the LA TIG. This letter will certify that all work has been completed through a final monitoring report and provide a final accounting of expenditures, funds balance, including interest, and the total amount of funds that will be returned, if required.

6. Form. All project reporting will be in the form specified by CPRA and consistent with the reporting requirements in RP #3.2 and the TC SOPs.

ADDITIONAL TERMS:

1. CPRA will notify the LA TIG of material project changes during design or construction before taking further action on the project. Notifications will include a brief discussion of the change, impact, and proposed path forward. Any material project changes must be approved by the LA TIG.

2. At the time this Implementation Plan is approved, all applicable consultations and regulatory compliance activities required to commence construction of the Project have been completed and appropriately documented. The LA TIG Trustees agree that all applicable consultations and regulatory compliance activities required to implement conditions of Project approval (i.e., mitigation and stewardship measures) must be completed prior to utilizing LA TIG funds to construct or implement those measures. The terms and conditions of all federal, state, and local permits must be complied with in the course of implementing the project. All compliance documents will be posted to the project file on the LA TIG SharePoint site.

[1] The definition of "Claims" is provided in the Louisiana Trustee Implementation Group Project Funding Agreement, LA TIG ROD, Attachment 11.

Regulatory Reviews Complete for Project Construction
Rivers and Harbors Act Section 10/Clean Water Act Section 404 (USACE permit)
Rivers and Harbors Act (Section 408) (USACE permission)
Endangered Species Act (ESA) Section 7 (NMFS)
Endangered Species Act (ESA) Section 7 (USFWS)
Essential Fish Habitat (EFH) (NMFS)
Marine Mammal Protection Act (MMPA) (USFWS)
Migratory Bird Treaty Act (MBTA) (USFWS)
Bald and Golden Eagle Protection Act (USFWS)
National Historic Preservation Act (NHPA) Section 106
Coastal Zone Management Act (Louisiana Coastal Use Permit)

ATTACHMENTS:

Attachment 1 - Monitoring and Adaptive Management Plan

Attachment 2 - Mitigation and Stewardship Plan

Attachment 1

See MBSD ROD Attachment 1.

Attachment 2

See MBSD ROD Attachment 2.

Attachment 5: Operation and Maintenance, Repair, Replacement and Rehabilitation Plan for the MBSD Project

Note: The Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) Plan for the MBSD Project may be revised over time. The most up to date version of the OMRR&R Plan can be found on the Louisiana CPRA Mid-Basin Sediment Diversion Program webpage at https://cims.coastal.la.gov/.

AECOM

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

MID-BARATARIA SEDIMENT DIVERSION (MBSD) PROJECT
STATE PROJECT No. BA-0153

Preparation of

OPERATIONS, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION (OMRR&R) PLAN

90% Working Copy Rev 0

For

Prepared By:
AECOM Technical Services
8555 United Plaza Boulevard
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Baton Rouge, LA 70809

February 2022

Rev	Date	Description
0	July 8, 2020	30% Draft Submittal
1	December 2020	Updated 30% Draft Submittal
2	May 2021	Updated 60% Draft Submittal with CPRA comments
3	July 2021	60% Draft Submittal to CPRA
4	August 2021	60% Draft Submittal to USACE
5	December 2021	90% Draft Submittal
6	February 2022	90% Working Copy Rev 0 (REV1 BWB)

AECOM

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Figures

References [update references]

Couvillion, B.R., Beck, Holly, Schoolmaster, Donald, and Fischer, Michelle, 2017, Land area change in coastal Louisiana 1932 to 2016: U.S. Geological Survey Scientific Investigations Map 3381, 16 p. pamphlet, https://doi.org/10.3133/sim3381.

Bednar, D.S., C.R. Thorne, C.C. Watson. 2000. Recent morphological evolution of the Lower Mississippi River, Geomorphology, Volume 34:227-249.

1. ACRONYMS AND ABBRREVIATIONS

ADCP	Acoustic Doppler Current Profiler
AHP	Above the Head of Passes
AMT	Adaptive Management Team
AOP	Annual Operations Plan
ATON	Aids to Navigation
BW	Barataria Waterway
BP	BP Exploration and Production Inc.
BUM	Beneficial Use of Excess Material
CEM	Conceptual Ecological Model
CFO	Chief Financial Officer
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CHS	Cenex Harvest States
Coned	Coastal National Elevation Database
COOP	Continuity of Operations Plan
CRMS	Coastwide Reference Monitoring System
CPRA	Coastal Protection and Restoration Authority
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
DCN	Design Change Notice
DMPA	Dredge Material Placement Area
DO	Dissolved Oxygen
DWH	Deepwater Horizon
EFC	Estimated Final Cost
EI	Early Implementation
EIS	Environmental Impact Statement
EL	Elevation
EM	Engineering Manual
ER	Engineering Regulation
EWOCDS	Early Warning Organic Compound Detection System
FWOP	Future without Project
FWP	Future with Project

GEBF	Gulf Environmental Benefit Fund
GOCA	Governor’s Office of Coastal Activities
GCERC	Gulf Coast Ecosystem Restoration Council
HVAC	Heating, Ventilation and Air Condition
Hwy	Highway
IEPR	Independent External Peer Review
LADOTD	Louisiana Department of Transportation and Development
LDEQ	Louisiana Department of Environmental Quality
LA TIG	Louisiana Trustee Implementation Group
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LS	Landside
LWRP	Low Water Reference Plane
MAM	Monitoring and Adaptive Management
MBrSD	Mid-Breton Sediment Diversion
MBSD	Mid-Barataria Sediment Diversion (or “Project”)
MLG	Mean Low Gulf
MOA	Memorandum of Agreement
MR&T	Mississippi River & Tributaries
MR	Mississippi River
MRL	Mississippi River Levee
NAVD	North American Vertical Datum
NED	National Elevation Dataset
NEMA	National Electrical Manufacturer’s Association
NEPA	National Environmental Protection Act
NETA	International Electrical Testing Association
NFPA	National fire Protection Agency
NFWF	National Fish and Wildlife Foundation
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOGC	New Orleans & Gulf Coast Railway
NOV	New Orleans to Venice
NRDA	Natural Resource Damage Assessment
OM	Operations Manager

OMRR&R	Operations, Maintenance, Repairs, Replacement and Rehabilitation
OMT	Operations Management Team
OPA	Oil Pollutions Act
OSHA	Occupational Safety and Health Administration
OTF	Outfall Transition Feature
PCA	Project Cooperation Agreement
PDARP/PEIS	Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement
PDDA	Project Delta Development Area
PDT	Project Delivery Team
PET	Program Executive Team
PIA	Primary Influence Area
PM	Project Manager
PMIS	Project Management Information System
PMT	Program Management Team
PPG	Plaquemines Parish Government
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies
RM	River Mile
ROD	Record of Decision
RP	Restoration Plan
RR&R	Repair, Replacement and Rehabilitation
RS	Riverside
SAV	Submerged Aquatic Vegetation
SOP	Standard Operating Procedure
SWAMP	System-Wide Assessment and Monitoring Program
TBD	To Be Determined
TBDEM	Topobathymetric Digital Elevation Model
TWG	Technical Work Group
TWIG	The Water Institute of the Gulf
USACE	U.S. Army Corps of Engineers
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
VE	Value Engineering
WBS	Work Breakdown Structure

2. INTRODUCTION

2.1 Authorities and Funding

A. The Mid-Barataria Sediment Diversion Project (MBSD or "the Project") was approved for design and construction as part of Louisiana's 2017 Comprehensive Master Plan for a Sustainable Coast. (State of Louisiana House Bill No. 1)
B. Funding for Project design and construction was allocated through the Deepwater Horizon (DWH) oil spill settlement with BP arising from the DWH Oil Spill. Specifically, the project's engineering, design, and permitting was funded by the GEBF managed by NFWF, and construction was provided through the NRDA process by the LA TIG following the OPA restoration, planning, which included opportunity for public review.
C. The NRDA construction funding Resolution No. XX was executed on XXX XX, 2023.

2.2 Purpose and Scope of Manual

The successful functioning of the MBSD and its accompanying appurtenances is not assured by the mere construction of the structure. If the diversion structure and its appurtenances are to serve their purpose, they must be properly operated and maintained. The purpose of this manual is to provide operation and maintenance information for the applicable components of the Mid-Barataria Sediment Diversion. Proper operation and maintenance require that project personnel have a thorough understanding of the functions of the various diversion structure components. This manual is a "living document" and as such should be revised, modified and changed as new operation and maintenance procedures are developed.

2.3 Related Manuals and Reports

Code of Federal Regulations (CFR), Title 33 Section 208.10 entitled Local Flood Protection Works Maintenance and Operation of Structures and Facilities

The Code of Federal Regulations (CFR), Title 33 Section 208.10 provides general guidelines for operation and maintenance of the MBSD structure. A copy of this CFR can be obtained at the web site https://www.govregs.com/regulations/expand/title33_chapterII_part208_section208.10

U.S. Army Corps of Engineers, Engineering Manual (EM) 385-1-1 entitled "Safety and Health Requirements Manual"

The purpose of this manual is to prescribe the safety and health requirements for all Corps of Engineers activities and operations. A copy of this EM can be obtained at the web site https://www.usace.army.mil/Missions/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/

U. S. Army Corps of Engineers, Engineering Regulation (ER) 1130-2-500 entitled "Project Operations"

This ER covers details required for the proper care and efficient operation of the various project elements. A copy of this ER can be obtained at the web site https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1130-2-500.pdf

Occupational Safety and Health (OSHA) Regulations

The OSHA Act of 1970 authorizes the Occupational Safety and Health Administration to set standards for safety in the workplace and enforce them through a system of inspections, citations, and fines. Employers and employees must adhere to a set of general duties described in the act as well as any specific standards set by OSHA. A copy of the latest OSHA Regulations can be obtained at the web site https://www.osha.gov/laws-regs.

Management of Water Controls Systems

EM_1110-2-3600 - Oct 2017: This manual delivers general guidance to field offices for water management at all U.S. Army Corps of Engineers (Corps) owned and Corps-operated reservoirs, locks, dams, and other water control projects in which water storage is managed and operated for multiple authorized purposes. It provides background on objectives, requirements, and types of content for management of a broad spectrum of water management project.
https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-3600.pdf

Preparation of Water Controls Manual

ER 1110-2-8156 – Dec 2018: This manual is for day-to-day use in water management under variable conditions that may affect a project or a system including project issues, authorities, data schedules, and all other information necessary to regulate a project. Additionally, it provides a format to document the effects and benefits of a project purposes which may be used to improve the water control plan and provide a basis for structural modifications.
https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/ER_1110-2-8156_%20Errata.pdf?ver=vP6ps3d2CxwQm9IY_TiFWg%3d%3d

Water Control Management

ER 1110-2-240 – May 2016: This Engineer Regulation prescribes policies governing water control management activities as required by Federal Law and directives, including the establishment of water control plans as appropriate, by the U.S. Army Corps of Engineers (USACE) at all USACE-owned and USACE-operated reservoirs, locks, dams, and other water control projects in which storage is operated and managed for authorized purposes such as flood control, navigation, and other uses. https://www.publications.usace.army.mil/portals/76/publications/engineerregulations/er_1110-2-240.pdf

OMRRR Manual for Projects and Separable Elements Managed by Project Sponsors

ER 1110-2-401 – Sept 1994: This regulation provides instructions for the preparation of operation and maintenance manuals outlining the responsibilities of those local sponsors that have entered into binding agreements with the Secretary of the Army to be solely responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R), and to pay 100 percent of the associated project costs.
https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1110-2-401.pdf

MAM (Monitoring and Adaptive Management) Procedures and Guidelines Manual

Dec 2017: This manual provides guidance for monitoring and data management, recommendations and procedures for data QA/QC, clearance and release, and guidance for identifying and addressing information gaps for implementation of MAM at any project. https://www.gulfspillrestoration.noaa.gov/sites/default/files/2018_01_TC_MAM_Procedures_Guidelines_Manual_12-2017_508_c.pdf

2.4 Project Owner

The State of Louisiana is the owner of the MBSD facility.

2.5 Operating Agency

The operating agency for the Project is the State of Louisiana's CPRA.

2.6 Permits and Regulatory Compliance

All applicable state and federal permits associated with the MBSD Structure are listed below.

A. The Project was permitted for construction and operation under permit # XXXXXX by the U.S. Army Corps of Engineers (USACE) (Sections 10 and 404 of the Clean Water Act).
B. The ROD was issued on XXX XX, 2022 for Sections 10 and 404 of the Clean Water Act, Section 408, and the NRDA RP.
C. LDNR CUP #P20131098 dated XXX XX, 2022.

See **Appendix E** for permits, permissions, and the ROD

2.7 Federal, State, and Local Agencies, Authorities, and Governments

The following Federal, State, and Local Agencies, Authorities, and Governments will be part of routine communications from CPRA.

- USACE
- USCG
- USFWS
- LDWF
- PPG
- LADOTD
- LDEQ

3. PROJECT DESCRIPTION

3.1 Location

The MBSD is located in Southeastern Louisiana, in Plaquemines Parish on the west bank of the MR between the Phillips 66 Alliance Refinery and the Town of Ironton at approximate river mile 60.8 above the head of passes AHP, as shown on **Figure 3-1**. The project intersects the MRL at Station 1109+58 and the NOV Levee at Station XXXX+XX. Both land and water access to the site is available. Land access is available via Hwy 23. A boat landing is available on site.

Figure 3-1: Project Location

3.2 Purpose of Project

The purpose of this project is to reconnect the Mississippi River to the Barataria Bay and divert river sediment, along with nutrients and fresh water, to build new land, maintain existing marshes and increase habitat resiliency to sea level rise and storm events. The primary objectives of the Project are to:

Objective 1: Deliver freshwater, sediment, and nutrients to Barataria Bay through a large-scale sediment diversion from the MR;

Objective 2: Reconnect and re-establish sustainable deltaic processes between the MR and the Barataria Basin (e.g., sediment retention and accumulation, new delta formation); and

Objective 3: Create, restore, and sustain wetlands and other deltaic habitats and associated ecosystem services.

In addition to the Project Objectives, the following conditions have been used as guidance to develop this draft of the OMRR&R Plan, which shall be updated as necessary.

1. Designed to deliver, during designated times of the year, variable flows through the conveyance channel from the MRL to the Barataria Basin by operating gates of the diversion structure. This flow rate was used as a basis to further develop design concepts at the proposed MBSD site. Actual diversion flow rates are dependent on Mississippi River and Barataria Basin conditions and is operated to meet the Project goals.
2. Operate and maintain the intake structure and appurtenances to maximize sediment capture and delivery allowing for operations flexibility based on monitoring data collected during project operations.
3. Meet state and federal design criteria and environmental compliance requirements as required to achieve project regulatory approval.
4. Develop an operational plan for the diversion structure.

3.3 Project Physical Data

3.3.1 Vertical and Horizontal Datum

The horizontal datum is the US State Plane 1983 (2011) Louisiana South Zone 1702, North American Datum (NAD) 1983 in US survey feet. The vertical datum is North American Vertical Datum 1988 (NAVD 88 2009.55) using Geoid 12A/B. All on-site benchmarks and gages are set in accordance with these datums at these locations (update Operation BM after construction):

- Name, location, type of benchmark, elevation (from the as-built locations)
- Name, location, type of benchmark, elevation

3.3.2 Hydraulics/Physical Features

The Project consists of the following features, also shown on **Figure 3.2** below:

- Headworks consisting of an intake structure, gated diversion, and transition (headworks)
- Conveyance channel including guide levees
- Administration and maintenance buildings
- Railroad bridge crossing near headworks
- Hwy 23 Bridge and Roadway Realignment
- Inverted siphon
- NOV drainage structure
- Utility relocations
- Boat ramps at the MR and OTF areas
- Outfall Transition Feature
- Monitoring Stations

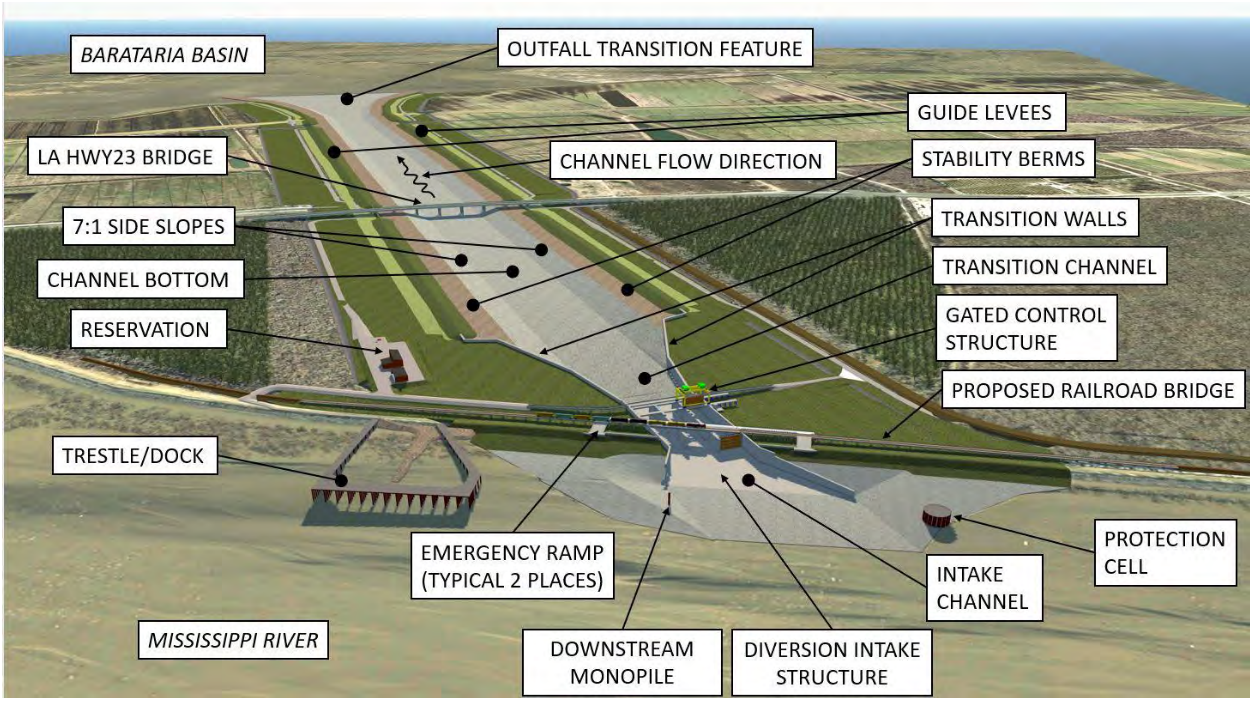

Figure 3-2: Project Features

The features of the Project and physical characteristics are described below and are presented in **Figure 3-2.**

The Project site and features have the following physical characteristics:

- Nominal Maximum Discharge: 75,000 cfs
- Nominal Baseflow Discharge: 5,000 cfs
- Riverside Dolphin Dimensions: (1) 61'-8 1/8" cell and (1) 60" dia x 1 ¼" Pipe Pile monopile.
- U-Frame/Gate Bay Total Width 198 ft
- Intake/U-Frame/Gate Sill Elevation: -25 ft
- Vertical Bulkhead Gate Bays (3) Dimensions: 66 feet wide
- Gate Bay Length: 153 ft
- Bulkheads (16 total – 4 for each gate bay and an additional 4 for emergency purposes): 11.33 feet in height, 66 feet wide, each weighing 122 kips
- Total Gate Height: 45.32 ft
- Total Gate Weight: 488 kips (4 – bulkheads pinned together)
- Gate Bay Closure Design Elevation: - EL 20.35
- Conveyance Channel Dimensions: Appx 11,000 ft long x 300 ft bottom width
- Bottom Elevation of Conveyance Channel Elevation:-25.0 ft
- Conveyance Channel Levee Design Elevation: 15.85 ft (does not include overbuild)
- Conveyance Channel and Levee Side Slopes: 1V on 7H and 1V on 4H
- Mainline Mississippi River Levee (MRL) Design Elevation: 16.65 ft (does not include overbuild)
- Mainline Mississippi River Levee (MRL) Crown Width: 10 ft
- Mainline Mississippi River Levee (MRL) Side Slopes: 1V on 3H RS and 1V on 4H LS
- Siphon Length: XX ft

- Siphon Pipes: XX Barrell at XX ft Diameter
- Siphon Pipe Inlet/Outlet Sill Elevation: XX ft
- Siphon Pipe Maximum Depth Elevation: XX ft
- OTF Length: 1,500 ft
- OTF Sill Elevation: Varies -25 ft to approximately -4 ft
- OTF Guide Levee and Sheet Pile Guide Elevation: Design Grade EL 8.2 (west of NOV)
- OTF Toe Wall Top of Sheet Pile Design Elevation: 8.2 ft

3.3.2.1 Inflow Channel and U-Frame Intake [Post construction add photos of features]

The inflow channel is rip-rap lined and extends from the Mississippi River to the concrete U-frame structure. The intake is monitored for scour.

3.3.2.2 Gate Bays

The intake structure consists of three bays for diversion operations. The three (3) gate bays, each made of concrete are 66 feet wide per gate bay and 153 feet long total. The gate bay numbering corresponds with the gates which are labeled as Gate 1 (Miss. River upstream gate), Gate 2 (middle gate), and Gate 3 (Miss. River downstream gate) on drawing 4013C100. Each bay includes three gate slots (one closure slot and two maintenance slots) in the gate monoliths that allow a gantry crane to raise and lower the bulkhead gates. There is one maintenance slot on each side of the closure slot. The concrete floor elevation of the gate bay is at EL -25 feet. The top of the gate monoliths is at EL 20.35 feet. This system will allow for opening and closing of one gate at a time.

3.3.2.3 Conveyance Channel

The conveyance channel is rip-rap lined and extends from the gate bays to the outflow channel. The conveyance channel is monitored for scour.

3.3.2.4 Outfall Transition Feature

The outfall transition feature is rip-rap lined and extends from the Conveyance Channel to Barataria Basin. The OTF consists of a guide levee system from the NOV Levee to the existing Back Levee, transitioning into a braced sheet pile guide wall. The guide system west of the NOV Levee is soley to train/contain diversion flow and is not hurricane protection. The OTF also includes a buried sheet pile toe wall for backward scour protection. Dimensions, features, and the layout of the OTF are shown on Drawings 6043C101 and 6043C102.

3.3.2.5 Guide Levees

The guide levees extend along the conveyance channel. The purpose of the guide levees is to provide flood protection and to allow diversion of Mississippi River water to Barataria Bay. The guide levee design elevation is controlled by hurricane loading, not riverine diversion loading.

3.3.2.6 General Gate Information

The gates consist of sixteen (16) vertical lift steel bulkheads – three (3) sets of four (4) bulkheads for the three (3) gate bays and one set of four (4) bulkheads is an extra set to be used if problems arise with a gate set being jammed and/or not functioning correctly and for dewatering purposes. Twelve (12) bulkheads are required for gate operations. During gate operations, the additional four bulkheads are stored on grade beams below the Bulkhead Storage Platform. Bulkheads may not be stacked on the grade beams. Each bulkhead is designed the same, is identical, may be used interchangeably in any position within the closure and maintenance slots and can be loaded from either side to address reverse head conditions without having to rotate gates. Four bulkheads are required to fill one gate slot. A stack of four bulkheads is referred to as one gate. The gates regulate flows from the Mississippi River to the Barataria Bay side of the structure. The bulkhead gates are stored on site such that a gantry crane is able to access each gate for placement into the gate bay slots.

3.3.2.7 General Gantry Crane Information

A permanent rail-mounted gantry crane is installed on the intake structure for removal and installation of the gates. The crane is rated to travel with a maximum of two (2) bulkheads at one time. The crane is rated to lift and lower a stack of four (4) bulkheads (one gate) while stationary and with wheel sets centered approximately over the gate bay piers. The crane is equipped with a load monitoring system and limit switches to prevent overloading the crane or exerting too much force on the bulkheads if a gate becomes jammed. The crane is powered by an on-board generator and has fully redundant mechanical and electrical systems, including multiple gantry driven wheels, hoist motors, trolley drive motors, a second generator and redundant control systems. Redundant systems reduce risk of gantry crane inoperability at a time when gates operation is required. When not in service, the gantry crane is parked over the center gate bay of the gate monolith structure. For high wind events such as hurricanes, the crane requires tie-down and stowage pins to be fastened to the supporting monolith structure in accordance with manufacturer's specifications. The crane should only be operated and travel with wind speeds less than 40 mph as per the crane manufacturer design.

The gantry crane is rated for 450 tons. When gates are closed, some silt build-up is anticipated. The rated load includes loads from 10 feet of silt build-up on the river side and 5 feet of silt build-up on the basin side. If silt accumulation exceeds these amounts, it may be necessary to wash silt off the gates prior to successfully lifting the gates.

3.3.2.8 Reservation Area

The reservation area provides the base for operations and maintenance of the sediment diversion facility. The key components of the reservation area include a combination O&M/Administrative Building. Reference Drawings 9003C100 – 9003C105 for plan views of the reservation area.

3.3.2.9 Site Drainage

The interior drainage system relies on the Wilkinson Canal PS to remove precipitation runoff or periodic coastal flood overtopping events. Upstream and downstream drainage are connected by the inverted siphon bank (inlet and outlet) that conducts water to the Wilkinson Canal PS. The siphon includes sluice gates on the inlet side for maintenance and emergency operations. Additionally, a drainage structure at the NOV levee maintains upstream drainage from fastlands outside of levee protection. The NOV drainage structure includes sluice gates and flapgates.

3.3.2.10 Hwy 23 Highway Bridge Crossing

As the conveyance channel crosses existing Hwy 23, a bridge crosses over the conveyance channel to allow vehicular traffic to cross over the Diversion. The bridge was designed and constructed to LADOTD standards.

3.3.2.11 New Orleans & Gulf Coast Railway (NOGC) Crossing

[TBD based on MOA] A bridge allows the existing NOGC Railroad to cross over the MBSD Structure. CPRA and on-site personnel cooperate with NOGC on any activities on the railroad crossing in the vicinity of the MBSD Structure.

3.3.2.12 Dredge Material Placement Area

Maintenance dredging is anticipated to be required at some time during the project life of the MBSD project. Dredging locations may include, but not be limited to, Alliance South Point Bar, the Inlet, U-Frame, Conveyance Channel, OTF, or areas in the Barataria Basin. Dredging disposal areas may consist of the DMPA, or other areas to be determined. The dredging process consists of dredging being assigned to remove material from a specific location and discharging the material in a designated area as beneficial use.

Whenever maintenance dredging is required, placement of the dredged material is conducted in accordance with the objectives of the Project. Disposal in desirable locations within the Barataria Basin should be determined based on the benefit to receive the dredged material while considering the distance between the dredge location and disposal location. This distance is designed to be as short as possible to reduce the size/type of dredge required which ultimately reduces the cost of the maintenance dredging project.

On dredging plans and contracts associated with the Project, mandatory beneficial use disposal sites will be identified by CPRA on the dredging drawings. The dredged material disposal sites are chosen carefully such that disposal activities do not adversely affect future operations of the Project.

3.4 History of the Project

3.4.1 Planning

A discussion of the planning that went into the MBSD Structure is included in Appendix G. If this is just a summary of BODR to 100%, eliminate Appendix G & move text here.

3.4.2 Engineering and Design

Project Engineering and Design of the MBSD began in October 2017 and was completed in XXXX XX, 2023.

The final Design Documentation Report (DDR) dated XXXX XX, 202X is included in Appendix XXX of this manual.

The 100% Plans and Specifications are included in Appendix XXX of this manual.

The final As-Built Plans are included in Appendix XXX of this manual.

3.4.3 Construction (Reserve for Post Construction Update)

To be furnished by CMAR-Future

3.5 Agreements

A copy of all pertinent agreements associated with the MBSD Structure are included in Appendix C of this manual. A summary of these agreements is listed below.

3.5.1 Partnership Cooperation Agreement (PCA) for MRL and NOV Levee (TBD)

CPRA will coordinate with USACE to identify the type and content of the agreement that would be required for the maintenance and inspection activities of the MRL, NOV Levee, and the Project tie-ins.

3.5.2 MOA with Plaquemines Parish Government – Levees and interior drainage (TBD)

It is anticipated that an agreement between CPRA and Plaquemines Parish would be developed for routine maintenance (turf management) and inspection activities for Project guide levees and the NOV-W-NF 5a1.

3.5.3 MOA with LADOTD for Bridge Inspection and Maintenance (In progress)

A copy of the MOA is attached in Appendix C.

3.5.4 MOA with NOGC (In progress)

CPRA will coordinate with the NOGC Railway to obtain a sample agreement that specifies the intent and responsibilities for inspection and maintenance activities of the rail system and structures.

3.5.5 MOA with Pectin Midstream, LLC (Shell Pipeline) (In progress)

A copy of the relocation agreement and Act of Subrogation are attached in Appendix C.

3.5.6 MOA with Plaquemines Parish Government – Water Line (In Progress)

A copy of the relocation agreement is attached in Appendix C.

3.5.7 MOA with Entergy Transmission (In progress)

A copy of the relocation agreement and Act of Subrogation are attached in Appendix C.

3.5.8 MOA with Entergy Distribution (In progress)

A copy of the relocation agreement and Act of Subrogation are attached in Appendix C.

3.5.9 MOA with Cable One (In progress)

A copy of the relocation agreement is attached in Appendix C.

3.5.10 MOA with AT&T (In progress)

A copy of the relocation agreement is attached in Appendix C.

3.6 Related Projects

Projects that would require permitting of river sediment resources (e.g., sediment mining activities, USACE maintenance dredging, or the saltwater sill construction) would require coordination between CPRA, USACE, or other agency/authorities, as necessary.

4. CHARACTERISTICS OF THE MISSISSIPPI RIVER AND BARATARIA BASIN

4.1 General Characteristics

Barataria basin is bounded on the north and east by the lower Mississippi River, on the west by Bayou Lafourche, and on the south by the Gulf of Mexico. The major receiving waterbody in this basin is the Barataria Bay. The basin consists largely of bottomland hardwoods and fresh to brackish marshes, having some saline marsh on the fringes of Barataria Bay. The coastal watershed area that is influenced by the Project occurs in the Mid-Barataria and includes the major waterbodies of Bayou Dupont, Wilkinson Canal, The Pen, Round Lake, Lake Laurier, the Barataria Waterway, and other estuarine lakes and bays (**Figure 4-1**). Upstream of the intake, there is a grain elevator, CHS, and the Phillips66 Alliance refinery (**Figure 4-2**).

River navigation features and locations are presented in **Figures 4-3 to 4-5**. At Ironton, the Mississippi River is between 0.40 and 0.50 miles wide, with a water velocity range between 1 and 7 ft/s, and a discharge range between 200,000 to 1,000,000 cfs (**Figure 4-3**). When operational, the Project discharges up to 75,000 cfs of water during periods when Mississippi River flows are 450,000 cfs or greater at the USGS Gage 07374525 at Belle Chasse located at RM 76. When Mississippi River flows are below 450,000 cfs at the same USGS Gage 07374525 at Belle Chasse, the Project maintains a maximum baseflow or maintenance flow of up to 5,000 cfs.

Figure 4-1: Barataria Basin and Waterways Influenced by the Project

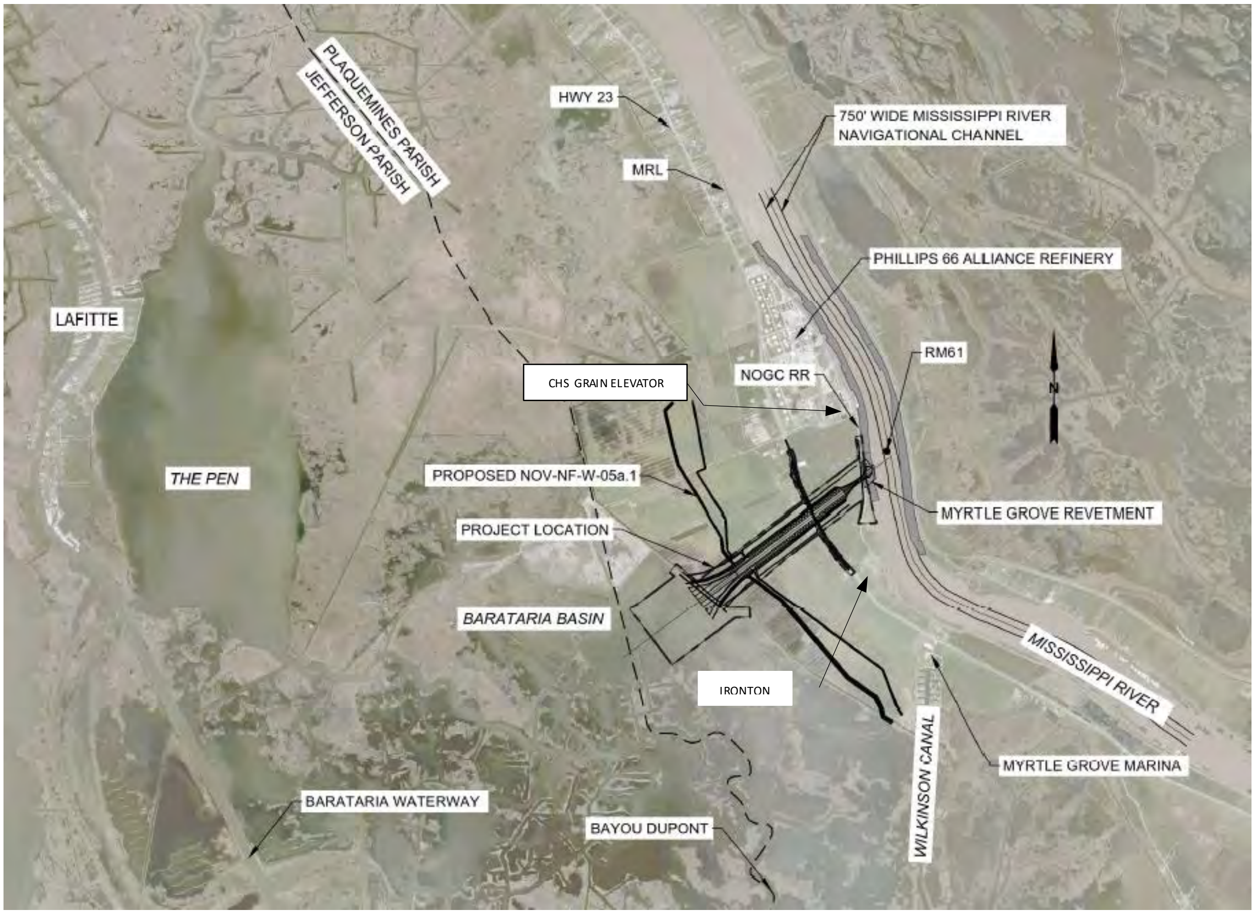

Figure 4-2: The Project Location and Adjacent Features

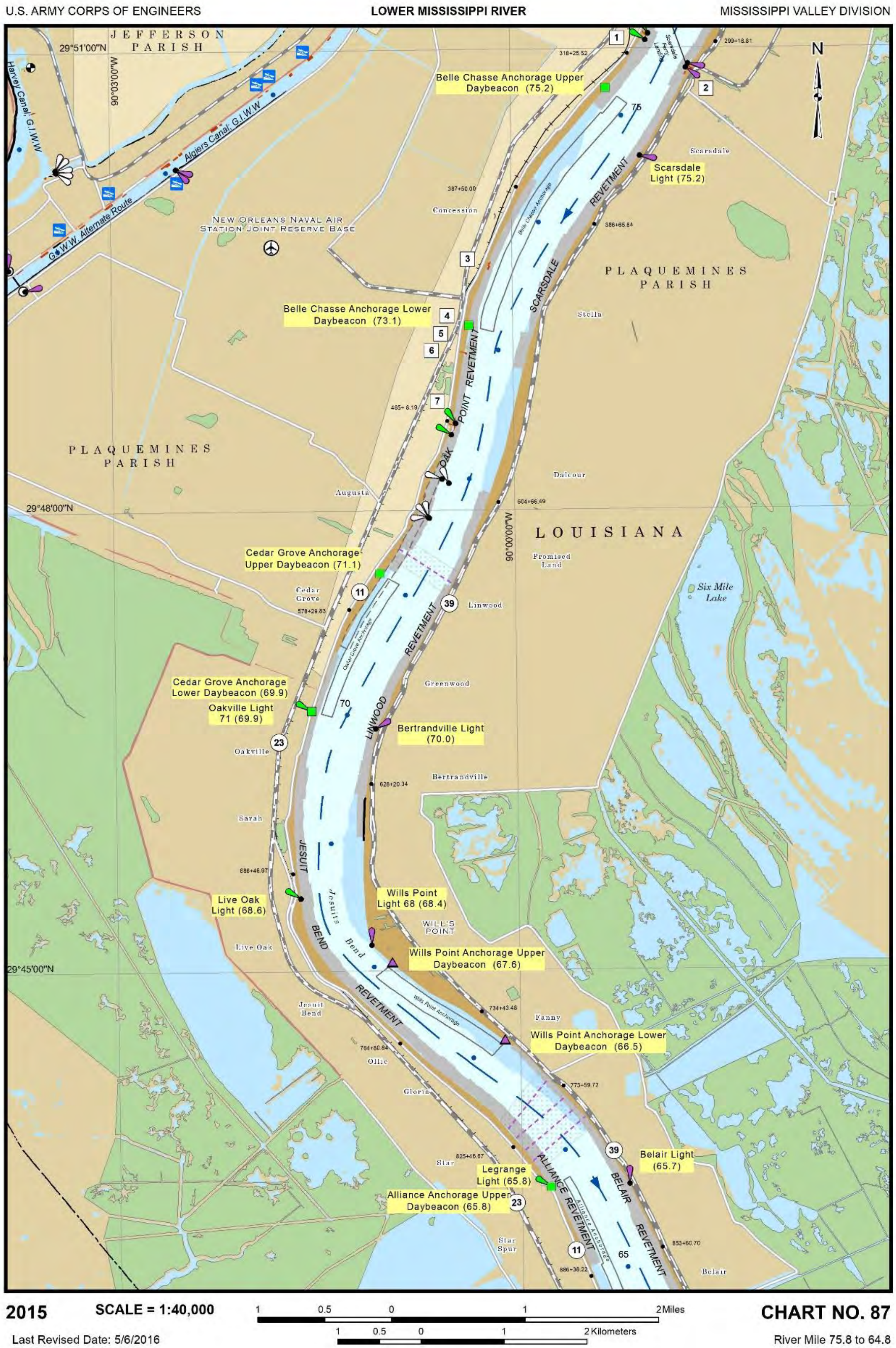

Figure 4-3: River Navigation Features and Locations Approximately 10 miles Upstream of the Project Location (RM 60.8)

Figure 4-4: River Navigation Features Near the Project Location (RM 60.8)

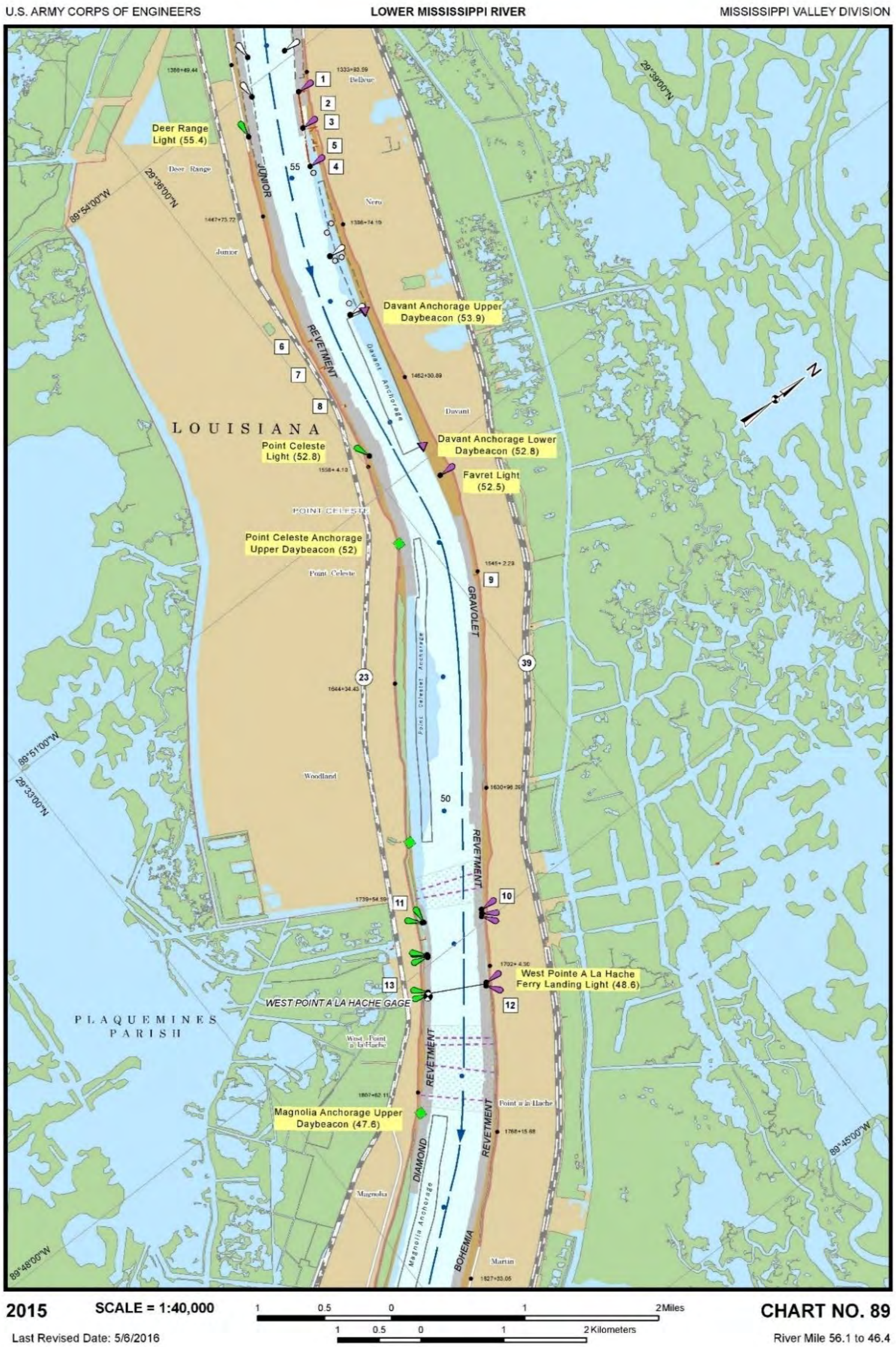

Figure 4-5: River Navigation Features Approximately 10 Miles Downstream of Project Location RM 60.8)

4.2 History

Historically, levee construction along the lower Mississippi River and its distributaries following settlement and land clearing for agriculture was largely complete by the mid-nineteenth century. However, a comprehensive federally managed system of levees only started after the flood of 1927. Current levee management practices on the river have resulted in almost all of the land-building potential of the Mississippi River being concentrated in two outlets of the river, the Birdsfoot Delta and the Atchafalaya Delta complex, leading to a collapse of expansive deltaic wetland[1]. Without future human restorative interventions, the coast is predicted to lose an additional 2,240 to 3,860 square miles of land in the next 50 years depending on future uncertain environmental conditions affected by climate change, such as sea level rise[2]. Because of human reliance on the current system, it is not feasible to return the system to a completely natural state, and so sediment diversions have been selected by the State of Louisiana to be a solution to quickly re-establish the natural processes between Mississippi River and estuarine basin[3].

4.3 Topography and Bathymetry

The primary sources of elevation data in the United States is the National Elevation Dataset (NED) and a recently developed layer, the Coastal National Elevation Database (CoNED), which combines both topographic (land elevation) and bathymetric (subaqueous elevation) datasets. The local TopoBathy Digital Elevation Model (TBDEM)/CoNED dataset is available in NAVD88 vertical datum or local tidal datum, and NAD83 horizontal datum (State Plane 1983 or UTM projection). The temporal range Geoid12A of the input topography and bathymetry is 1888 to 2013, however, latest collection in the Barataria Bay began on March 5th, 2013 and was completed on March 8th, 2013[4]. Accuracy is spatially variable depending on the specific site. For the Jean Lafitte and Barataria surveys, horizontal positional accuracy is estimated to be 0.73 meter (2.4 feet), vertical positional accuracy is estimated to be 0.122 meters (0.4 feet) at the 95% confidence level in open terrain[6] (see **Figure 4-6**).

[1] RESTORE. BUILDING LAND IN COASTAL LOUISIANA 2016. www.MississippiRiverDelta.org/DiversionOpsReport mississippiriverdelta.org

[2] Coastal Protection and Restoration Authority of Louisiana (CPRA). Louisiana's Coastal Master Plan for a Sustainable Coast; Coastal Protection and Restoration Authority of Louisiana: Baton Rouge, LA, USA, 2017.

[3] Water 2017. Optimizing Sediment Diversion Operations: Working Group Recommendations for Integrating Complex Ecological and Social Landscape Interactions. Water 2017, 9, 368; doi:10.3390/w9060368

[4] 2013 USGS Lidar: Jean Lafitte and Barataria, LA. https://inport.nmfs.noaa.gov/inport/item/49766

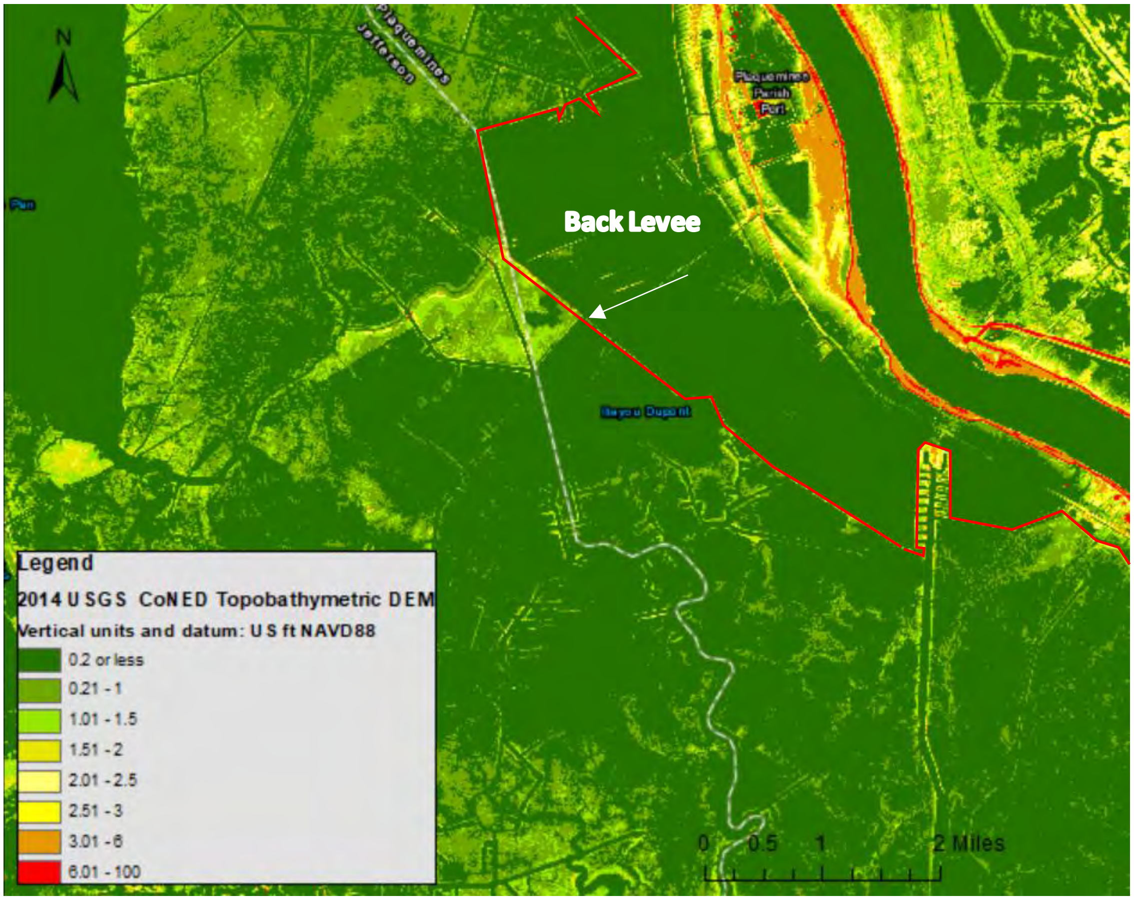

Figure 4-6: Digital Elevation Model (DEM) from the Coastal National Elevation Database (CoNED) Near the MBSD

South of the back levee, the area is predominantly open water. The bathymetric condition shown on **Figure 4-6** indicates that the project outfall transition feature is generally shallow bay with very mild slopes. Marsh elevation ranges between 0.5 and 1.0 feet NAVD88 near the MBSD outfall[5]. In general, the bathymetry adjacent to the outfall ranges from -1.6 to -4 feet NAVD88. The main features near the outfall area are the dredged channel created for navigation and the associated dredged spoil areas. The back levee is a local/private levee and is part of the Oakville to City Price Levee System, from approximately Mississippi River Levee (MRL) Mile 70.5 to MRL Mile 46.5. The back-levee elevations range from +2 feet to +9 feet. The lands between MRL and the Back Levee are pastureland, wetlands, and canals. Ground elevations in the area range between -5 feet and +3 feet NAVD88, with the lowest elevations occurring near the back levee and higher elevations toward the MRL.

[5]Coastwide Reference Monitoring System gages provide marsh water level elevation in the project vicinity (https://www.lacoast.gov/crms_viewer/Map/CRMSViewer)

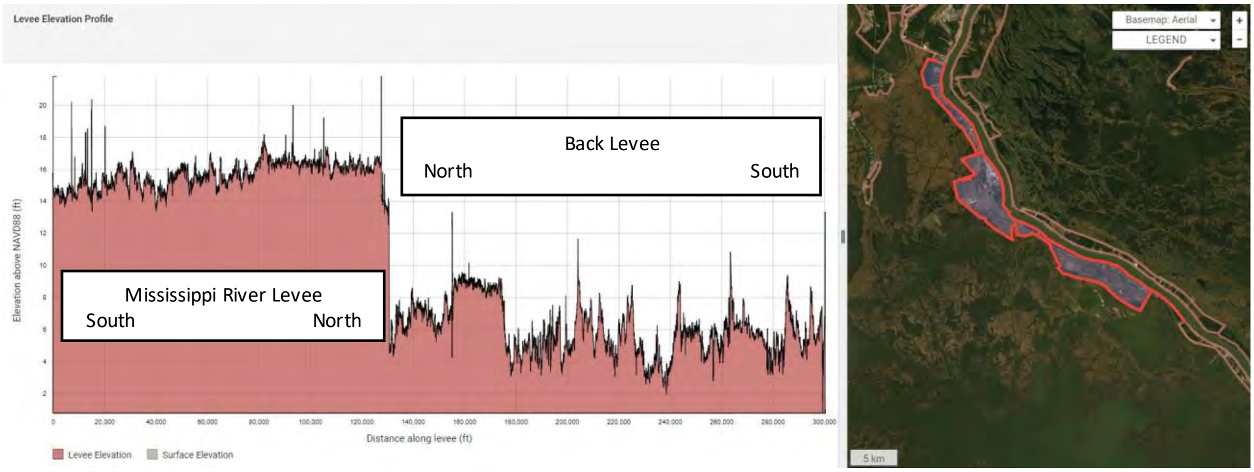

Figure 4-7: Figure showing levee elevations (left side) and plan levee system (right side). Source: USACE National Levee Database (NLD): Plaquemines LD - Oakville to St. Jude Polder

4.4 Geology and Soils

The site can be divided into several major depositional units including a point bar deposit at the Mississippi River. This point bar deposit is overlain by natural levee deposits extending into the marsh area to the west of the project's intake at the Mississippi River. Both the marsh and natural levee deposits overlie undifferentiated interdistributary/intradelta sequences lain in brackish water environments and, in turn, nearshore Gulf and prodelta deposits lain in saltwater environments. These deltaic deposits, deposited during the Holocene Epoch, are incised by two abandoned distributary channels identified in the geotechnical exploration. The surface of deposits from the Pleistocene Epoch appears to be between EL -100 and EL -125 at the Mississippi River with a general trend at approximately EL -110 along the proposed Conveyance Channel alignment.

4.5 Climatology

Plaquemines Parish is a semitropical climate, where temperatures vary from season to season but are typically warm, see **Table 4-1**. Cold front passage can occur every 7-10 days during winter and spring months (Nov-Apr). The approach of cold fronts can cause a pre-frontal set-up of coastal water levels with southerly and easterly winds, which is then followed by northerly winds that set-down water levels. The windiest part of the year lasts for 7.5 months, from October 7 to May 22, with average wind speeds of more than 6.9 miles per hour. **Figures 4-8** through **4-11** show the distribution of quarterly wind speed and direction. The calmer time of the year lasts for 4.5 months, from May 22 to October 7. Hurricane season occurs from June 1 to November 30, and the region experiences tropical systems, including major hurricanes.

Table 4-1: Climate Averages for Plaquemines Parish, Louisiana

Rainfall	61.8 in.
Snowfall	0.0 in.
Precipitation	108.7 days
Sunny	219 days
Avg. July High	89.8°F
Avg. Jan. Low	44.8°F
Comfort Index (higher=better)	6.9
UV Index	5.6

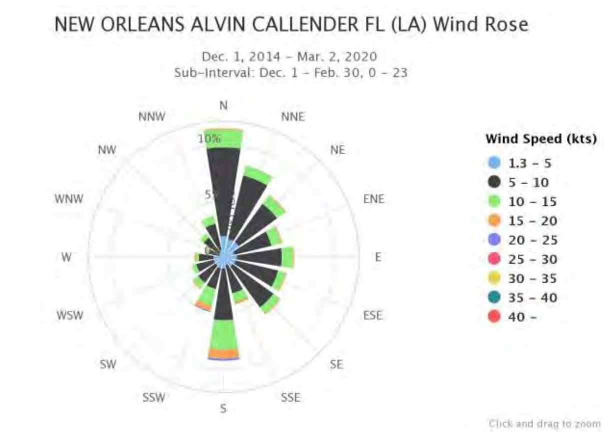

Figure 4-8: Distribution of wind direction and velocity from Dec through Feb.

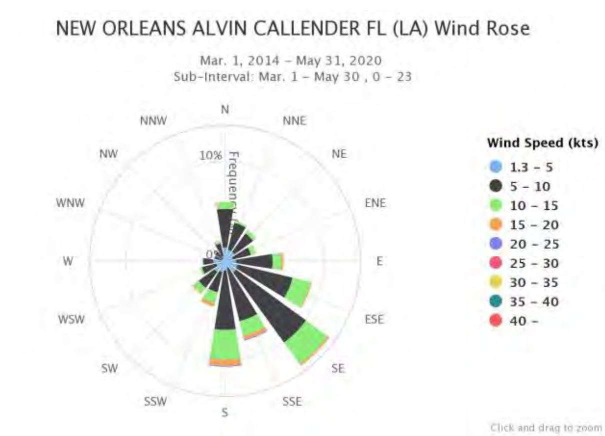

Figure 4-9: Distribution of wind direction and velocity from Mar through May.

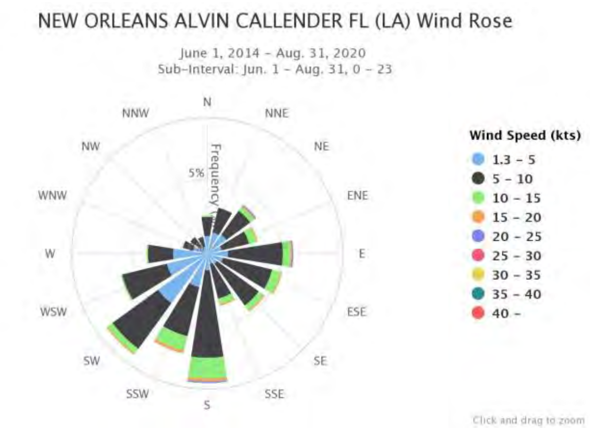

Figure 4-10: Distribution of wind direction and velocity from Jun through Aug.

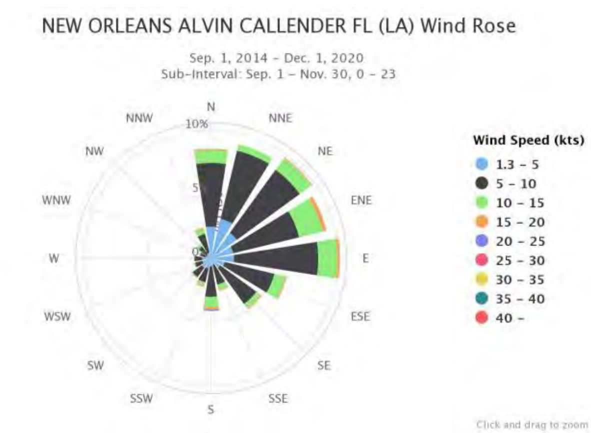

Figure 4-11: Distribution of wind direction and velocity from Sep through Nov.

4.5.1 Basin Water Levels

Barataria Basin largely experiences diurnal tides. The Grand Isle gage, where the basin exchanges with and the Gulf of Mexico, is a long-term data collection station that maintains tidal datum information. The mean tide level (MTL) is 0.53 feet, and the mean higher-high water (MHHW) and mean lower-low water (MLLW) is 1.06 and 0.00 ft (**Table 4-2**).

Based on a broad distribution of water level gages in the Basin, there is negligible difference between MHHW with location across the basin (approximately 1 foot, NAVD88); however, the tidal amplitude among the upper, mid, and lower basin is 0.1, 0.3, and 0.5 foot, respectively.

Table 4-2: Tidal Elevations for Grand Isle, Louisiana from the NOAA COOPS Gage 8761724.

Elevations on Mean Lower Low Water

Station: 8761724, Grand Isle, LA — **T.M.:** 0
Status: Accepted (Feb 1 2018) — **Epoch:** 2012-2016
Units: Feet — **Datum:** MLLW
Control Station:

Datum	Value	Description
MHHW	1.06	Mean Higher-High Water
MHW	1.06	Mean High Water
MTL	0.53	Mean Tide Level
MSL	0.54	Mean Sea Level
DTL	0.53	Mean Diurnal Tide Level
MLW	0.01	Mean Low Water
MLLW	0.00	Mean Lower-Low Water

4.5.2 Basin Floods of Record (All references in the paragraph will be converted to NAVD 88)

Based on historic data from the Grand Isle gage, the water elevation of a 1% annual exceedance probability event would be approximately 7.0 feet above MSL (**Table 4-3**). The highest observed tide at the Grand Isle gage was 5.2 feet above MLLW and occurred on 29 August 2012 with the approach and landfall of Hurricane Isaac (80 mph wind). At an inland gage near Lafitte (USACE 82875 Barataria Waterway at Lafitte) a maximum tide of 5.1 feet (NAVD 88 2004.65) was observed with the passage of Hurricane Ike on 13 September 2008. During Hurricane Ike, approximately 2,000 structures were flooded in lower Jefferson Parish, from Lafitte and Crown Point to Grand Isle.

Table 4-3: Water Elevation Annual Exceedance Probability (AEP) from the Grand Isle NOAA Gage (Based on Period of Record Through 2018)

Annual Exceedance Probability	Above MSL (m)	Above MSL (ft)	NAVD88 (ft)
1%	2.13	7.0	6.5
10%	1.15	3.8	3.3
50%	0.69	2.3	1.8
99%	0.42	1.4	0.9

4.5.3 River Discharge and Stage

Based on long-term MR data at Tarbert Landing, peak river discharge generally occurs during March, April, and May (**Figure 4-12**). The lowest discharge occurs from August through October. Beginning in November and during December, the discharge generally increases above 400,000 cfs. From December through June, there is an average of greater than 19 days per month that discharge exceeds 450,000 cfs (**Figure 4-13**).

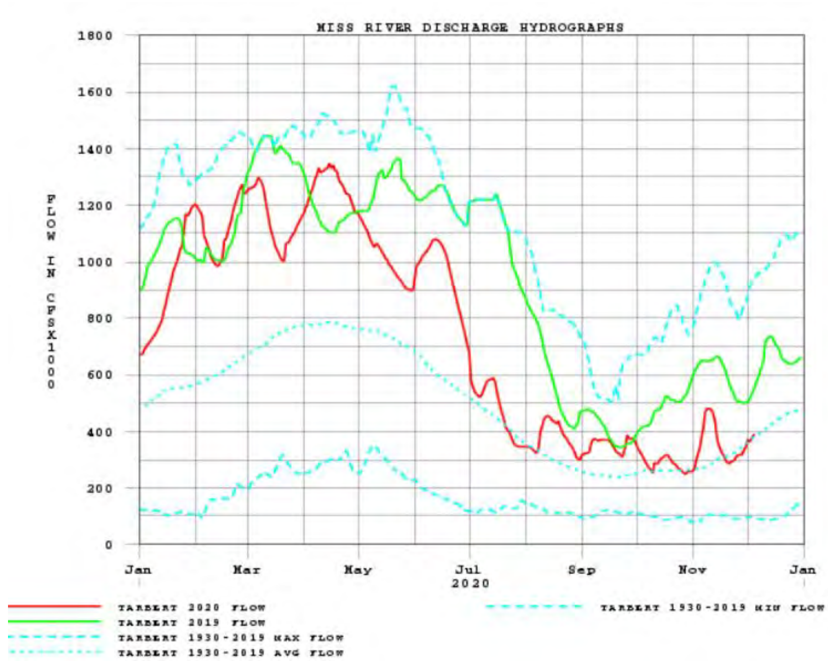

Figure 4-12: MR Discharge Hydrographs at Tarbert Landing (Data Analyzed over 1939-2019). Source USACE

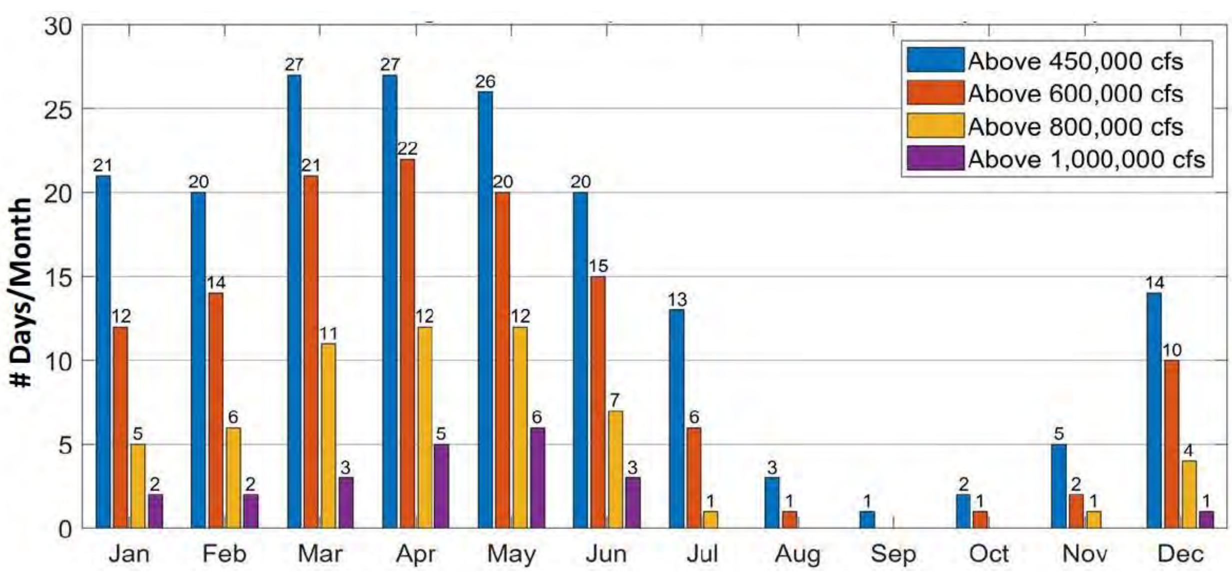

Figure 4-13: The Average Number of Days Each Month that MR Discharge Exceeded Different Levels (Data from Tarbert Landing, 1964-2017). Source FTN

4.5.4 Mississippi River Discharge Records Based on Belle Chasse Gage

The Belle Chasse Gage (USGS 07374525) is located on the left descending bank of the Mississippi River approximately 0.75 miles downstream of the Scarsdale Ferry Landing at river mile 76 (approximately 15.3 miles upstream of the Project). USGS started collecting data at this location in October 2008. The datum of the gage is 6.58 feet below NAVD 88 GEOID12B EPOCH 2010.0000. This means that USGS gage height data should subtract 6.58 feet to get water levels in NAVD88 GEOID12B EPOCH 2010.0000.

The stage and discharge characteristics of notable high-water events recorded at the Belle Chasse Gage since October 2008 are summarized below. The gage height listed is the gage height at the time of the peak discharge.

A. May 2009 - Discharge 1.23 M cfs; Gage Height 17.54 ft. = Gage Elevation 10.96 NAVD88
B. Feb 2010 - Discharge 1.21 M cfs; Gage Height 15.84 ft. = Gage Elevation 9.26 NAVD88
C. May 2011 - Discharge 1.32 M cfs; Gage Height 18.01ft. = Gage Elevation 11.43 NAVD88
D. Dec 2011 – Discharge 1.06 M cfs; Gage Height 15.22 ft. = Gage Elevation 8.64 NAVD88
E. May 2013 - Discharge 1.05 M cfs; Gage Height 15.70 ft. = Gage Elevation 9.12 NAVD88
F. Apr 2014 - Discharge 933,000 cfs; Gage Height 15.04 ft. = Gage Elevation 8.46 NAVD88
G. July 2015 - Discharge 1.18 M cfs; Gage Height 17.17ft. = Gage Elevation 10.59 NAVD88
H. Jan 2016 - Discharge 1.39 M cfs; Gage Height 17.78 ft. = Gage Elevation 11.20 NAVD88
I. May 2017 - Discharge 1.24 M cfs; Gage Height 17.32 ft. = Gage Elevation 10.74 NAVD88
J. Mar 2018 - Discharge 1.39 M cfs; Gage Height 17.45ft. = Gage Elevation 10.87 NAVD88
K. May 2019 - Discharge 1.33 M cfs; Gage Height 17.93 ft. = Gage Elevation 11.35 NAVD88

The USGS link documenting water year summary for the Belle Chasse gage can be found at: https://nwis.waterdata.usgs.gov/la/nwis/wys_rpt/?site_no=07374525&agency_cd=USGS.

The USGS link documenting peak flows for the Belle Chasse gage can be found at: https://nwis.waterdata.usgs.gov/la/nwis/peak?site_no=07374525&agency_cd=USGS&format=rdb.

4.6 Basin Erosion and Sedimentation

The nature of erosion in the basin is characterized by intertidal wetland loss, which is approximately 2,000 to 3,000 ac/yr (from 1985 – 2016; Couvillion et al. 2017). This annual rate of land loss is equivalent to nearly 1% of the land area remaining of Barataria Basin. Given the nature of the estuary as an ebb-dominated system and high subsidence rates, there is a net flux of eroded sediments seaward, as wetlands are submerged and deteriorate.

4.7 River Erosion and Sedimentation Patterns

The lowermost MR is considered net-depositional. In the Project vicinity (~RM 60), point bars and channel depths are sufficiently deep, such that the deep draft navigation channel has not historically required maintenance dredging.

4.8 Basin Water Quality

The LDEQ monitors the water quality of Barataria Basin and the nearshore coastal waters for their suitability for uses, such as: primary contact recreation (swimming), secondary contact (boating), and fish and wildlife propagation (fishing). There are approximately 28 water bodies that are assessed within the basin, and LDEQ routinely updates these assessments based on sampling results (**Figure 4-14**). Water

bodies are classified according to the uses that are supported, and subsegments that do not meet certain criteria are considered impaired, along with identifying the suspected sources and causes of impairment. The link to view the water quality inventory and assessments is:
https://ldeq.maps.arcgis.com/apps/MapSeries/index.html?appid=8186b44f9a30453483fedd0df4bad9fa

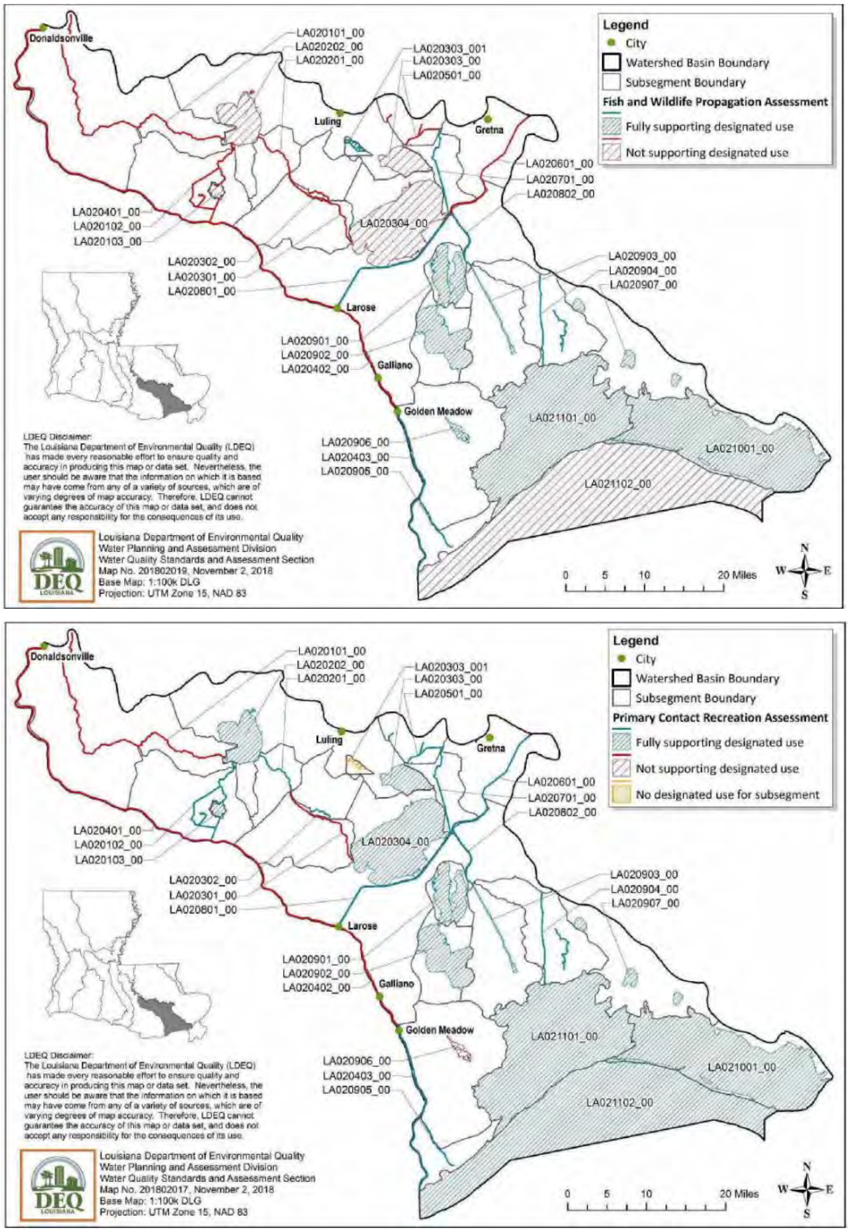

Figure 4-14: LDEQ Water Quality Water Body Segments Assessed for Designated Uses such as Swimming and Fishing (Upper and Lower, Respectively)

4.9 River Water Quality

Similar to the methods for the basin, the water quality of the Mississippi River is monitored and assessed among several reaches. The Lowermost MR fully supports a number of uses such as primary contact recreation (swimming) (**Figure 4-15**).

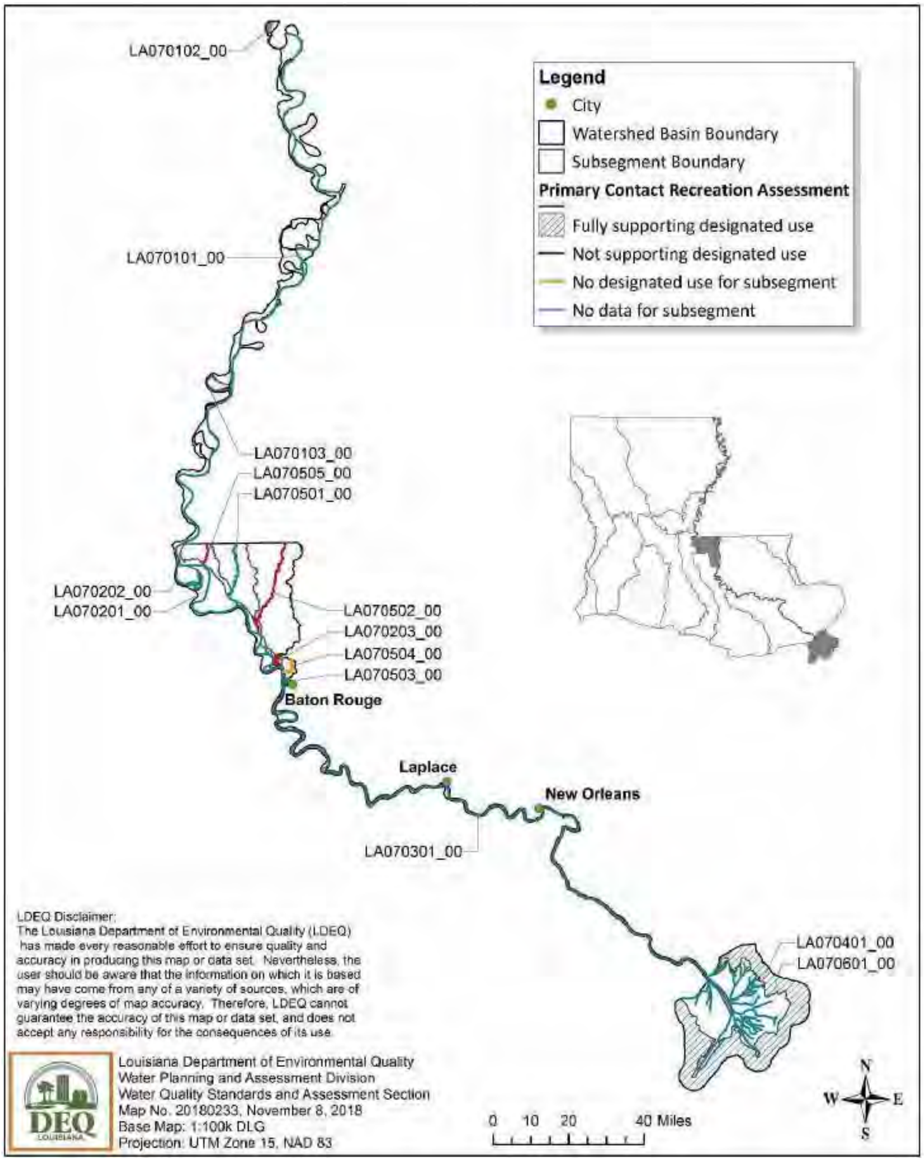

Figure 4-15: LDEQ Water Quality Water Body Segments along the MR and the Assessment of 'Use Support' for Primary Contact Recreation (Swimming) in the Region of the Project

4.10 Upstream Structures

The following structures are located upstream of the MBSD Structure:

a. Naomi Siphon mile 64 AHP (3.3 miles above MBSD Structure)

b. Caernarvon Freshwater Diversion Project at mile 82 AHP (21 miles above the MBSD Structure)

c. Algiers Lock at mile 88 AHP (27 miles above MBSD Structure)

d. IHNC Lock at mile 93 AHP (32 miles above the MBSD Structure)

e. Harvey Lock at mile 98 AHP (37 miles above MBSD Structure)

f. Davis Pond Freshwater Diversion Project at mile 118 AHP (57 miles above the MBSD Structure)

g. Bonnet Carre Spillway at mile 128 AHP (63 miles above the MBSD Structure)

h. Port Allen Lock at mile 228 AHP (167 miles above the MBSD Structure)

There are many other locks and control structures along the Mississippi River located above Port Allen Lock.

4.11 Downstream Structures

The following structures are located downstream of the MBSD Structure:

a. Empire Lock at mile 29.5 AHP (31 miles below MBSD Structure)

b. West Pointe a la Hache Siphon mile 49 AHP (11.7 miles below MBSD Structure)

c. Ostrica Lock at mile 25.2 AHP (35.5 miles below MBSD Structure)

5. OPERATIONS

This section presents the methodology for the operation of the Project and the monitoring that is required for the safe and efficient functioning of the project to produce the benefits set forth in the project authorization. Published guidance from USACE Engineer Regulations was integrated to create the topics in this section.

5.1 Operational Objectives

The core operational objectives include:

1. Maximize the delivery of river sediment to the basin according to the natural temporal variation in river sediment and water discharge.
2. Minimize gate operations considering rising/falling projected river peaks/valleys. Considering river hydrographs, river data, stage fluctuations, and gate operations, target routine gate adjustments on a weekly or longer basis.
3. Adjust operations to maintain freshwater and sediments to the basin wetlands to ensure optimal wetland development through the processes of plant productivity and soil accretion.
4. Use outfall management measures as needed to improve the system performance (e.g., sediment retention, hydraulic gradient) to meet Objectives 1 and 2.
5. Operate according to established standards of public health and safety, and environmental quality.

These operational objectives are intended to be flexible and accommodate natural variability, physical and financial constraints, regulatory requirements, and stakeholder concerns. These operational objectives are routinely assessed through the decision-making processes utilizing Monitoring and Adaptive Management. Appendix D1 provides an index of specific monitoring parameters and locations. Appendix D2 provides the MAM Plan which serves as the guidance document that describes the basis for selecting monitoring parameters, the framework for Adaptive Management, and data management protocols.

5.1.1. Operational Decision Guidance

The operation of the Project is guided by an adaptive management framework and the following factors:

Effectiveness. The Project’s past and current effectiveness in creating sustainable wetland habitat as compared to its overall goals and current objectives are considered. Decisions may be made to adjust future operations during the Yearly Planning process based on how the Project performed in the prior Year(s) and/or is performing in the current Year when compared to its goals and objectives. Decisions may also be made to deviate from the approved Annual Operations Plan based on how the Project is performing in the current Year when compared to its goals and objectives.

Status and Trends. All potential changes to the operation of the Project are analyzed using the best science available to predict both the short-term and long-term impacts of the change to the Project based on current and expected future conditions in the Basin such as water quality, habitat utilization. Data collected and managed as part of Project monitoring is used in this analysis. The amount of analysis performed is based on the time and amount of relevant data available. It is recognized that a certain degree of uncertainty will always exist regardless of the amount of data available.

Compliance. All potential changes to the operation of the Project are performed with consideration of the project's regulatory requirements and conditions of its permits.

Physical Condition of the Project. The Project's operational condition as well as environmental conditions and safety at the Project site is considered. Decisions may be made to adjust future operations during the Yearly Planning process based on planned major maintenance activities. Decisions may also be made to deviate from the approved Annual Operations Plan to safeguard lives, property, and/or the environment emergencies such as oil spills and tropical events, and emergencies that impact the proper functioning of the structures.

Operational Capabilities. The Project's operational capabilities are considered. There may be instances where proposed changes to the Project's operations are not physically possible to implement given the Project's physical capabilities and/or constraints such as the river stage and associated differential head at the gates. Decisions to change gate settings would consider how best to conserve manpower and to minimize gate operations to meet the target discharge.

Available Resources. The funding and staffing available to implement a proposed change will also be considered. There may be instances where a proposed adjustment to Project operations may need to be modified based on resource limitations.

Stakeholder Input. When and where practical, stakeholder input is considered in the decision-making process.

5.2 Project Management

This section provides a description of the roles and responsibilities for managing the Project and operational decision making. Operational decisions are made at the appropriate level of authority within CPRA and communicated in the most comprehensive and transparent manner possible.

5.2.1. Decision-Making Chain of Command

The existing chain of command and management structure within CPRA is utilized in the operational decision-making process, except as noted. For purposes of Project operations, the chain of command within CPRA is as follows and may be modified by the CPRA Executive Director:

- Executive Director
- Deputy Executive Director
- Operations Division Chief
- Diversion Program Manager [maybe Area Engr TBD]
- New Orleans Regional Operations Office Manager [TBD]
- Project Operations Manager

The nature of the decision required will determine who within CPRA will have the approval authority for the decision, with decision-making authority delegated as much as practical to the lowest level that is appropriate within civil service guidelines. In the case of an emergency on the Project site, all CPRA employees that are authorized to operate the Project structures are empowered to implement emergency operational procedures as describe in Section 6.0 to safeguard lives, property, and/or the environment.

The following table identifies who within CPRA is authorized to make operational decisions. This is not intended to be an all-inclusive list and may be modified.

Table 5-1: Operational Decision-Making Matrix

Action	Project Operations Manager	New Orleans Regional Office Manager	Operations Chief /Diversion Program Manager	Executive/Deputy Executive Director
Approve Annual Operation Plan			X	Inform
Routine Operations	X			
Non-Routine Operations			X	Inform
Emergency Operations	X	X	X	X

5.2.2. Communication Network

The Project features a robust and redundant suite of communications systems for the control and management of Project operations that may include the following:

- Landline
- Cell Phone Coverage
- Marine Band Radios (mostly for emergencies)
- Internet Access
- Satellite Communications Systems

The primary means of communications for operational decision-making are via telephone (land and/or cell phone). The alternate means of communication are marine band radios, satellite communications systems (mostly for emergencies) and internet access.

5.2.3. Responsibilities

CPRA Executive Director

The CPRA Executive Director is ultimately responsible for the project, to include:

1. Ensuring the structure is operated in accordance with the Annual Operations Plan and this OMRR&R Manual;
2. Ensuring adequate staffing, funding, and other resources are provided to implement the Annual Operations Plan, comply with the OMRR&R requirements for operating and maintaining the structure, and comply with all regulatory requirements; and
3. Approving operational policies, standards, and decisions related to the operation of the project, as required.

CPRA Operations Division Chief/Diversion Program Manager

The CPRA Operations Division Chief/Diversion Program Manager is responsible for operation of the project, to include:

1. Implementing the Annual Operations Plan and the operational decisions of the CPRA Executive Director;
2. Operating the structure in accordance with applicable CPRA policies and guidelines and this OMRR&R Manual;
3. Establishing policies, procedures, and standards as required, to supplement this OMRR&R Manual and guide operation of the project facilities and structures;
4. Leading the Operations Management Team;
5. Providing recommendations to the CPRA Executive Director on the operation, maintenance, funding, and staffing of the project to improve performance and efficiency;
6. Certifying to the CPRA Executive Director, with input from the CPRA Engineering Division Chief, that the project is ready and safe prior to operation;
7. Providing an annual post-operation report, with input from the CPRA Engineering Division Chief, to the CPRA Executive Director after sediment diversion operations are completed; and
8. Approving operational policies, standards, and decisions related to the operation of the project, as required.

Some or all of these responsibilities may be delegated to the Diversion Program Manager at the discretion of the CPRA Executive Director and CPRA Operations Division Chief.

CPRA Engineering Division Chief

The CPRA Engineering Division Chief is responsible for providing technical and engineering support, as required, to support operation and maintenance of the structure, to include:

1. Completing a pre-operational engineering inspection of the project in coordination with the CPRA Operations Division, to assess the integrity, condition and viability of all project structures from an engineering perspective;
2. Completing a post-operational engineering inspection of the project in coordination with the CPRA Operations Division, to assess the integrity, condition and viability of all project structures from an engineering perspective and provide recommendations on project maintenance work to be completed prior to the next operational period; and
3. Providing engineering expertise during operation of the structure, as required, to support the CPRA Operations Division.

CPRA New Orleans Regional Operations Manager

The CPRA New Orleans Regional Operations Manager is responsible for:

1. Monitoring and managing implementation of the Annual Operations Plan and the operational decisions of the CPRA Executive Director;
2. Administrative and logistic support of the project operations manager and on-site project staff;

3. Recommending/reviewing policies, procedures, and standards as required, to supplement this OMRR&R Manual and guide operation of the project facilities and structures;
4. Participating as a member of the Operations Management Team;
5. Providing recommendations to the CPRA Operations Division Chief on the operation, maintenance, funding, and staffing of the project to improve performance and efficiency; and
6. Ensuring all pre- and post- operations inspections and reports are completed as required.

CPRA Project Operations Manager (OM)

The CPRA Project Operations Manager assigned to the Mid-Barataria Diversion Project is responsible for:

1. Day-to-Day operation and maintenance of the project facilities and structures in accordance with this OMRR&R Manual;
2. Routine, Non-Routine, and Emergency Operations
3. Operational monitoring and reporting;
4. Serving as the single point of contact for the project and all project operations;
5. Recommending/reviewing policies, procedures, and standards as required, to supplement this OMRR&R Manual and guide operation of the project facilities and structures;
6. Providing recommendations to the CPRA Operations Regional Manager on the operation, maintenance, funding, and staffing of the project to improve performance and efficiency;
7. Coordinating and managing completion of all required pre- and post- operations inspections and reports;
8. Serving as the project manager for all maintenance, repair, rehabilitation, and replacement projects;
9. Participating as a member of the Operations Management Team; and
10. Leading and managing assigned project staff supporting operation of the project.

Operations Management Team (OMT)

The Operations Management Team (OMT) consists of the:

1. CPRA Diversion Program Manager;
2. CPRA New Orleans Regional Office Manager;
3. CPRA Project Operations Manager;
4. CPRA Biologist assigned to the Project; and
5. CPRA Engineer assigned to the Project.

The Operations Management Team is responsible for:

1. Developing the Annual Operations Plan, with input from the Adaptive Management Team, Data Management Team, Stakeholder Review Team, Technical Working Groups, External Peer Review Panel, and public;
2. Updating and maintaining this OMRR&R Manual;
3. Coordinating with the Adaptive Management Team and Data Management Team on existing site conditions, day-to-day operations, data collection, and deviations from normal operations; and
4. Maintaining and updating the Project Log with assistance from the Adaptive Management Team and Data Collection Team.
5. Maintaining all operations, maintenance, inspection, and as-built data and records.

Adaptive Management Team (AMT)

The Adaptive Management Team (AMT) is led by the CPRA Executive Division Senior Scientist or as designated by Executive Director and consists of CPRA staff from the Operations and Planning and Research Divisions. Its focus is on long-term planning and achievement of the project's performance goals over the design life of the project. The AMT is responsible for the following in support of project operations:

1. Providing input to the Annual Operations Plan and recommending changes to project features, data collection, and/or operations based on results from modeling of existing and future conditions; and
2. Providing technical and modeling support during operations, as required, to evaluate project performance and/or address operational issues related to modeling.

Data Management Team

The Data Management Team is led by the CPRA Planning & Research Division/Research Section Manager and consists of CPRA staff from the Operations and Planning and Research Divisions. Its focus is on the management of project monitoring data. The Data Management Team is responsible for the following in support of project operations:

1. Providing input to the Annual Operations Plan as related to data collection and data collection means/methods;
2. Providing technical support during operations, as required, to evaluate data collection and/or address operational issues related to data collection; and

Stakeholder Review Panel

The Stakeholder Review Panel is facilitated by the CPRA Executive Director or their designee and consists of project stakeholders from the Barataria Basin Parishes, State and Federal regulatory agencies, Oyster, Shrimp, Crab, and Finfish Working Groups, and navigation interests. Its focus is on addressing stakeholder project-related issues and concerns and promoting transparency in the operation and management of the project. The Stakeholder Review Panel is responsible for the following in support of project operations:

1. Providing comments on the draft Annual Operations Plan and recommending changes to project features, data collection, and/or operations based on their expertise and unique perspectives;
2. Providing guidance and insight during operations, as required, to address operational issues; and
3. Serving as a conduit to various stakeholders and the public at large on plans, discussions, and concerns related to project operations, data collection, and performance.

Technical Working Groups

Technical Working Groups may be formed at the direction of the CPRA Executive Director to investigate and provide recommendations on a specific issue or set of issues related to project operations, data collection, maintenance, and/or management. Technical Working Groups may provide guidance and/or input to the Annual Operations Plan and recommend changes to project features, data collection, operations and/or this OMRR&R Manual based on their findings.

External Peer Review Panel

An External Peer Review Panel may be convened by the CPRA Executive Director on an as needed basis to complete an external peer review (EPR) of the plans and/or reports developed by the Technical Working Groups, Adaptive Management Team, Operations Management Team, and/or Data Collection Team.

5.2.4. Stakeholder Communications

Timely and transparent stakeholder outreach and engagement is critical to the successful operation of this Project. Close coordination is maintained with all appropriate international, federal, state, regional, local agencies, and stakeholders during all aspects of Project operations. These operations include monitoring, development and implementation of the Annual Operations Plan, and emergency operations. Stakeholder outreach and engagement will primarily be through the Stakeholder Review Panel. The CPRA Operations Division Chief or their designee, with support from the CPRA Public Information Director, is the primary point of contact for stakeholder outreach and engagement related to Project operations.

5.3 Routine, Non-Routine, and Emergency Operations

It is anticipated that the CPRA will occasionally be required to make operational decisions for routine, non-routine, and emergency events. Routine, non-routine, and emergency operations are included within the Annual Operation Plan. Non-routine operators are allowed with approval from the CPRA Operations Chief or his/her “designated representative.”

5.3.1. Routine Operations

Routine operations are implemented by the OM in accordance with this manual and the Annual Operation Plan. Routine events may be required due to the following:

1. Maintenance activities and inspections of facilities, to include utility and bridge crossings, monitoring instrumentation equipment, and railroad lines;
2. Project Monitoring activities;
3. Educational activities, to include the demonstration of gate operations and structure capabilities;
4. Operational considerations, to include head differential, operation below maximums, or higher on/off triggers due to tidal/water conditions in the basin/river;
5. Allowing debris to clear from the structure inlets;
6. Exercising Gates; and,
7. Project Maintenance sediment flushing.

5.3.2. Non-Routine Operations

Non-Routine operations are implemented by the OM in accordance with this manual and the Annual Operation Plan. Non-routine operations may be required due to the following:

1. Major maintenance activities, including the repair, rehabilitation, and/or replacement of a major component of the structure;
2. Operational considerations such as additional trigger parameters; and,
3. Other activities or changes in conditions.

5.3.3. Emergency Operations

Emergency operations are not a departure from the approved Annual Operations Plan. These types of operations are of unknown duration and are taken in response to an emergency condition or incident to protect lives, property, and/or the environment. Refer to Section 6.0 of this Manual for more details.

5.4 Water Control Operations

Water Control Operations are defined as the procedures and actions to be taken to properly accomplish the operational objectives of the Project CPRA will make operational decisions for routine, non-routine, and emergency events. Routine, non-routine, and emergency operations are included within the Annual Operation Plan.

5.4.1. Monitoring Locations and Data to Inform Gate Settings

The network of measurements that will inform gate settings can be described by general location and purpose (**Table 5-2**). The specific station locations and purposes are subject to refinement with further guidance; however, the primary gages that inform gate settings (FOR GATE ADJUSTMENT) are water surface elevation readings from "headwater" and "tailwater" stations and discharge readings. Appendix D1 (Project Monitoring) provides more detail on specific locations.

Table 5-2: General locations of measurements to inform gate settings

General Location of Readings	Purpose	Examples of station locations	Key Measurements
MR Upstream	Forecasting Headwater stage, discharge, and sediment loads	Memphis to Baton Rouge, Carrolton*, Belle Chasse, and Alliance	Stage, Stage trend (rise/fall), discharge, sediment loading
Headwater (H)	Head Differential	Alliance Headworks STA 30+75	Stage
MR Discharge	MR Discharge	Belle Chasse USGS (07374525)	Stage, discharge, sediment loading
Headworks	MBSD Stage, Discharge, Gate Operations, Sediment Load	STA 30+75	Stage, Discharge, velocity, Sediment Load, Turbidity, and Temperature
Tail water (T)	Head Differential	Channel STA 112+50 Bayou Dupont	Stage
Coastal Downstream	Forecasting tail water stage	Grand Isle	WSE

*The Carrolton gage provides short- and long-term forecasts of Mississippi River stage are updated daily by the Lower MR Forecast Center (https://www.weather.gov/lmrfc/). Gages further downstream from Carrolton do not provide forecasts at the time of this writing.

5.4.2. Water Control Operations Process Overview

The MBSD yearly operations are based on the MR water year running from October to September. The OMT monitors the MR stage and discharge and the MR forecasts daily. Routine operations in a given water year will be gates open above the trigger, base flow, or the gates closed. When the gates are open for base flow or during periods of MR discharge greater than approximately 900,000 cfs, operators should expect gate operations for discharge control within the permit conditions. Gate positioning for routine operations may target weekly gate operations based on monitoring and MR forecasting. Flows through the structure and gate settings are determined by CPRA. The gate settings are communicated to on-site personnel to achieve the proper flow for the given conditions. Whenever flow through the structure is started or stopped, on-site personnel notify the USCG via a Navigation Bulletin so that traffic is informed of the structure's operating condition.

The operational procedure during a typical water year is provided in the operational flow chart (**Figure 5-1).** This procedure begins during typical low water conditions (Sep or Oct) in the Mississippi River. Actual gate settings for partial closures in base flow or above the operational trigger are determined at the time of operation based on the MR Stage, Discharge, Stage Trend, target MBSD Discharge, and target gate operational interval.

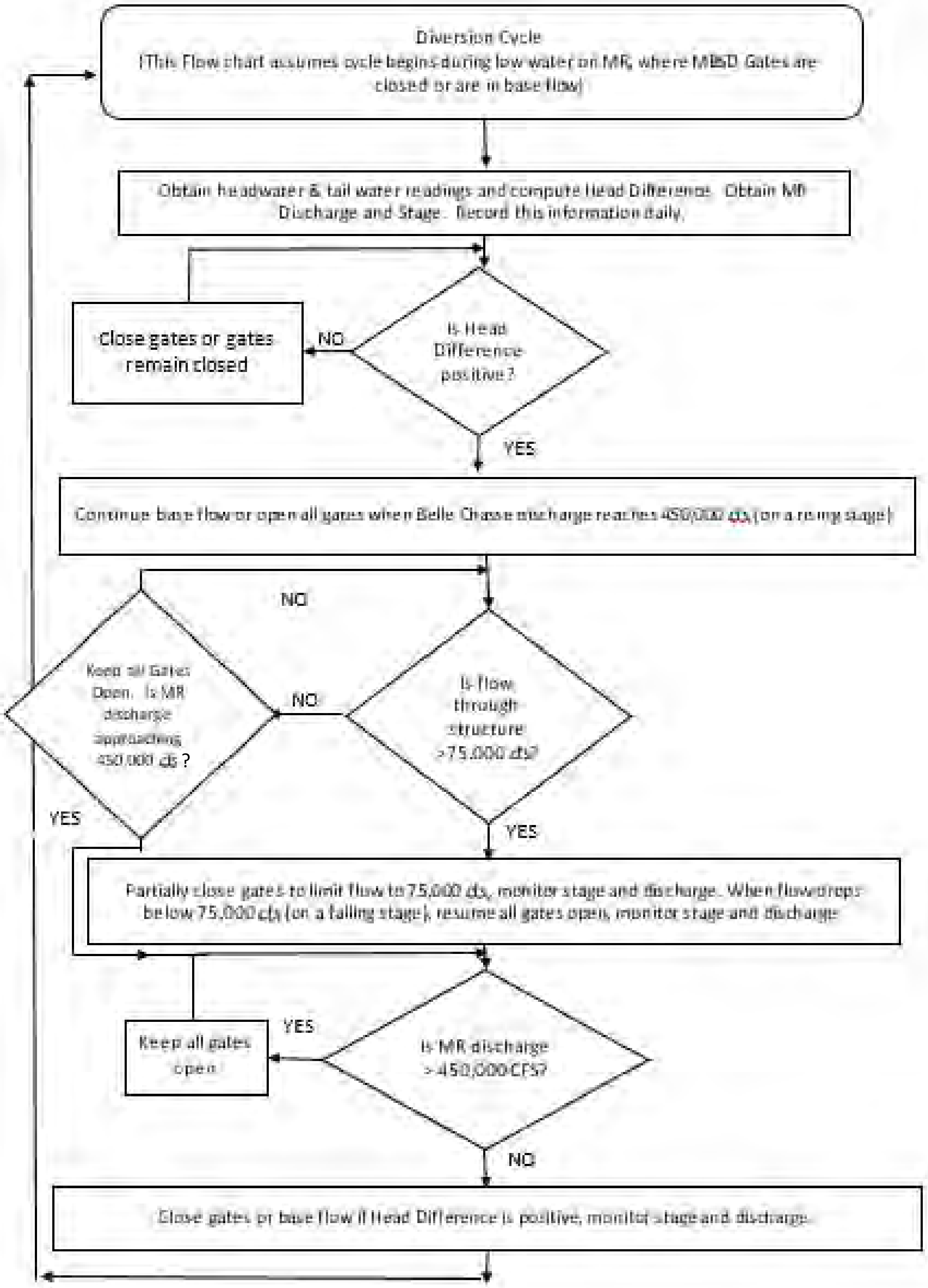

Figure 5-1: Water Control Operation Flowchart

5.4.3. Standing Instructions to Project Operations Manager

5.4.3.1. General Gate Operations

Operational procedures established at the outset are the starting point from which successive refinements emerge as experience grows. The gates are set to maximize flow through the structure without exceeding the maximum permitted flow rate. Once the gate settings have been sent from CPRA to on-site personnel, the gates are put into place.

To operate the gates, a stack of four bulkheads is installed in the closure slot of each bay. The bulkheads and slots are designed so that each bulkhead is secured to the structure with a locking pin near the top of the slot. Once the first bulkhead is secured to the structure, the next bulkhead is lowered into place and secured to the first bulkhead with the coupling mechanism. The stack is then lowered, and the second bulkhead is secured to the structure. This sequence continues until all four bulkheads are stacked and locked together and the bottom of the gate is lowered to the specified elevation for the desired operating condition. All bulkheads are identical and weigh the same thus are interchangeable within and across gate bays. Only one gate is raised or lowered at a time.

Regarding gate storage, when the gates are fully open, four bulkheads are stored in each bay. Two bulkheads are stored in the operating slot of each bay. These two bulkheads are pinned together with a coupling mechanism. One bulkhead is stored in each of the closure slots of each bay. Locking pins are used to secure the bulkheads to the intake structure. The remaining four bulkheads are stored below the Bulkhead Storage Platform at the west end of the structure on grade beams. Bulkheads are not stacked on the grade beams. Gantry crane travel and gate operations cease when winds exceed 40 mph. Whenever wind speeds are predicted to approach 90 mph, the gantry crane is moved off the bulkhead storage platform and onto the gate monolith for tie-down at the center bay.

Since the gates will be initially raised during lower water conditions for each diversion year and since periodic flushings occur during periods of low water, sediment build-up adjacent to the gates is not anticipated to be great enough to prevent the gates from being operable. However, if sediment build-up creates a problem in gate operability, sediment can be suspended and removed adjacent to the gates by use of pressurized hoses adjacent to the gates or by wheel-washing close to the gates. If these methods prove ineffective, dredging the sediment build-up is used as a last resort.

5.4.3.2. Gate Settings and Decisions

Gate settings are reviewed routinely by the OM, and when new settings are required, OM advises the gate operators of the required settings in accordance with the instructions provided. After making gate changes, flow conditions are allowed to stabilize. See Appendix XX for gate settings and configuration look up chart.

5.4.3.3. Gate Operational Procedure

Before raising or lowering any gate, the operator checks the vicinity of the inflow, conveyance and outflow channels for boats, fishermen and swimmers and alerts them to clear the area by using the horns, lights and/or audio messages discussed in paragraph 6.6.2.1.

A complete closure consists of four bulkheads attached together to form one gate. A partial gate closure consists of 1, 2, 3 or 4 bulkheads attached together, dogged open. Dog positions for gate positions are generally on XX to XX foot intervals for discharge control. A gantry crane is used to lift each bulkhead and allow the pinning of bulkheads to form a complete or partial gate closure. The gantry crane can lift a complete stack of four bulkheads.

To minimize the risk of bank scour, closing of the gate bays is initiated with movement of gate 1 or 3 first with gate 2 being the last gate moved. When opening gate bays, gate 2 is opened first followed by gates 1 or 3.

For raising, lowering, and partial closure of gates (up to four bulkheads), all pinning and unpinning of gates are manually performed above water with a dogging system. The operation of the bulkheads/gates during emergency conditions is no different than for routine or non-routing conditions.

The gantry crane is equipped with two generators that travel with the crane – one primary and one back-up. The facility has another on-site generator that will power the buildings and provide lighting for the grounds.

If the gantry crane becomes unusable and the gates are in the closed position, then the gates will remain closed until the gantry crane is repaired. If the gates are open and the gantry crane becomes unusable, and the gates must go down due to an emergency (tropical storm, oil spill, etc.), then actions must be taken to fix the gantry crane as soon as practicable. Opening and closing of gates for the MBSD structure relies totally on the operability of the gantry crane.

5.4.3.4. Operational Scenarios Based on Typical Mississippi River Discharge

Historical MR Discharges by month of the year from 1964 to 2017 are provided in Figure 4-13. Considering these data, there are generally four (4) scenarios for gate configurations.

Scenario 1, No Flow: Gates are fully closed when no positive head is available, during maintenance events, or for emergencies. The no flow scenario may be expected when the MR Discharge is below 300,000 cfs which generally occurs between the months of August through November. Tropical Cyclone activity typically peaks in the months of August and September, but may occur between June and November.

Scenario 2, Free Flow: Gates fully opened when the MR discharge is at or greater than the operations trigger and discharge through MBSD is less than the maximum permitted capacity. This scenario typically occurs from December through July. Gates will not likely have to be moved for this scenario except to be exercised for inspection and maintenance.

Scenario 3, Controlled Flow: Gates are partially closed to control discharge through the structure such that the maximum permitted capacity is not exceeded. The controlled flow scenario may be expected when the MR Discharge is above 900,000 cfs which could occur between the months of December through June. Historically, this scenario is most likely to occur in April or May, for a total duration of approximately 4 weeks. For this scenario, gates could be expected to be moved more frequently than scenarios 1 & 2, to maximize flow without exceeding 75,000 cfs through the structure. For the Controlled Flow scenario gates 2 and 3 would remain open, and gate 1 would be used to control discharge through the structure such that the maximum permitted capacity is not exceeded.

Scenario 4, Base Flow: Gates partially closed to limit base flow through the structure. The base flow scenario may be expected when there is positive head differential, and the MR Discharge is below 450,000 cfs which generally occurs between the months of August through November. For the base flow scenario, generally several combinations of one to three gates may be used to control the discharge to reach the target base flow. The controlling gate may be cycled among all three gates to minimize sedimentation.

5.5 Operation of Other Project Features

5.5.1. Gate Machinery/Gantry Crane

Each time gates are operated, the gantry crane is inspected and observed by the operator to ensure that the gantry crane is operating properly. Unusual sounds or observations shall be immediately reported to the OM for discussion and action. For any issues causing concern, the gantry crane operations manual is consulted. If maintenance by on-site personnel cannot address the issue, higher authorities are notified so that corrective actions can proceed. If possible, gates should be placed in the down position until the gantry crane corrective actions are completed.

5.5.2. Inverted Siphon

The inverted siphon is operated with all six tubes normally opened. Water levels upstream and downstream of the siphon are continually monitored. If the head differential between the upstream and downstream exceeds 0.5 ft, operators inspect the siphon intake to determine if there is an obstruction preventing free flow through the siphon.

During the exercising of the tube slide gates, the operator notes any unusual resistance or sounds in the gate operation and confirms that the gate opening and closing operation is within normal parameters. Any identified issue with gate operation is logged and a detailed gate inspection is scheduled.

The upstream and downstream bar screens are cleared of debris on a regular basis to minimize head losses across the screens.

Prior to hurricanes, or other events when the facility is planned to be unmanned, an inspection of the siphon intake and discharge is performed to ensure no obstruction exist. The upstream and downstream bar screens are cleared of any debris that could block flow. Cameras have been installed so that the bar screens can be monitored off site during tropical storms. If the bar screens become clogged, it may be necessary to alert emergency personnel to clear the bar screens when possible.

5.5.3. NOV Drainage Structure [STA XX+XX]

The sluice gate structure in the NOV Levee installed just upstream of the inverted siphon operates with all four gates normally opened. Sluice gates will only be closed during inspection and maintenance procedures. With the sluice gates opened, the drainage structure operates automatically by virtue of the flap gates installed on the protected side of the four-48” culverts. A positive hydraulic grade differential between the unprotected side of the structure and the protected side will drive flow through all four culverts. Reverse flow is blocked by the flap gates installed on the protected side of the culverts when there is a negative hydraulic grade differential.

Both the protected side and the unprotected side of the culverts are regularly cleared of any debris that could prevent or block flow in the culverts. If, during the regular debris removal, any damage or other unusual condition of any of the flap gates is observed, a detailed inspection is scheduled.

As with the inverted siphon, prior to tropical storms and heavy rainfall events, the sluice gates are checked and cleared of any debris that could block flow.

5.6 Flood Risk Management

5.6.1. Operation of Facility During a River High Water Event

A River High Water Event is defined whenever the Carrollton gage is at elevation 15 feet or higher OR when federal and state official have initiated flood fight activities. The MBSD Structure is not intended to be used as a flood control structure. Other facilities and spillways exist to divert water from the Mississippi River during high flow events to reduce the risk of flooding. Use of the MBSD Structure for purposes other than those authorized for the project are not permitted. The structure is operated in accordance with this manual during high water events provided maximum limits are not exceeded.

5.6.2. Tidal Flood Concerns in the Barataria Basin

The Project is not operated during periods when moderate or major coastal flooding is forecasted, such as for tropical storms or hurricanes. For these events, gates are placed in the down position and no flow through the structure is allowed.

5.7 Reporting Requirements [TBD section requires cleanup for AOP and yearly reporting]

5.7.1. Annual Operations Plan

The AOP is a stand-alone document developed each Year with stakeholder input and presented as part of the CPRA's annual operating budget request. It contains pertinent information and describes the plan for operating the Mid-Barataria Project during the Year under the widely varying conditions on the Mississippi River and Barataria Basin. The Year begins annually during the historical low water season on the Mississippi River on the first day in October and runs through the end of September. The AOP guides operation of the Project during the Year.

Contents and Format
The AOP includes the following sections, as a minimum:

Executive Summary
The Executive Summary summarizes the operations plan for the Project for the Year, to include structure opening and closing parameters, performance objectives, planned major maintenance, projected budget, and anticipated staffing.

Background and Annual Operations Planning Process
The Background and Annual Operations Planning Process section includes a brief project description, focusing on pertinent information related to operation, maintenance, and management of the Project during the Year. This section also describes how the AOP was developed, and includes the timeline, agencies involved, and summary of public and stakeholder engagement.

Ongoing Coordination, Studies, and Reports
The Ongoing Coordination, Studies, and Reports section summarizes any ongoing studies, agency coordination, and pending reports that influenced the development of the AOP or may need to be considered during implementation of the AOP during the Year. The section also describes any annual planning guidance received from the Adaptive Management Team during the development of the AOP and how this was incorporated into the AOP.

Project Operations and Adaptive Management for the Year
The Project Operations and Adaptive Management section describes how the Project is planned to be operated during the Year (i.e., routine operations), and includes anticipated sediment diversion

operational periods based on historical data, hydrologic forecasts, potential discharge rates, and diverted sediment.

Planned Monitoring for the Year

The Monitoring section summarizes what data may be collected, analyzed, managed, and disseminated during the Year. This section also describes any planned changes to Project performance monitoring as compared to the Prior Year and the planned start of any coordination, studies, or reports related to the operation and/or monitoring of the Project.

Planned Maintenance During the Year

The Planned Maintenance section describes any major maintenance, repair, rehabilitation, and replacement activities beyond routine maintenance tasks, planned for the Year, and includes their timing, expected duration, impact on operation of the structure, estimated cost, and anticipated benefit to future Project operations.

Appendix A – Public Comments and CPRA Staff Responses

Appendix A of the AOP includes all public comments received on the draft AOP and the corresponding responses from CPRA.

Appendix B – Summary of Results from Previous Year

Appendix B of the AOP includes summaries from the Annual Operations and Performance Reports from the prior Year. The following operational-related reports are required. Additional details on the formats of these reports can be found in Appendix F. Completed and approved reports are distributed in accordance with **Table 5-3** below.

Table 5-3: Operations Reports Distribution Matrix[**TBD continued development**]

	Daily Reports	Monthly Reports	Annual Operation Reports
Governor's Advisory Commission on Coastal Protection, Restoration and Conservation (GOCA)			X
CPRA Board			X
CPRA Executive Director		X	X
CPRA Deputy Executive Director		X	X
CPRA Operations Division Chief		X	X
CPRA Engineering Division Chief		X	X
Operations Management Team	X	X	X
Adaptive Management Team	X	X	X
Data Management Team	X	X	X
Stakeholder Review Panel			X

5.7.2. Daily Operations, Maintenance and Monitoring Report (Daily Report)

A Daily Report is prepared each day by on-site personnel and is approved at the end of each day by the Operations Manager. This report captures all operation and maintenance activities that occur at the facility. Upon approval, these reports are made available to the Operations Management Team. After approval, the Operations Manager is responsible for distributing these reports as outlined in **Table 5-3**.

As a minimum, the following information is recorded in the Daily Report.

- Data collected as shown in **Table 5-2**
- Head Difference calculation
- Gate configuration (open and setting, closed)
- Private Aids to Navigation (PATON) status
- Visitors
- Meteorological, basin, and river conditions
- Summary of any maintenance performed
- Any observations that warrant future actions

5.7.3. Monthly Operations, Maintenance and Monitoring Report (Monthly Report)

A Monthly Report is prepared after each month, by on site personnel and is approved at the end of the month by the Operations Manager. Upon approval, this report is made available to the Operations Management Team. After approval, the Operations Manager is responsible for distributing these reports as outlined in **Table 5-3**.

The Monthly Report is a summary of the daily reports and should summarize the project operations and maintenance during the reporting month. Plans and schedules for future maintenance are documented in this report.

5.7.4. Annual Operations, Maintenance and Monitoring Report (Annual Operations Report)

An Annual Operations Report is prepared after each calendar year, by on site personnel and is approved by the Operations Manager. Upon approval, this report is made available to the Operations Management Team. After approval, the Operations Manager is responsible for distributing these reports as outlined in **Table 5-3**.

The Annual Report includes copies of each Monthly Report and summarizes the project operations and maintenance during the reporting year. Plans and schedules for future maintenance are documented in this report.

6. EMERGENCY OPERATIONS

This section addresses operations pertaining to high river conditions (i.e., flood fight), general emergency practices, emergency methods of treatment and special emergency requirements for gates, siphon, etc.

The structure is operated in accordance with Section 5 of this OMRR&R Manual. However, in the event of an emergency, the structure may be closed. The structure may be reopened after a review by the OM. The review takes place as soon as possible after the emergency has passed. Test exercise emergency closures are planned to test the response of the system. Any problems that occur through testing are resolved as soon as possible. In the event of an emergency closure, CPRA notifies the USCG and the USACE. Emergency situations warranting closure are listed below but are not limited only to these situations.

A list of all emergency contact numbers is prominently displayed in several on-site locations. This is typically done using bulletin boards mounted to walls. The emergency numbers are checked periodically for accuracy. As a minimum, the emergency contact list includes the name and numbers for CPRA officials, other appropriate state officials (i.e., LDEQ), USCG, USACE, PPG, nearest hospitals, nearest police departments, nearest fire departments, local electric company and emergency crane service companies.

6.1 USCG Emergency Gate Closures

Whenever a gate closure request is received by the USCG, gates are closed immediately. The USCG may request that gates be closed for various reasons, but it is anticipated that the primary reason for USCG gate closures would be for navigation issues or spills.

6.1.1 Emergency Gate Closure for Navigation Issues

Coordination with the USCG is essential. Constant marine radio monitoring between the USCG, maritime Mississippi River traffic and on-site MBSD personnel is maintained to ensure maximum reaction time for unexpected emergencies such as reports of loose barges and unpowered ships. For such events, gates are closed to prevent damage to the MBSD structure and marine traffic.

6.1.2 Emergency Gate Closure for Spills

Oil or chemical spills on the river upstream of the MBSD Structure with threat of hazardous substances being diverted into the structure inflow channel may warrant closure of the gates. The USCG, the LDEQ and industrial and municipal water users monitor chemical discharges or spills on the Lower Mississippi River. LDEQ has developed a computerized time-of-travel calculation model that can estimate the time of arrival at downstream locations for the leading edge of a pollutant plume and the duration of time the pollutant concentration is at the elevated levels. Unless otherwise directed, if a pollutant plume is detected and its travel time is predictable, and if feasible, gates are closed prior to the estimated time of arrival of the pollutant plume. If a pollutant plume is reported near the structure or if its arrival time at the structure is uncertain, then the structure is closed immediately. LDEQ can be contacted at (225) 219-3640 or at https://deq.louisiana.gov/page/emergency-response.

For any oil or chemical spills at the Project due to equipment leaks or accidents, closing of the gates may or may not be necessary. In these cases, the spill is reported to the National Response Center at 1-800-424-8802. Information on reporting spills can be found at the website below. It is recommended that only spills greater than 5 gallons be reported. Spill containment and cleanup supplies are kept onsite to address such incidents.
https://www.epa.gov/pesticide-incidents/how-report-spills-and-environmental-violations.

6.2 USACE Emergency Gate Closures

Whenever a gate closure request is received by the USACE, gates are closed immediately. The USACE may request that gates be closed for various reasons, but it is anticipated that the primary reason for USACE gate closures would be related to Mississippi River Flood Fighting or Tropical Events.

6.3 Other Types of Emergency Gate Closures

The gates are closed whenever the MBSD Structure cannot be operated properly. This could be for various reasons, but it is anticipated that the primary reason would be when gates are damaged and cannot be properly placed or the gantry crane is not properly operating.

6.4 Tropical Events

The structure is closed whenever there is a threat posed by a tropical event. Gate movements are checked prior to closure to ensure gates are operable when closure is directed. The following are procedures that are followed prior to a tropical event.

a. This decision is made on a case by case basis considering the severity and direction of the storm. It is recommended that the structure remain manned until the USCG has issued operation "Zulu" for the Mississippi River. (Operation Zulu is an order given by the USCG that shuts down all marine traffic on a waterway.)
b. Before evacuation is to occur, on-site personnel secure all boats and equipment in a safe place. The facility is completely locked down. Any item on the premises that can be moved by high winds is moved to safe storage places or tied down. Facility security actions are initiated no later than 48 hours before landfall.
c. Before evacuation is to occur, gates are positioned in a closed position to prevent flow through the structure. The gantry crane is positioned on the center gate bay of the gate monolith. The crane is centered on the bay with tie-down and stowage pin assemblies for the gantry crane. The gantry crane is tied down to the structure using the tie-down arms attached to the crane. Additionally, the crane stowage pins are lowered into the sockets located in the concrete piers of the gate monolith. Any bulkhead that is not used, is positioned upright on the grade beams located at ground level between the crane rails at the bulkhead storage platform.
d. Before evacuation is to occur, all on-site fuel tanks (especially the generator fuel tank for the gantry crane) are filled in anticipation that commercial power is lost and is not restored immediately after the storm.
e. Personnel report back to structure as soon as conditions are safe. The decision to report back to the facility is made by the Executive Director of CPRA or his/her designated representative.

6.5 Structure Emergency

6.5.1 Cranes

Since there are no on-site cranes located at the Project except for the gantry crane, an emergency procurement contract with a crane supplier has been obtained by CPRA in advance of emergency needs. The contract identifies minimum lift capacities, boom lengths, quick report times, crane operator qualifications and other requirements for addressing on-site crane emergencies. This contract allows for a crane to be delivered on-site to address any issues that cannot be resolved using the gantry crane.

A contracted crane is not recommended to ever lift the bulkheads. If the gantry crane goes down, efforts to repair the gantry crane are pursued as soon as possible. It is likely that the gantry crane can be repaired quicker than mobilization and safely positioning a contract crane on-site. The OM inventories and maintains spare parts for critical gantry crane components which do not have redundant systems such as the hoist system/cables, lifting eyes, dogging pins, etc.

As an additional gantry crane risk reduction measure, on-site personnel exercise the gantry crane periodically in accordance with the manufacturer's recommendations. The gantry crane is also exercised prior to the start of the water year (September), periodically during the operation period, and prior to hurricane season (June 1st) so that there is time to perform unanticipated maintenance if needed.

6.5.2 Personnel / Suppliers

During operation of the MBSD structure, the facility may be staffed to address any emergency that could arise. On-site personnel have the training and skills to address emergencies affecting operation of the facility. However, there may be times when skill sets are needed that exceed that of on-site personnel. A list of local suppliers/contractors and their contact information is kept on site so that they could provide needed assistance quickly to the facility. Common examples of such suppliers include crane suppliers, local electrical contractors, mechanical contractors, divers, gantry crane specialists, PATON suppliers, etc.

6.5.3 Impacts to Gates

Impacts to gates are anticipated to be remote. However, if a gate impact were to occur, the gates are not to be moved until an official CPRA structural evaluation. This evaluation would be used to determine the next appropriate steps.

6.6 Safety and Security

6.6.1 Safety

6.6.1.1 General Safety

All work shall be planned and performed in accordance with the pertinent provisions of the U.S. Army Corps of Engineers, EM 385-1-1 "General Safety Requirements Manual" and OSHA regulations. If a specific requirement is not addressed in the EM or there is a conflict between the EM and OSHA Regulations, the OSHA regulations are to be used. Nothing in this manual should be interpreted or construed as altering any provisions of the General Safety Requirements Manual. Copies of the latest EM 385-1-1 and the OSHA regulations can be found at the websites listed in paragraph 2.3 of this manual.

6.6.1.2 Navigation Safety

The facility is equipped with a marine band radio (with a battery back-up) to monitor weather, oil spills, marine traffic, etc.

In addition to the warning signs discussed in 6.6.1.4, horns, lights and/or audio message broadcasting systems are installed on the gate monoliths and are maintained to alert boaters, fishermen and swimmers in the area and OTF of changes to gate openings that will cause a difference in flow. All horns, lights and/or audio message broadcasting systems associated with the MBSD structure are inspected each day and the operability recorded in the Daily Report.

Mississippi River Private Aids to Navigation (PATONS) are located on the dolphins/cells in the river. These PATONs consist of signage and/or solar-powered obstruction lights mounted on the dolphins to act as a warning to Mississippi River traffic. Any Mississippi River PATON associated with the MBSD structure should be coordinated with the USCG, is visually inspected each day and the operability recorded in the Daily Report.

Any repairs that are identified in the Daily Report are addressed as soon as possible to minimize navigation liability.

6.6.1.3 Standards of Conduct

The following standards of conduct shall be followed while working at the MBSD Structure:

1. Use of all tobacco products inside buildings, vessels and vehicles is prohibited.
2. Only government employees are allowed to ride in a government vehicle or boat. Contractors or visitors are allowed to ride in a government vehicle or boat if business related and approved by CPRA officials.
3. Alcohol will not be transported or consumed in a government vehicle or boat or allowed on government property.
4. No hunting or fishing is allowed on government property.
5. No use of government equipment for personal use.
6. Absolutely no illegal drugs allowed on government property.
7. Absolutely no camping allowed on government property.
8. Only employees are allowed overnight stay on-site unless approval is obtained from appropriate CPRA officials.
9. No watching television on government time except when watching weather or news events that could affect the MBSD Structure (examples includes hurricanes or national/state security.)
10. No obscene language allowed.
11. Employees shall act in a courteous and professional manner towards co-workers, visitors, the public, media, etc.
12. Employees shall not use cell phones or land line phones while performing duties requiring the use of hands (i.e., while operating gates, driving a government vehicle, operating a government boat, etc.). "Hands free" cell phone use is allowable when driving a car or truck.
13. In recognition that dogs and cats provide protection from snakes, rats and other nuisance animals, dogs and cats are permitted on government property (at the discretion of the Operation Manager) but not inside buildings. Dogs and cats must be confined to a kennel when visitors are at the structure. This requirement can be revised at any time at the OM's discretion.
14. The only firearm acceptable on the reservation is a .22 caliber rifle for control of nuisance animals. The rifle shall be registered with appropriate CPRA officials and stored in a gun cabinet. Only designated employees shall be allowed access to the rifle. However, this requirement does not prohibit the possession of a firearm by security guards or officers who are authorized by CPRA to provide for law enforcement and/or security duties.
15. In addition to firearms, other dangerous weapons shall be prohibited on-site. Examples of items that are considered dangerous and are prohibited are listed below. This list does not include all possibilities. CPRA officials shall have the discretion to determine what weapons are to be prohibited.
    a. Knives having switch blades or automatic blade openers.
    b. Knife blades longer than two- and one-half inches with the exception of knife blades used for normal kitchen utensils.

c. Brass knuckles or any device fitted over a hand to be used in striking another individual.

d. Blackjacks, law enforcement batons or other related devices.

e. Razors, ice picks, machetes, hatchets, axes, swords, spikes, or any cutting or piercing type device that could be used as a weapon, even if use as a weapon is not a use for which it is normally intended. Note: This does not include normal items used by persons as standard tools of the trade in performing their duties.

f. Archery equipment – bows, crossbows, arrows.

g. Pyrotechnics and incendiary equipment – except for authorized use only.

h. Homemade percussion type weapons (primitive /black powder)

i. Spear fishing equipment – pole spears, Hawaiian slings, spear guns, etc.

j. Shark / Bang / Powerhead / Smokie sticks

k. Flares, pistols, cartridges

6.6.1.4 Warning Signs

Warning signs on gate monoliths facing both inflow and outflow channels alerting boaters, fishermen and swimmers to stay at least **1,000** feet away from the structure have been installed and are monitored and maintained. Those in violation of the warning signs are asked to vacate the area. In addition, the perimeter of the OTF is posted with signs indicating that entrance is prohibited. The signage in the OTF area is readily visible to any person approaching the property and adheres to spacing guidance defined in Louisiana R.S. 3:3622 (i.e., signage no more than 1,000 ft apart). (The wording on the signage is to be checked by the CPRA Legal Office.) Violators will be reported to the appropriate enforcement agencies, as appropriate.

6.6.2 Security

6.6.2.1 On-Site Cameras and Warning Signals

On Site Cameras are monitored regularly for security, gate movements, navigation/vessels, siphon debris, etc. The cameras are installed in locations that can most capture the day to day activities occurring on-site. Bulkhead/gate movements and hard to see areas shall be equipped with cameras so that operators can check cameras before moving bulkheads/gates.

The cameras record the time and date of activities. A monitoring location to view all cameras can be found in the O&M/Administration Building. Off-site computer security monitoring of cameras is also available for times when the structure is unmanned.

Cameras have been installed at the:

a. Vehicle traffic entrance/exit points for security purposes.
b. Siphon trash rack locations to monitor trash build-up during storms.

Additional camera locations may be added in the future if deemed necessary by on-site personnel.

Warning signals are installed and activated before all gate movements to alert anyone in the vicinity of the structure of the gate movements. The cameras are equipped and positioned to capture identifying marks on vessels that violate warning signals and safety protocol. Using this recorded information, violators could be reported to appropriate enforcement agencies by on-site personnel.

6.6.2.2 Security Guards

Security guards are not anticipated to be necessary unless otherwise determined by CPRA. Monitoring the cameras described in paragraph 6.6.2.1 from off-site locations is anticipated to be sufficient security for the facility. However, when the structure is unoccupied and if there is a reason to believe vandalism could occur, Security Guards may be necessary to prevent the vandalism.

6.6.2.3 Electrical System

The company responsible for supplying electricity to the MBSD Structure is Entergy. In case of a commercial power failure, backup generators power the facility. The gantry crane is powered by an on-board generator. An identical, back-up on-board generator is available in case the primary generator fails.

6.6.2.4 Communications Outage

If the telephone circuits are unreliable or inoperable CPRA shall ensure that the OM is able to communicate with CPRA and emergency agencies by radio. The structure site has the capability for emergency power availability if necessary, to maintain radio contact with the CPRA and emergency agencies.

6.6.2.5 Security Fencing

The perimeter of key features of MBSD are marked with security fencing to prevent unauthorized personnel from entering the facility. The fencing is periodically checked to ensure that it is in good working order and able to provide a reasonable measure of security. Any damage to the fencing is immediately repaired such that fencing security is not compromised.

6.7 Other Emergencies

6.7.1 Flood Fight or High River Conditions

6.7.1.1 Gate Operations

The MBSD Structure is designed to operate at the highest river conditions and is not intended to be used as a flood control structure. Other facilities and spillways exist to divert water from the MR during high flow events to reduce the risk of flooding. Use of the MBSD Structure for purposes other than those authorized for the project are not permitted.

6.7.1.2 Levee Inspections

During high water events, on-site MBSD Structure personnel cooperate with local, state, and federal officials in flood fight inspections and in taking precautionary maintenance measures to reduce the risk of flooding.

6.7.2 Emergency Repairs

The facility is closed to implement emergency repairs to the structure when it is apparent that the MBSD will not operate properly and emergency repairs are required.

6.8 Reporting Requirements

The same data collection and reporting procedures during normal conditions are followed during emergency conditions except that the stages and gate settings are monitored more closely because of the relatively rapid rates of change that may occur.

7. MAINTENANCE AND INSPECTION

Generally, maintenance and inspections are scheduled periodically and in advance. However, maintenance and inspections could be altered due to conditions such as high-water events, tropical storms, structure operations, or for any other circumstance that may warrant a change.

7.1 General

The CPRA will follow and execute the maintenance program for the MBSD Project defined in this Section. As maintenance experience is gained, additional maintenance responsibilities will likely be added to this Section of the OMRRR Manual. Maintenance should be based principally on a program of preventative maintenance for selected items of equipment and facilities supplemented by breakdown maintenance. Preventative maintenance consists of periodic inspection and repair of project features and routine servicing and repair of mechanical equipment. Breakdown maintenance is the practice of allowing an item of equipment or a component to operate to failure without inspection or servicing. This practice is generally followed on those items of equipment or components whose failure will not affect the operation of the project and the cost of periodic inspection and servicing is equal to or exceeds replacement cost. The facilities of this project shall be maintained in accordance with these procedures and any additional provisions included in this manual to obtain maximum project benefits. All operating personnel should be familiar with the information contained herein since it will assist in both scheduled and preventative maintenance, as well as to provide the correct operating procedures.

7.2 Maintenance Standards

A balanced maintenance program must be based on defined standards that establish quality, extent and quantity of maintenance desired. Quality is the most important of the three objectives. Poor project maintenance standards, regardless of extent or quantity, can lead only to equipment trouble and possible failure. High quality maintenance requires proper and capable personnel, proper and sufficient tools, use of quality materials, well-planned scheduling of inspections and overhaul and an excellent performance record of meeting the maintenance schedule. Cleanliness is also very important to quality maintenance. The Operation Manager has the responsibility of developing realistic maintenance schedules that will realize the highest value from funds expended for maintenance. This requires that the maintenance program be under constant surveillance and review. The frequencies of inspections and maintenance should be revised to longer or shorter intervals when indicated and justified by maintenance records. Quantity of maintenance is also a significant phase of maintenance standards. Supervisory personnel must be able to determine those items which must be adequately maintained to ensure proper operation of the equipment and facilities to determine when a lack of funds or personnel makes it necessary to select items which can be reasonably and safely deferred without unduly reflecting on the quality and extent of overall project maintenance.

7.2.1 Lubricants and Lubrication

All gantry crane lubricants are in accordance with the manufacturer's recommendations. If possible, gantry crane lubricants that may contact the water surface on site, are environmentally friendly. The frequency of gantry crane lubrication is applied as recommended by the manufacturer.

If possible, any lubrication used for the bulkhead gates are environmentally friendly since these lubricants are in contact with water on site. The frequency of bulkhead gate lubrications is at least once every 60 days but more often if on site personnel notice the need for more lubrication. Squeaking of bulkhead gate wheels, binding of the bulkheads in slots, etc. are signs indicating that more lubrication might be needed.

7.2.2 Bulkhead Gate Maintenance

As stated in paragraph 7.2.1, the bulkheads are inspected and lubricated at least once every 60 days. Bulkhead inspections and lubrications can be performed while the structure is operating. If the bulkheads are operable and functional, repair and/or maintenance is delayed to desirable times of the year when diversion impacts are less, or the structure is not in operation.

The bulkheads are constructed of steel and painted with a Cole Tar Epoxy System. The bulkheads are anticipated to require periodic painting during the 50-year design life of the structure. Over time, the paint on the bulkheads is anticipated to wear and holes may develop on the skin plates and support braces. It may be necessary to remove the bulkheads from the structure to allow the bulkheads to be easily sandblasted, painted, and repaired. An on-site area is designated for such maintenance. The area is located such that the gantry crane or another crane can lift and remove the bulkheads and then place the bulkheads in the designated area.

Because the bottom gate is exposed to more abrasion than the other gates, the gates are rotated to extend their life. In the beginning of operations, the same gates are used as bottom gates for a period of two years. If minimal damage is found, this time is extended to five years. If severe gate damage is observed, then that gate is removed from the structure, repaired, sand blasted and painted before being placed back into service. If possible, it is advantageous to schedule multiple gate repairs (but no more than three) at the same time.

7.2.3 Dredging

Dredging of the Alliance South Point Bar, the Inlet, U-Frame, Conveyance Channel, OTF, or areas in the Barataria Basin may be necessary for maintenance of this project. Sedimentation build-up and shoaling are monitored by CPRA. CPRA determines if any deposition affects the operation of the structure and if removal of the material by dredging is necessary.

7.2.4 Maintenance Flushing of the Channel

To minimize sediment build-up and shoaling maintenance flushing procedures may be periodically conducted, as feasible, generally within the months of August through November. The procedure consists of full or partial opening of the gate(s) to generate flow through the structure when adequate head is available. Maintenance flushing is anticipated monthly.

Project surveys at control locations to monitor sediment build-up and shoaling are taken every year after the operational period of the flood season (generally December through May), anticipated from June to August and again before the opening of the diversion fully for the next operational year anticipated November to January.

7.2.5 Site Maintenance

Site maintenance such as grass cutting, garden maintenance, painting, building maintenance, etc. is accomplished on a routine basis either by on-site personnel or by contractors. Any maintenance requiring excavation is preceded with a check of underground utilities by consulting with the utility owner and contacting Louisiana One Call (811). MBSD as-built drawings shown in the Appendix XX should be reviewed prior to initiating any excavation.

7.2.6 Spare Parts, Oil, Fuel and Lubricants

To expedite maintenance and repairs, an inventory of spare parts, oil, fuel, and lubricants for items that are routinely to be replaced and maintained is kept on site and accessible to on-site maintenance personnel. Spare parts, oil, fuel and lubricants for the gantry crane machinery, bulkheads and any part associated with operation of the gates is a priority among items kept on site. It is not anticipated that bulkhead parts will require frequent maintenance, but it may be advantageous to have spare bulkhead wheels on site to address any needed wheel repairs. Gate seals are required prior to a dewatering but are not anticipated to be a spare part to be kept on site. An inventory of parts needed for routine up-keep of the facility is also kept on site. A list of spare parts, oil, fuel, and lubricants to be kept on site include, but are not limited to, those items documented below. This list is a generic list and is updated as necessary based on O&M experience. Specific spare parts kept on site evolve as operations proceed and O&M experience is gained. The MBSD spare parts inventory is shared with other CPRA diversion projects so that duplicate spare parts are minimized.

Spare parts, oil, fuel, and lubricant list:

1. Machinery gaskets and filters
2. Parts and fuel recommended by the Gantry Crane O&M Manual
3. Gantry crane limit switches and motors
4. Parts for grass cutting equipment
5. Parts for routine plumbing repairs (i.e., PVC fittings, washers, etc.)
6. Parts for routine electrical repairs (i.e., facility light bulbs, ATON light bulbs, etc.)
7. Other electrical parts such as breakers, starters, fuses, switches etc.
8. Bulkhead Wheels
9. Parts/items for building maintenance (i.e., paint, paint brushes, flooring parts, etc.) *
10. Equipment oil *
11. Equipment fuel (i.e., gasoline, diesel) *
12. Lubricants (i.e., gate lubricants, equipment lubricants) *
13. SCADA parts
14. Add any other items that on-site personnel view as advantageous to the project
15. ADCP discharge monitoring gages

* Any item that is considered hazardous, is stored safely on site in a building that is designed to store hazardous materials.

7.2.7 Maintenance Dewatering of a Gate Bay

Planned or routine dewaterings are considered essential to the maintenance programs of locks, control structures and other structures where water prevents routine visible inspections. Dewaterings are typically performed as periodic preventative maintenance events to ensure that the underwater components continue to perform as designed. Divers can be used for inspection purposes; however, visibility may be impaired, and the inspection could be limited. Divers may also be limited in repairing components of the structure. Therefore, maintenance dewaterings are anticipated during the 50-year life of this Project. The MBSD initial dewatering is planned ten (10) years after start-up. Future maintenance dewaterings are scheduled to be performed at an interval not to exceed 15 years.

Maintenance dewaterings are scheduled during the low water season and can proceed only when the water elevation is on a falling river and preferably below elevation 2.5 ft NAVD88 but not greater than elevation 8.0 ft NAVD88 based on the USACE Alliance Gage. (The Alliance Gage is used since it is the closest in-river gage unaffected by diversion flow. It is the best possible water level marker that is representative of background river conditions.) Since the low water season coincides with hurricane season and since the bulkhead stack is not intended to resist a hurricane loading, when a chamber is dry, it is rewatered in advance of an approaching hurricane to a minimum stage of El -1.0. Additionally, the fourth bulkhead is added to the riverside gate assembly prior to a storm.

Prior to using the bulkheads for dewaterings, all fracture-critical welds are visually inspected for signs of distress. Any deteriorated connections, or signs of deterioration, requires cleaning of the connection and Non-Destructive Testing (NDT) of the welds by a certified technician. If needed, repairs are made by a welder qualified in accordance with AWS D 1.5. For all maintenance dewaterings, the condition of the bulkhead bottom and side seals are inspected. Deteriorated seals are replaced in advance.

To dewater a gate bay, a minimum of 6 bulkheads (3 on each side of the operating gate) are required. The 3-high gate assembly achieves a closure height at El 9.0. All bulkheads are identical and may be used interchangeably in any position within the closure and maintenance slots. Two maintenance gate wall slots are provided when maintenance dewatering is required. Only one bay can be dewatered at a time. Even with the bulkhead gates down, leakage around the sides and bottom of the gates is anticipated. These areas are sealed as much as possible, and a pump is positioned in the dewatered gate bay to remove water that leaks through the bay.

Prior to a maintenance dewatering, a step-by-step plan is developed to minimize downtime. This plan includes a list of spare parts, the purchase of parts with long lead times, equipment and worker disciplines that are needed. Planning also includes a Hurricane Plan that addresses flooding the dry bay in advance and safely moving personnel and equipment. A generic example of a maintenance dewatering plan is as follows.

Step 1 – Wait for water levels to be low enough to initiate a dewatering. River predictions must indicate that water levels will either remain the same or drop further during the entire dewatering. As stated above it is preferable to dewater when water levels are at 2.5 ft NAVD88 or below, but water levels must always be below El 8.0 ft. NAVD88.
Step 2 – Record the Top of Wall elevations before dewatering commences and throughout the dewatering as water levels drop until dry. Continue taking readings daily for a period of 7 days.
Step 3 – With the gantry crane and bulkhead gates, install bayside and riverside gates on the gate bay to be dewatered. A minimum of 3 bulkheads per side.
Step 4 – Using divers, inspect and improve the sealing along the side and bottom seals of both the bulkhead gates of the dewatered gate bay. This can be accomplished with oakum (waxed rope) or adding sawdust to slow the leaks.
Step 5 – Using pumps, dewater the gate bay by pumping water from the gate bay back to the river. The dewatering rate should not exceed 2ft./hr.
Step 6 - With the gate bay in a semi-dewatered state, check and reseal leakage areas and continue to remove water from the gate bay.
Step 7 – Install a pump on the floor of the dewatered gate bay to remove water that leaks through the sealed areas.
Step 8 – With the gate bay dewatered, planned inspections and maintenance can be initiated. The anticipated scope of work may be more than expected since unplanned areas needing repairs are now exposed.
Step 9 – Once the dewatering work is complete, the pump is removed from the dewatered gate bay.
The gantry crane is not rated to lift a gate when one side is completely dry; therefore, water must be pumped into the dewatered gate bay to reduce the differential hydrostatic pressure on the gate prior to lifting. For crane operations after a dewatering, the maximum water elevation allowed on one side of the gate is Elevation 9.0 NAVD88, and the minimum water elevation allowed on the other side of the gate is

Elevation -13 NAVD88. Once water has been pumped back into the dewatered bay such that these conditions are met, that gate can be raised. Once the gate has been removed, additional water will flow into the dewatered bay and the water level differentials will change on the remaining gate. Prior to crane operations, the water elevations on either side of the gate must be within the minimum and maximum elevations above. Once both gates have been removed, the dewatering process has been completed. The process can then be repeated to dewater another gate bay.
Step 10 – When all the gate bays have been dewatered and repairs made, all the bulkhead gates can be raised, and normal operations are resumed.

Prior to a dewatering, the above plan is reviewed and further developed by those conducting the dewatering and is focused on the goal of accomplishing the scheduled dewatering in a timely manner.

In addition to the preventative maintenance program, if unforeseen problems arise, dewatering may be considered essential to help resolve the issue. For example, if gates become jammed during the raising/lowering process, a dewatering may be necessary to inspect and resolve the problem. Should the gates become inoperable, either the riverside or basin side dewatering gate locations can be used. However, complete dewatering (El -25) of the gate chamber for repairs cannot commence until the river stage is at El 9.0 NAVD88 and falling; workers are not allowed to enter the dewatered chamber until the water stage is at El 8.0 NAVD88 and falling.

Another dewatering scenario could utilize the riverside bulkhead slots located past the railroad bridge. Given the continuous interior piers, the gate bays can be dewatered past the railroad bridge. This allows for the inspection of over 50% of the U-Frame walls and slabs, as well as the walls that support the NOGC Railroad bridge. The bulkheads at the river end would be installed by contracted floating plant. The allowable loadings and dewatering procedures are the same as the localized, single bay dewatering described above.

It is advisable that a contractor is not used to perform a dewatering since the scope of work below the waterline is unknown which could lead to difficulties administering such a contract. In lieu of a contractor, it is recommended that CPRA consult with the New Orleans District Corps of Engineers (MVN), Operations Division, for dewatering maintenance. MVN performs dewaterings at their facilities every year. They have dewatering equipment and experience and would be considered a good partner in planning a dewatering for this Project. MVN has aided with repairs and dewatering of the Caernarvon Fresh Water Diversion Structure, so using assistance from MVN for the MBSD structure is not precedence setting.

7.2.8 Levees and Guide Levees

Inspection and maintenance procedures for the levee portion of the project are contained in 33 CFR Subparagraph 208.10 (b) entitled "Levees". The reshaped levee and right-of-way are maintained free and clear of any obstructions and/or encroachments.

7.3 Maintenance Control System and Inspection of Project Features

A maintenance control system is established by on-site personnel to include comprehensive, accurate data, such as equipment records, inspection records, maintenance and repair records and effective scheduling of maintenance. The maintenance control system has complete records of all maintenance work performed and a good filing system to maintain and make use of these records.

In addition, provisions are made to maintain summary records of all maintenance work orders and man-hour expenditures by jobs and features. A record of work schedules and assignments and any other preventative maintenance records needed to evaluate project maintenance work performance are included in the maintenance control system. Advanced planning and proper scheduling of any maintenance work is essential to the success of any maintenance control system. Each aspect of the maintenance control system and the maintenance program is periodically reviewed and evaluated, and revisions and modifications made whenever needed to improve the program.

Of primary importance to the success of a maintenance program is the establishment of an adequate inspection program. The purpose of the inspections is to assure that the project features receive proper attention so that the project is ready for use to provide safe and efficient operation. The scope of the preventative maintenance inspections includes adjusting, lubricating, and repairing equipment and replacing worn or defective parts. Inspection intervals are established based on how critical the equipment is to safe reliable operation of the project. At the same time, the maintenance work is carried out economically and to acceptable standards. The objective is to obtain a favorable balance between inspection costs and the costs of repairs and replacements that could be avoided by timely and thorough inspections. A guide for the inspection tasks and frequencies for the various facilities and items of equipment is included in the following paragraphs. The suggested frequencies are a maximum and it is intended that these be modified as necessary to obtain a favorable balance between maintenance costs and replacement costs.

7.4 Inspection of Project Features

7.4.1 Gantry Crane and Bulkhead Inspections

7.4.1.1 Gantry Crane and Operator Inspections

The gantry crane is inspected by an OSHA certified gantry crane inspection representative at least annually. All recommended repairs to the crane are performed before use unless approval from the certified OSHA gantry crane representative is provided.

Gantry crane operators are licensed and certified by an OSHA certified representative before operating the gantry crane. All operators ensure that their license is up to date before operating the crane. Therefore, annual license renewal for all operators is a requirement for operation of the gantry crane.

7.4.1.2 Bulkhead Gate Inspections

The bulkheads are visually inspected daily and greased at least once every 60 days. All damaged areas or components are repaired or replaced when appropriate. If the bulkheads are operable and functional, repairs may be delayed to desirable times of the year when diversion impacts are less.

7.4.1.3 Gantry Crane and Bulkhead Exercises

To ensure reliability of the gantry crane and bulkhead gate system, exercises are conducted. The exercises are conducted whenever there is a two-week period without any gate movements in a specific gate bay. If all the gates are in an “up” position for a two-week period, a gate is completely lowered and raised in each gate bay to check operability. If all gates are in a “down “position for a two-week period, the stack of gates in each bay is lifted at least once during a two-week period and then lowered. Once a degree of confidence has been reached in the operability of the gantry crane and bulkhead system, the on-site OM may make a recommendation to higher authorities to lengthen the two-week interval between gate exercises.

7.4.2 Floodwalls

Inspections of Floodwalls are conducted no less frequently than annually, per USACE requirements. Proper maintenance is required for the floodwall to function as designed. There are settlement reference bolts installed in the concrete on the protected side face of the T-wall stems to measure vertical movements of the walls. Vertical and horizontal movement, as well as signs of scour or erosion, are noted and repaired as needed.

7.4.3 Levee Maintenance

Surveys of the Mississippi River levees, Hurricane Protection levees and Guide/Conveyance channel levees are conducted every (3) years in accordance with LA Rev Stat 38:301.1. Grass cutting is performed as needed to ensure visual inspection of the levees at all times and to ensure that surveys can be easily taken. These surveys capture any levee armoring and document the need for maintenance.

7.4.4 Sedimentation Monitoring

Sedimentation survey monitoring of the Project, Barataria Bay, and the Mississippi River (in the vicinity of the MBSD Structure) are conducted at least annually using a combination of LiDAR, wading depth surveys, and multibeam surveys during periods of low flow or when the diversion is non-operational. More frequent monitoring is conducted if there is a reason to believe that sedimentation is adversely affecting the MRL system, navigation in the river or the performance of the MBSD Structure. These sedimentation surveys are compared to the original project surveys and are forwarded to the OM for analysis and review. Diversion flushing and/or maintenance dredging may be required to remove any sediment that may threaten the integrity of the MRL system, navigation in the river, or performance of the MBSD Structure.

7.4.5 Private Aids to Navigation (PATON)

All Private Aids to Navigation are coordinated with the USCG. The email address for PATON coordination with the USCG is D08-DG-District-DPWPaton@uscg.mil. Any aid to navigation associated with the MBSD is visually inspected daily and recorded in the Daily Report. This includes but is not limited to any lights or signage on dolphins in the river or on the gate monoliths. Repairs that are identified and recorded are immediately addressed.

The specifications for the PATONS are as follows.

<u>Marine Signal Lantern</u> - The marine signal lantern is a nonmetallic base, 155-mm, red or white acrylic Fresnel lens, LED lamp(s), solid state flasher, solar power station, 4-foot nonmetallic support pedestal and photo control. The entire system is watertight and approved for a marine environment.

<u>Flasher</u> - The flasher has a 3-second cycle period with a 1-second "ON" time.

<u>Solar Power Station</u> - The solar power station is an encased silicon solar energy cell, nonmetallic battery box with blocking diodes, rechargeable sealed batteries, and mounting brackets. The solar power station is a complete unit supplied and coordinated by a single manufacturer, sized to provide adequate year-round power to fully operate the signal lantern specified at the exact geographic location of the signal lantern.

7.4.6 Monolith Settlement

Reference bolts have been installed, tagged, and numbered at each end of monoliths to monitor differential movement. The elevation and relative movement of each bolt is measured at least annually by a registered land surveyor using the latest technology and submitted to the CPRA who evaluates the findings and compares these readings to previous readings to determine differential movement. Wall displacements and settlement records are kept over the life of the Project for comparison purposes. Any observation of excessive settlement or wall displacement is reported to the OM for further review and/or appropriate actions.

7.4.7 Bulkhead Gate Monoliths

The monoliths are visually inspected weekly for cracks or other signs of wear. Any issues are reported immediately for further discussion and actions. No changes in operations are required to perform these visual inspections.

7.4.8 Protection Cells/Dolphins

Protection Cells and Dolphins are provided to provide protection form vessels or other debris from damaging the intake walls and structure. Inspections are made daily to ensure integrity and no damage has occurred, see also Section 7.4.6, Aids to Navigation. After any collisions with vessels or other large debris, a more intensive inspection of the structure is performed to verify structural integrity.

7.4.9 Inverted Siphon

The inverted drainage siphon requires both a monthly and a semi-annual inspection and maintenance protocol. The monthly protocol is performed by the operator while the siphon is under normal operating conditions while the semi-annual protocol requires tubes of the siphon to be taken out of service and sequentially opened and closed as described below.

Monthly Inspection

During the monthly inspection, the operator documents all findings on a prepared inspection form. If the regularly scheduled inspection occurs during an active rainfall event or if there is a measurable head differential between the upstream and downstream side of the siphon, indicating flow within the siphon, the inspection is rescheduled.

The monthly inspection includes, but is not limited to, the following:

- Inlet and Discharge Basin – The inlet and discharge basins are visually inspected and cleared of unwanted debris.
- Siphon Tube Slide Gates – All six slide gates are exercised and lubricated. Any unusual resistance or noise during exercising operations are logged and the source of the problem determined and corrected. However, as experience is gained, this may be reduced to once a quarter.
- Bar Screens – The bar screens are visually inspected for any excessively bent or damages bars or other structural issues that could impede the performance of the screens. They are also cleared of any debris.
- General visual inspection of the visible aspects of the intake and outlet structure are performed.

Any findings of the monthly inspection requiring maintenance or repair are immediately addressed by on-site staff if possible. If maintenance or repair items are identified that require additional resources, it is documented and scheduled as soon as possible.

Semi-Annual Inspection and Cleaning

During the semi-annual inspection and cleaning, all findings are documented on a prepared inspection form. A portion of the semi-annual scheduled inspection requires significant flow through the siphon and will therefore need to occur after a significant rainfall event. Because of this, flexibility of scheduling is required.

- Depth probing of the inlet basin and outlet basin:
  1. For safety reasons, probing of the inlet and outlet basin are performed when there is little to no flow within the siphon.
  2. Probing consists of either manual or sonar probing of the bottom of the inlet and outlet basin to determine if excessive buildup of subsurface silt/debris has occurred.
  3. If excess silt and debris is identified, it is scheduled for removal.
- Flushing of the siphon tubes:
  1. Siphon flushing is scheduled to occur after a significant rainfall event to ensure flow through the siphon. This requires a level of flexibility when scheduling this work.
  2. Siphon flushing is performed in close coordination with the Plaquemines Parish pump station operation personnel.
  3. On the scheduled day for flushing, the siphon tubes are closed one at a time until 1-ft of differential head is developed between the upstream and downstream side of the siphon. Once the one foot of differential head is established there is a flushing velocity of approximately 4.5 fps in the opened tubes.
  4. Once flushing has been maintained in one of more of the tubes for 30 minutes, the opened/closed tubes are alternated, and flushing is performed on the previously closed tubes. This process is repeated until all tubes have had at least one flushing cycle performed, continually maintaining a maximum of 1-ft of differential head.
  5. In no case should more than 1-ft of differential be imposed on the system. If the head differential increases beyond 1-ft, additional tubes are opened immediately.

7.4.10 NOV Drainage Structure [STA XX+XX] [TBD OMRRR responsibility]

The sluice gate structure in the NOV Levee installed just upstream of the inverted siphon is inspected monthly. All finding of the inspection is logged on a preformatted form. The inspection includes, but is not limited to the following:

- General visual inspection of the sluice gate structure.
- Visual inspection of the 2-6 ft x 6 ft box culverts to identify any damage to the culverts or excess debris buildup that could impede the performance of the culvert.
- The upstream bar screens are visually inspected for any excessively bent or damages bars or other structural issues that could impede the performance of the screens. They are also cleared of any debris.
- Inspection of the flap gates on the discharges of the culverts. In addition to visual inspection of the flap's condition, the inspection of the flap will include manual operation of the flap to ensure free movement. The inspection of the flaps also includes lubrication of the flap hinges.

Any findings of the inspection requiring maintenance or repair is immediately addressed by on-site staff if possible. If a maintenance or repair item is identified that requires additional resources, it is documented and scheduled as soon as possible.

7.4.11 On Premise Electrical Systems

The electrical systems include Power Systems, Communication Systems, and Electronic Safety and Security Systems.

7.4.11.1. Power Systems

Components of the Power Systems include the power supply distribution equipment, the power distribution system raceways, electrical supports, conductors and cables, electrical outlets and receptacles, electrical devices, light fixtures, lighting controls, and the electrical grounding system.

Power distribution equipment is visually inspected on an annual basis for damage and corrosion. Infrared testing of distribution equipment is performed at least once every five years and more frequently if test results indicate above normal temperatures.

Circuit breakers and switches are exercised and lubricated in accordance with manufacturer's guidelines.

Exterior raceways, boxes, enclosures, and associated electrical supports are visually inspected annually for signs of damage and corrosion.

Conductor and cable terminations are inspected at least once every 5 years unless infrared test results warrant more frequent inspections.

Receptacles and devices are visually inspected at least once every five years, except exterior receptacles are visually inspected on an annual basis, for visible signs of damage, corrosion, dirt, insects, and water infiltration. Devices that are observed to be dirty, corroded, or damaged during inspection are cleaned or replaced, as appropriate.

Light fixtures and lighting controls are repaired or replaced whenever operational failures are noticed.

Grounding system connections are visually inspected annually. Any loose connections observed are corrected immediately. Resistance to ground are tested any time the system is modified, but at least once every 10 years.

Any Power System components that is known to have been subjected to damage or flooding is de-energized, inspected and tested immediately after damage has occurred and is not placed back into service until equipment has passed all tests recommended by NETA for acceptance of the associated equipment. Equipment and wiring subjected to flooding is evaluated per the recommendations of NEMA "Guidelines for Handling Water-damaged Electrical Equipment".

Testing and maintenance of generators and transfer equipment is performed in accordance with NFPA 110 and manufacturer's recommendations and published literature. Additionally, generator(s) and associated transfer switches are exercised weekly, tested monthly under load, and are load-bank tested at 100% output rating annually. Generators are serviced in accordance with manufacturer's published requirements, but in no case less than annually. Fluid levels are checked before and after each test. Pressures and temperatures are visually observed during testing to confirm they are within normal operating parameters.

7.4.11.2. Communication Systems

Communication equipment is repaired or replaced whenever operational failures are noticed.

7.4.11.3. Electronic Safety and Security Systems

Fire Alarm Systems are tested and maintained in accordance with NFPA 72.

Security Systems are repaired whenever operational failures are noticed. Refer to system-specific Operation and Maintenance manuals provided at the time of system acceptance.

Proper operation of the warning system is confirmed every time the gates are operated.

7.4.12 Elevation Instrumentation and Gages Inspection [TBD update post construction]

Permanent instrumentation on the structure consists of settlement reference markers, water surface elevation gages, piezometers, and manual staff gages. Settlement survey data are evaluated and as data are accumulated trends are established. Instrumentation will be surveyed on XXX interval to ensure an accurate datum. See Appendix D1 for instrument locations. Instruments are repaired or replaced as necessary.

7.4.13 Other Gages and Monitoring Equipment

Maintenance of gages and other monitoring instruments are specified in the SOP for the Project (or other established programs) and are referenced in Appendix D1. Project SOPs and manufacturer manuals for maintenance, testing, and calibration will be updated for the applicable types of instruments.

7.4.14 Site Utilities

On-site personnel constantly monitor all site utilities. Any maintenance issues regarding water or electricity are immediately addressed by on-site personnel if possible. For any maintenance issues beyond the expertise of on-site personnel, qualified contractors are utilized to remedy the situation. Safety is paramount. For this reason, on-site personnel are discouraged from performing any maintenance task that is beyond their expertise and could cause harm.

7.4.15 Firewater System

On-site personnel check the firewater system at least monthly to ensure proper operability. Any maintenance associated with the firewater system is addressed by on-site personnel as soon as possible after the need has been discovered.

7.4.16 Sewerage Package Unit

Sewerage distribution from the individual buildings within the reservation area is transported via a gravity PVC line to a prefabricated package lift station on site and pumped via sewer force main line for treatment and then discharged through gravity flow to a drainage ditch. The lift station system is designed for approximately 4,650 gallons/day. Any required maintenance associated with the sewage package unit is performed in accordance with the manufacturer and/or vendor recommendations and is performed by licensed plumbers. The PVC line, sewer force main and underground components are marked above ground to assist with maintenance and avoid disturbance when excavating on site.

7.4.17 Electrical Services

Electrical services are maintained by Entergy. Electrical maintenance associated with components of the Project is described in paragraph 7.4.11.1.

7.4.18 Potable Water

Water service is provided from a municipal connection and meter on the reservation. The Project water line will connect into the Parish water line. The only maintenance within the reservation is periodic observation of facilities for any leaks visible. Any required maintenance associated with the water line is performed by licensed plumbers. The PVC line and underground components are marked above ground to assist with maintenance and avoid disturbance when excavating on site.

7.4.19 Telecom Services

Telecom services are maintained by the public utility.

7.4.20 Site Security and Lighting

A full check of the site lighting is performed at least once every 5 years. This test can be performed during daylight by placing the controls in the manual (or HAND) position at the control panel(s) or by covering the photocell(s) to simulate low light conditions.

7.4.21 Boat Ramps

Inspections of the Mississippi River and Outfall boat ramps are performed by on-site personnel as the ramps are used. Routine maintenance on decking and supports is accomplished by on-site personnel on an as needed basis. Maintenance may occasionally require the services of a contractor, but typically maintenance is accomplished with on-site personnel.

7.4.22 Drainage Structure

8. REPAIR, REPLACEMENT AND REHABILITATION (RR&R)

8.1 General Definition

Proper maintenance extends the life of facilities but does not eliminate the need for repair, replacement, and rehabilitation. "Repair" refers to those activities of a routine nature that restore damaged or worn mechanical, electrical, or structural elements to their specified operating condition. "Replacement" covers those activities taken to exchange a worn-out, damaged, or otherwise malfunctioning element with one that meets or exceeds specifications. Rehabilitation" refers to a set of activities to bring a deteriorated project back to its original condition. All three of these actions are to conform to the project as-built plans and specifications unless other arrangements are made with CPRA. These activities are the responsibility of the CPRA, as such the need for repair, replacement, and rehabilitation is determined through inspections and the maintenance program as outlined within this manual, based upon manufacturers' recommendations and tolerances, as well as experience gained in maintaining the structure.

8.2 RR&R Records

Repairs, replacement, and rehabilitation of project features are recorded in the daily maintenance and inspection reports. See Section 5.2.8.1 of this OMRR&R Manual for a description of daily records that are maintained. Updates to the manufacturer's manuals, including tolerances and guides for repair, replacing and overhauling equipment, is provided as equipment is replaced. Keeping this information in a single repository helps prevent the use of outdated instructions for maintenance of new equipment.

Appendix A – Plans and Specifications (Reference Paragraphs 3.3.2.8 & 3.4.2)

To be added

A printed copy of As-Built Drawings is kept on site

Appendix B – DDR

To be added

Appendix C – Agreements (Reference Paragraph 3.5)

To be added

Appendix D1 – Project Monitoring

Appendix D2 – Monitoring and Adaptive Management Plan (MAM) (Reference Para. 5.1)

Link to be added to access the MAM Plan

Appendix E - Regulatory Requirements

To be added

Appendix F – Reporting Requirements (Reference Paragraph 5.2.8)

To be added

Appendix G – Planning (Reference Paragraph 3.4.1)

If this includes a general summary of BODR, remove appendix and put in text paragraph 3.4.1.

A Basis of Design Report (BODR) was forwarded to CPRA in October 2018. It was updated and resubmitted to CPRA in September 2019. The BODR revision reflected changes to the size and geometry of the diversion's Mississippi River Intake.

A 30% Design Phase was completed and forwarded to CPRA and to the U.S. Army Corps of Engineers in November 2019. It was revised and resubmitted to CPRA in June 2020 and to the U.S. Army Corps of Engineers on July 9, 2020 as a preliminary Section 408 Permissions Submittal. The revisions to the 30% Design Phase reflected value engineering changes to the diversion's Conveyance Channel, the Channel's Hurricane/Guide Levees and the location and geometry of the diversion's Outfall Transition Feature.

A 60% Design Phase was completed in two parts. The first part included the DDR, the Plans and the Specifications except for the Numerical and Physical Modeling Reports. The first part was submitted to CPRA in July 2021 and then submitted to the USACE in August 2021. The second part was the Numerical and Physical Modeling Reports. The second part was submitted to both CPRA and the USACE in September 2021.

90% Design Phase- TBD

100% Design Phase-TBD

Appendix H – Dewatering Cell (Reference Paragraph 7.2.6)
To be added

Attachment 6: Adoption Analysis for the USACE MBSD Environmental Impact Statement

Adoption Analysis for the USACE MBSD Environmental Impact Statement

1 Background

The *Deepwater Horizon* (DWH) Louisiana Trustee Implementation Group[1] (TIG) prepared the Final Phase II Restoration Plan #3.2: Mid-Barataria Sediment Diversion (Final RP #3.2/Final RP) to restore the natural resource injuries and losses caused by the April 20, 2010 DWH oil spill and associated oil spill response efforts (collectively, the Incident).

Considered in the context of restoration for injuries from the DWH oil spill, large-scale sediment diversions were evaluated as a restoration approach in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (PDARP/PEIS)[2]. Thereafter, in the 2018 *Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana* (SRP/EA #3), the Louisiana TIG identified a large-scale sediment diversion project in the Barataria Basin as a restoration technique that should move forward for detailed planning and analysis under the Oil Pollution Act of 1990 (OPA), 33 U.S.C. 2701 et seq. In the SRP/EA #3, the Louisiana TIG considered a range of strategic alternatives that would restore ecosystem-level injuries in the Gulf of Mexico through the restoration of critical wetlands, and coastal and nearshore habitat resources and services in the Barataria Basin. The Louisiana TIG selected a high-level strategic alternative that included a sediment diversion, marsh creation, and ridge restoration projects. In the SRP/EA #3, the Louisiana TIG also selected a Mid-Barataria Sediment Diversion (MBSD[3]) as the specific sediment diversion project to move forward for further analysis.

That further analysis is the focus of the Final RP #3.2, prepared under the authority of OPA. The National Oceanic and Atmospheric Administration (NOAA) was identified as the lead federal agency for the purposes of preparing the Natural Resource Damage Assessment (NRDA) restoration plan. The federal agencies, the Department of the Interior (DOI), United States Department of Agriculture (USDA), and United States Environmental Protection Agency (USEPA), and the state agency, Louisiana Coastal Protection and Restoration Authority (CPRA), actively participated in its development as co-trustees within the Louisiana TIG. CPRA is the implementing agency for the proposed action. The Final RP #3.2

[1] The Louisiana TIG is the group responsible for restoring natural resources and services within the Louisiana Restoration Area that were injured by the Incident. The Louisiana TIG includes five Louisiana State Trustee agencies and four federal Trustee agencies: the Louisiana Coastal Protection and Restoration Authority (CPRA); the Louisiana Department of Natural Resources; the Louisiana Department of Environmental Quality; the Louisiana Oil Spill Coordinator's Office; the Louisiana Department of Wildlife and Fisheries; the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (USFWS), the National Park Service (NPS) and the Bureau of Land Management (BLM); the United States Department of Agriculture (USDA); and the United States Environmental Protection Agency (USEPA).
[2] The PDARP/PEIS and Record of Decision can be accessed at www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/.
[3] In this document, the term "MBSD" is used to refer to the general concept of a sediment diversion in the Barataria Basin, while the term "Proposed MBSD Project" refers specifically to Alternative 1, the 75,000 cubic feet per second (cfs) capacity diversion evaluated by the Louisiana TIG in the MBSD RP #3.2.

presents the Louisiana TIG's evaluation of a proposed 75,000 cubic feet per second (cfs) capacity Mid-Barataria sediment diversion (MBSD, Alternative 1 or the Project) and five alternatives under OPA.

Federal trustees must comply with the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq., and its implementing regulations (40 CFR Parts 1500–1508) when planning restoration projects, as well as NEPA procedures specific to their own agency. NEPA provides a framework for federal agencies to determine if their proposed actions have significant environmental effects, consider these effects when choosing between alternative approaches, and inform and involve the public in the environmental review process. For major federal actions that would significantly affect the quality of the human environment, NEPA requires federal agencies to prepare a detailed, interdisciplinary Environmental Impact Statement (EIS) that assesses the environmental effects of the actions and alternatives to such actions before deciding whether to undertake them.

The Final RP #3.2 does not include the requisite NEPA analysis as an integrated component of the document. Under OPA NRDA regulations, Trustees typically choose to combine the restoration plan and the required NEPA analysis into a single document (*see* 33 CFR 990.23(a), (c)(2)). In this case, however, prior to evaluation of the Proposed MBSD Project by the Louisiana TIG as a proposed restoration project under OPA, the U.S. Army Corps of Engineers (USACE) initiated scoping under NEPA for the MBSD EIS, which was initiated through a permit application for the project by CPRA. To increase efficiency, reduce redundancy, and be consistent with federal policy and 40 CFR 1506.3[4], the four federal Trustees in the Louisiana TIG (i.e., NOAA, DOI, USDA, and USEPA) decided to participate as cooperating agencies in the development of a single Final MBSD EIS, the *U.S. Army Corps of Engineers, New Orleans District Final Environmental Impact Statement for the Proposed Mid-Barataria Sediment Diversion Project; Plaquemines Parish, Louisiana* (MBSD EIS), with the intent to adopt that NEPA analysis to inform the Louisiana TIG's OPA decision.

As the lead agency, the USACE had primary responsibility for preparing the EIS (40 CFR 1501.5(a)). The federal cooperating agencies, having jurisdiction by law as well as special expertise with respect to environmental impacts potentially resulting from the proposed action, participated throughout the development of the USACE's MBSD EIS from scoping, development of the Draft MBSD EIS, public review of that document, and completion of the Final MBSD EIS (40 CFR 1508). The federal agencies reviewed and commented throughout the preparation of the Final MBSD EIS. Those comments were considered and addressed by the USACE in their completion of the final document.

The Louisiana TIG released the Final RP #3.2 on September 23, 2022 (87 FR 58067), coincident with the USACE's release of its Final MBSD EIS. The balance of this adoption analysis summarizes the approach followed by the federal agencies of the Louisiana TIG to comply with NEPA and inform their decision under OPA on the Final RP #3.2 through the adoption of the Final MBSD EIS, pursuant to 40 CFR 1506.3. The Council on Environmental Quality (CEQ) regulations permit an agency to adopt a final EIS provided that the statement meets the standards for an adequate statement under the CEQ regulations (40 CFR 1506.3(a)). The federal Trustees of the TIG have independently reviewed and evaluated the Final

[4] The EIS is being prepared using the 1978 Council on Environmental Quality (CEQ) NEPA regulations. In 2020, CEQ revised the 1978 NEPA regulations. Consistent with the 2020 revised CEQ NEPA regulations, NEPA reviews initiated prior to the effective date of the 2020 CEQ regulations (September 14, 2020) may be conducted using the 1978 regulations. Given that the preparation of this EIS began on April 27, 2017 when the Notice of Intent (NOI) to prepare a Draft EIS was published at 82 Federal Register (FR) 19361, USACE has decided to proceed under the 1978 regulations. CEQ has subsequently reconsidered portions of the 2020 revised CEQ regulations and restored key provisions of the 1978 NEPA regulations. All references herein indicate sections of those 1978 CEQ regulations.

MBSD EIS and determined that it meets the standards for an adequate EIS under the CEQ regulations. In accordance with 40 CFR 1506.3(b), each federal agency participating on the Louisiana TIG has reviewed the Final MBSD EIS, found through this Adoption Analysis that it meets the standards set forth in the CEQ regulations as well as its own NEPA-implementing procedures and has adopted the Final MBSD EIS NEPA analysis. Accordingly, NOAA, DOI, USDA, and USEPA are documenting their decisions to adopt the Final MBSD EIS in the Louisiana TIG MBSD Record of Decision.

1.1 Description of the TIG's Proposed Action in the Final RP #3.2

Tiering from the SRP/EA #3, the Louisiana TIG identified a purpose and need for the MBSD project:

> Consistent with the Louisiana TIG's Strategic Restoration Plan and Environmental Assessment #3 and the Louisiana Coastal Master Plan, the purpose is to restore for injuries caused by the DWH oil spill by implementing a large-scale sediment diversion in the Barataria Basin that will reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, freshwater, and nutrients to support the long-term viability of existing and planned coastal restoration efforts. The proposed project is needed to help restore habitat and ecosystem services injured in the northern Gulf of Mexico as a result of the DWH oil spill.

Consistent with this statement of purpose and need, the Louisiana TIG identified the following specific restoration goals and objectives for the MBSD project:

- Deliver freshwater, sediment, and nutrients to the Barataria Basin through a large-scale sediment diversion from the Mississippi River;
- Reconnect and re-establish sustainable deltaic processes between the Mississippi River and the Barataria Basin (e.g., sediment retention and accumulation, new delta formation); and
- Create, restore, and sustain wetlands and other deltaic habitats and associated ecosystem services.

Responsive to these goals and objectives, the Proposed MBSD Project consists of a large-scale, 75,000 cfs capacity multi-component river diversion system intended to convey sediment, fresh water, and nutrients from the Mississippi River at approximate River Mile (RM) 60.7 in the vicinity of the town of Ironton, Plaquemines Parish, Louisiana to the Mid-Barataria Basin. After passing through a proposed intake structure complex on the bank of the Mississippi River and a proposed intake channel, the sediment-laden water would be transported through a conveyance channel to the Mid-Barataria Basin located in Plaquemines and Jefferson Parishes. A more detailed description of the features and components of the Proposed MBSD Project is provided in the MBSD EIS Sections 1.3 and 2.8 and in Section 1.2 below.

As proposed, by re-establishing deltaic processes, the biological, chemical, and physical processes in the formation of a river delta, the Proposed MBSD Project is expected to enhance the ecological productivity of the estuary and improve food web dynamics to provide benefits to the northern Gulf of Mexico ecosystem. The Proposed MBSD Project is critical to achieving the overall goals of the Wetlands, Coastal, and Nearshore Habitats Restoration Type in the PDARP/PEIS, which include providing benefits across the interconnected northern Gulf of Mexico ecosystem, and placing particular emphasis on coastal and nearshore habitat restoration in the historical Mississippi River delta plain in Louisiana. Based on the ability of the Proposed MBSD Project to restore for injuries to natural resources and services in the Barataria Basin, the Louisiana TIG evaluated the Proposed MBSD Project according to the OPA NRDA regulations and prepared the Final RP #3.2.

1.2 Description of the USACE Proposed Action Evaluated in the MBSD EIS

The proposed action evaluated by the USACE in the MBSD EIS is the construction and operation of the proposed 75,000 cfs capacity Mid-Barataria Sediment Diversion. The Proposed MBSD Project consists of a controlled sediment and freshwater intake diversion structure in Plaquemines Parish on the right descending bank of the Mississippi River at RM 60.7, with a conveyance channel that would discharge sediment, fresh water, and nutrients from the Mississippi River into the Mid-Barataria Basin in Plaquemines and Jefferson Parishes. An outfall transition feature would be included that gradually transitions the conveyance channel to the natural ground within the basin, which would help facilitate sediment dispersal away from the diversion and reduce velocities to limit scour at the end of the structure. The conveyance channel would cross a portion of Louisiana Highway 23 (LA 23) and the New Orleans Gulf Coast Railroad. The Proposed MBSD Project would also alter a portion of the Mississippi River Levee, which is part of the Mississippi River and Tributaries (MR&T) Project, and would alter the existing non-federal back levee and future NOV-NF-W-05a.1 levee reach of the New Orleans to Venice, Louisiana (NOV-NFL) Project. When operational, the Proposed MBSD Project could discharge up to 75,000 cfs of fresh water, sediment, and nutrients into the Mid-Barataria Basin during periods when Mississippi River flows are 450,000 cfs or greater at Belle Chasse, Plaquemines Parish, Louisiana. When the Mississippi River flows exceed 450,000 cfs and the gates are opened fully, the diversion flow would increase to approximately 25,000 cfs, and, thereafter, flows would increase proportionally as the river flow increases. This ramp-up would continue up to maximum diversion capacity flow of 75,000 cfs when the Mississippi River reaches a flow of 1 million cfs. When Mississippi River flows are below 450,000 cfs at Belle Chasse, the Proposed MBSD Project would maintain a background (base) flow of up to 5,000 cfs to protect, sustain, and maintain newly vegetated or recently converted fresh, intermediate, and brackish marsh near the diversion outflow.

As proposed, the footprint of the Project would directly impact 204.2 acres of wetlands and 307.2 acres of open water (including waters of the U.S., waters containing submerged aquatic vegetation, and other waters, and excluding beneficial use placement areas) subject to the USACE jurisdiction under the Clean Water Act (CWA) Section 404. As such, Department of Army authorization and permission from the USACE are required for construction and operation of the Proposed MBSD Project as follows:

- Because the proposed MBSD Project includes discharges of dredged or fill material in CWA Section 404 jurisdictional waters, a CWA Section 404 permit is required;
- Because the proposed MBSD Project requires construction to be performed in and structures to be located in the Mississippi River, a Rivers and Harbors Act (RHA) Section 10 permit is required; and
- Because the proposed MBSD Project would alter the USACE civil works projects, permission to proceed under RHA Section 14 (33 U.S.C. 408) (Section 408) is also required.

Thus, the USACE prepared the Final MBSD EIS to inform the USACE's permit and permission decisions under CWA Section 404, RHA Section 10, and RHA Section 408.

1.3 Comparison of the USACE Proposed Action to the Louisiana TIG Proposed Action.

By evaluating the large-scale sediment diversion to be constructed and operated in Barataria Basin, the Louisiana TIG's proposed action is inclusive of the USACE's proposed action. The USACE has issued those permits and permissions necessary under CWA Section 404 and RHA Sections 10 and 408 for the construction and operation of the Proposed MBSD Project. The Louisiana TIG's decision under OPA is whether to fund the construction and implementation of that same proposed action, including monitoring, adaptive management, mitigation and stewardship measures to address project-related changes to the environment.

The USACE decision to issue Section 404/10 permits and Section 408 permission was based on an evaluation of the probable impacts, including cumulative impacts, of the proposed action and its intended use on the public interest. As part of the EIS process, CPRA and the Louisiana TIG developed a Mitigation and Stewardship Plan (Appendix R1 to the Final MBSD EIS) based on the impacts identified in the Final MBSD EIS and associated technical analyses (as well as in other consultations outside of the NEPA process). The USACE included implementation of these measures as a special condition in its Section 408 permission and portions of these measures in its Section 404/10 permit.

CWA and RHA mitigation commitments are distinguished from other mitigation, conservation measures, and conservation recommendations under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Fish and Wildlife Coordination Act (FWCA), and National Historic Preservation Act (NHPA), as well as voluntary mitigation and stewardship actions to be implemented by CPRA. The mitigation measures and stewardship actions are further addressed in Section 2.3 of this analysis.

2 Alternatives and Impact Assessment

2.1 Summary of Alternatives Considered

The Final MBSD EIS focused on identifying and evaluating restoration alternatives for the MBSD, including the No Action Alternative. A screening process narrowed down possible locations, operational regimes, and diversion outfall management approaches to arrive at a reasonable range of alternatives. Based on the screening process provided in Chapter 2 of the Final MBSD EIS, some of the geographical and operational alternatives considered were not carried forward for detailed evaluation. Those alternatives considered but not carried forward for detailed evaluation because they did not meet the project's purpose and need or were not practicable or feasible are listed in Table 2.6-1 of Chapter 2 and Appendix D2 of the Final EIS. At the conclusion of the screening process, six alternatives were carried forward for further analysis in the MBSD EIS. This reasonable range of alternatives is the same alternatives evaluated in Final RP #3.2.

The Final RP #3.2 and associated Final MBSD EIS both evaluate the same large-scale, 75,000 cfs capacity[5] sediment diversion in the Mid-Barataria Basin (referred to in the Plan as the Proposed MBSD Project), as well as the same five alternatives and a no action alternative. The alternatives for the Proposed MBSD Project all focused on the same geographical location and have similar structural features, but the alternatives vary in size and maximum flows that can pass through the diversion, as well as the use of marsh terracing; consequently, their potential benefits and impacts also vary.

The structural features of the Proposed MBSD Project and its alternatives are located in south Louisiana on the west bank of the Mississippi River at RM 60.7, just north of the Town of Ironton. The anticipated outfall area for sediment, freshwater, and nutrients conveyed from the river is located within the Mid-Barataria Basin. The Project area of the Proposed MBSD Project and its alternatives includes the hydrologic boundaries of the Barataria Basin and the lower Mississippi River Delta Basin, also known as the birdfoot delta. The Mississippi River itself, beginning near RM 60.7 and extending to the mouth of the River, is also included in the Proposed MBSD Project area. Further detailed information regarding the features of the Proposed MBSD Project and the Project area can be found in Section 2.8 and Chapter 3 of the Final MBSD EIS.

As described in more detail in Chapter 3 of the Final RP #3.2, the Proposed MBSD Project (Alternative 1) and Alternatives 2 and 3 vary by the maximum flow through the diversion, ranging from 50,000 cfs to 150,000 cfs; and Alternatives 4–6 are identical to Alternatives 1-3, respectively, with the addition of marsh terrace outfall features for each alternative (Table 1-2). All of the proposed action alternatives include a base flow of up to 5,000 cfs to help moderate and stabilize seasonal fluctuations in salinity that could negatively affect certain marsh areas and types.

The preferred alternative (Alternative 1, 75,000 cfs) consists of a controlled sediment and freshwater intake diversion structure in Plaquemines Parish on the right descending bank of the Mississippi River at RM 60.7. The preferred alternative would discharge up to 75,000 cfs of fresh water, sediment, and nutrients into the Mid-Barataria Basin during periods when Mississippi River flows are 450,000 cfs or greater at Belle Chasse, Plaquemines Parish, Louisiana. The proposed structure is designed to discharge a maximum of 75,000 cfs when the Mississippi River flow reaches 1 million cfs. When the Mississippi River flows exceed 450,000 cfs and the gates are opened fully, the diversion flow would increase to approximately 25,000 cfs, and thereafter flows would increase proportionally as the river flow increases. This ramp would continue up to maximum diversion capacity flow of 75,000 cfs when the Mississippi River reaches a flow of 1 million cfs. When Mississippi River flows are below 450,000 cfs at Belle Chasse, the Proposed MBSD Project would operate to maintain a background (base) flow of up to 5,000 cfs. At the downstream end of the diversion channel, an engineered ''outfall transition feature'' would be constructed to guide and disperse the channel flow into the Barataria Basin. The preferred alternative is projected to increase land area, including emergent wetlands and mudflats, in the Barataria Basin across the 50-year analysis period relative to natural recovery, with a maximum increase of 17,300 acres in 2050, at the approximate mid-point of the 50-year analysis period.

The Louisiana TIG fully evaluated a smaller-capacity diversion with a maximum capacity of 50,000 cfs (Alternative 2). The Trustees found that such a diversion would provide substantially less benefit in marsh preservation and restoration and associated benefits to nearshore marine ecosystems, water column resources, birds and terrestrial wildlife, recreational use, and offshore ecosystems, with only a small reduction in adverse impacts and a slight cost reduction.

The Louisiana TIG also fully evaluated a larger-capacity diversion with a maximum capacity of 150,000 cfs (Alternative 3). While the marsh creation and associated benefits of such a large diversion would be significantly greater, the collateral injuries and risks to public health and safety would also increase to levels unacceptable to the Trustees.

Three other alternatives (Alternatives 4–6) would divert the same flow (cfs) capacities as described above for Alternatives 1–3 and would include marsh terrace outfall features. While providing some benefits, the outfall feature alternatives do not substantially change the extent to which the corresponding alternatives with similar capacities and without terraces meet the Louisiana TIG's goals and objectives for the project.

A No Action alternative was evaluated as an alternative in the MBSD EIS. Under the No Action Alternative, the Louisiana TIG would not approve funding for construction of the preferred alternative or the other action alternatives. As a result, the proposed large-scale sediment diversion would not be constructed, nor would any of the other alternatives that are considered. In addition, potential impacts (both beneficial and detrimental to resources within the Project area) described for the considered action alternatives would not occur.

Implementation of the Proposed MBSD Project includes implementation of a Mitigation and Stewardship Plan, Management and Adaptive Management (MAM) Plan, Dolphin Intervention Plan[5], and a diversion operations plan. Construction would require a minimum of three to five years to complete, depending on the extent of needed ground modifications and soil stabilization measures.

2.2 Summary of Environmental Consequences

All areas of the human and natural environment that may be impacted by the Proposed MBSD Project or any of the alternatives were considered, including geology and soils; groundwater resources; surface water and coastal processes; surface water and sediment quality; wetland resources and waters of the U.S.; air quality; noise; terrestrial wildlife and habitat; aquatic resources; marine mammals; threatened and endangered (T&E) species; socioeconomics; commercial fisheries; environmental justice; recreation and tourism; public lands; land use and land cover; aesthetic and visual resources; public health and safety, including flood risk reduction and shoreline protection; navigation; land-based transportation; hazardous, toxic, and radioactive waste; and cultural resources. A detailed discussion of the affected environment is provided in Chapter 3 of the Final MBSD EIS.

The Proposed MBSD Project would result in impacts on the general character of the Barataria Basin, including, but not limited to, salinity, temperature, land accretion, tidal flooding, storm hazards, and water quality. These impacts would generally be either adverse or beneficial depending on habitat tolerances of area plants, animals, and people, with moderate to major adverse impacts anticipated to occur only on those plants and animals that are unable to tolerate the modified habitat, and subsequently to the people that rely on the area plants and animals for economic, recreational, or other purposes. In many cases, impacts to the Barataria Basin resources would be higher near the diversion outfall, where land building/sedimentation, salinity, and water level impacts would be greatest, and would decrease with distance from the outfall.

The major issues identified during the evaluation of resource impacts from implementation of the Proposed MBSD Project include: surface water and coastal processes; surface water and sediment quality; wetland resources and waters of the U.S.; noise; aquatic resources; marine mammals; T&E species; socioeconomics, environmental justice; commercial fisheries; recreation and tourism; public health and safety, including flood risk reduction and shoreline protection; navigation; and land-based transportation. A detailed discussion of the potential impacts from Project implementation in comparison to the other action alternatives and the No Action Alternative is provided in Chapter 4 of the Final MBSD EIS.

2.3 Mitigation and Stewardship Measures

The purpose of the Mid-Barataria Sediment Diversion Mitigation and Stewardship Plan (Mitigation Plan) is to demonstrate how adverse impacts of the Proposed MBSD Project will be avoided, minimized, or mitigated. In particular, the objectives of the Mitigation Plan include identifying mitigation that will: (1) offset unavoidable adverse impacts to jurisdictional waters of the United States; and (2) ensure the Project is not contrary to the public interest, pursuant to section 404 of the CWA, and sections 9 and 10 of the Rivers and Harbors Act. The Mitigation Plan also identifies: (1) conservation measures to avoid and minimize potential effects to species listed as threatened or endangered under the federal Endangered Species Act (ESA); (2) conservation recommendations provided by the National Marine Fisheries Service (NMFS) to conserve, avoid and/or minimize adverse effects to essential fish habitat (EFH); (3) recommendations provided by the DOI's Fish and Wildlife Service (FWS) under the Fish and Wildlife Coordination Act (FWCA); and (4) stewardship measures to address project-related changes to the

[5] The Dolphin Intervention Plan is also called the Marine Mammal Intervention Plan in the Phase II RP #3.2, MBSD FEIS, and Louisiana TIG ROD; the two names are interchangeable and refer to the same Plan.

environment. The mitigation and stewardship measures were developed and refined with public input via the public comment response process and community outreach as summarized in Section 1.8 of the Final RP #3.2. The measures are described in more detail in the Final Mitigation and Stewardship Plan (Appendix B of the Final RP #3.2 and Appendix R1 of the Final MBSD EIS).

2.4 Monitoring, Maintenance, and Adaptive Management (MAM Plan)

Evaluation metrics and implementation guidance and goals are identified in the MAM Plan developed by the Louisiana TIG. Performance evaluation metrics and parameters are also adopted for the Project to ensure that the Project is achieving its intended restoration benefits. Such performance metrics and parameters will help determine if the Proposed MBSD Project and the related mitigation are achieving the overall objectives of the Proposed MBSD Project and the Final RP #3.2. These standards are based on attributes that are objective and verifiable by field measurements and analysis. Data collection and analysis will be based on methods established and/or approved by CPRA using established best-practices. The MAM Plan also identifies monitoring, maintenance, and adaptive management requirements to ensure that mitigation components and the Project restoration objectives are achieving the performance standards.

Once construction is underway, CPRA will be responsible for monitoring per the MAM Plan and implementation of any required mitigation and stewardship measures. If monitoring reports comparing progress on mitigation and stewardship measures to performance standards indicate progress for any required mitigation or stewardship measures is falling short of the identified performance standards, consultation with the Louisiana TIG will be initiated regarding the need for adaptive management. Additional information about the reporting process is included in the *Louisiana Trustee Implementation Group Project Implementation Work Plan for Mid-Barataria Sediment Diversion Project.*

3 Public Scoping and Public Review Opportunities

In recognizing the federal agencies' status as cooperating agencies, the USACE invited the federal agencies to participate in the scoping process and provided the federal agencies with preliminary versions of the Draft and Final MBSD EIS documents for review, and the federal agencies provided comments in support of the analysis regarding areas of each federal agency's subject matter expertise and jurisdiction.

The Louisiana TIG and the USACE coordinated a public review process for both the Draft RP #3.2 and the associated Draft MBSD EIS. A Notice of Availability (NOA) for the Draft MBSD EIS was published in the Federal Register (FR) on March 5, 2021 (86 FR 12942). Concurrent with the USACE NOA for the Draft MBSD EIS, the Louisiana TIG issued an NOA in the FR for the Draft RP #3.2 on March 5, 2021 (86 FR 12915) and in the Louisiana Register on February 20, 2021 (Louisiana Register, 2021). The NOAs encouraged all interested persons and organizations to review the Draft MBSD EIS and Draft RP #3.2 and to submit any comments regarding the Proposed MBSD Project, the Draft MBSD EIS, and/or Draft RP. The NOAs of the Draft MBSD EIS and Draft RP #3.2 and notification of the public meetings was emailed to all individuals and stakeholders on the USACE Project mailing lists. Public meetings were also advertised in the *New Orleans Advocate* on March 5, 2021, and the *Plaquemines Gazette* on March 9, 2021. Additional details regarding the public meetings were advertised in the *New Orleans Advocate* on March 21 and 28, 2021, and the *Plaquemines Gazette* on March 23 and 30, 2021. Portions of the public notices were translated to Spanish and Vietnamese.

The initial 60-day public review and comment period established by the NOAs for the Draft MBSD EIS and Draft RP #3.2 began on March 5, 2021 and was proposed to end on May 4, 2021. However, the 60-day public comment period was extended by an additional 30 days (for a total of 90 days) to June 3, 2021.

All comments submitted electronically, orally, by voice mail, or by mail via the U.S. Postal Service on or before June 3, 2021 were considered in preparing the Final MBSD EIS and Final RP #3.2.

The USACE and Louisiana TIG jointly conducted three public meetings to solicit comments on the Draft MBSD EIS and Draft RP #3.2. The meetings were held to inform the public about the Project and to obtain and record public comments. Since there were COVID-19 restrictions on in-person gatherings, the public meetings were held virtually on April 6, April 7, and April 8, 2021 at 9 a.m., 1 p.m., and 6 p.m. central time, respectively. Meetings could be accessed via internet/web-based conferencing application or via telephone. Language interpretation and translation in Spanish, Vietnamese, and Khmer were provided at each of the virtual public meetings, and translators facilitated participation by non-English speakers. Key messages from the meeting presentations were translated during the meetings and the translators were available to interpret participant comments in those languages. Additionally, the public meetings were transcribed by a court reporter.

At the beginning of the public comment period, the USACE posted to the USACE's Project webpage several pre-recorded presentation videos consisting of an explanation of how to comment on the Draft MBSD EIS and/or the Louisiana TIG's Draft RP #3.2, an update on the Proposed MBSD Project design, information concerning the ongoing restoration planning efforts and the Louisiana TIG's Draft RP #3.2, and details about how to navigate and review the contents of the Draft MBSD EIS. These pre-recorded presentation videos were then consolidated into one presentation and played at the beginning of each of the three public meetings. This consolidated pre-recorded presentation was also translated into Spanish, Vietnamese, and Khmer and available on the USACE's Project webpage. In addition, dedicated toll-free numbers were provided during the public comment period on the Draft MBSD EIS and the Draft RP #3.2 through which Spanish, Vietnamese, and Khmer-speaking individuals could listen to the translated pre-recorded presentation rather than watching the presentation on a computer.

The Draft MSBD EIS and supporting documents were available for public review on the USACE Project website at: http://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-BaratariaSediment-Diversion-EIS/, or upon request. Printed copies of the Draft MBSD EIS were provided for public review at eight public libraries in Belle Chasse, Buras, Cut Off, Harvey, Lafitte, New Orleans, Paradis, and Port Sulphur. At these same locations, the Executive Summary for the Draft MBSD EIS summarizing the details of the document into a concise, easy-to-read, document was available in English, Spanish, and Vietnamese. Individuals wishing to view hard copies of the Draft MBSD EIS were advised to contact the locations regarding viewing hours and COVID-19 restrictions.

The USACE and the Louisiana TIG coordinated with the Southeast Louisiana Voices of Impacted Communities and Environments (VOICE) organizations to understand the needs of the local communities, including Indigenous communities, regarding the best ways to reach out to these communities prior to the release of the Draft MSBD EIS and during the public comment period. Recommendations for where to make the Draft MSBD EIS available, as well as translation of material related to the Draft MBSD EIS, were implemented. Spanish, Vietnamese, and Khmer translators interpreted the meeting and comments in real time during the public meetings. The USACE engaged with community groups to distribute information and materials about the Proposed MBSD Project. CPRA also engaged with communities that would be affected.

Following the comment period, the 40,699 comment submissions received were reviewed by the USACE and the federal agencies and taken into consideration in the preparation of the Final MBSD EIS. The Final MBSD EIS includes a summary of the comments received and responses to those comments. Comments prepared by the federal agencies were also addressed in the preparation of the Final MBSD EIS. Those revisions included in the Final MBSD EIS adequately reflect comments provided by the federal agencies as cooperating agencies.

4 Environmental Review Summary and Adoption

The CEQ regulations provide federal agencies with the option to adopt other agencies' analyses. Specifically, a cooperating agency may adopt without recirculating the environmental impact statement of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied (40 CFR 1506.3). The federal trustees of the Louisiana TIG (NOAA, DOI, USDA, and USEPA), participated throughout the NEPA process as cooperating agencies, including in the preparation of the USACE's MBSD Draft EIS and Final EIS, to ensure the information and evaluation of the impacts adequately address the potential impacts to the natural resources and services under their purview according to OPA NRDA regulations, such that the Final MBSD EIS would be appropriate for adoption for each of the federal trustees' action of a decision to implement the Proposed MBSD Project. This section summarizes the federal agencies' independent environmental review considerations for adopting the USACE's Final MBSD EIS.

The Final MBSD EIS addresses the required components for adoption because it meets the requirements for an adequate EIS under the CEQ regulations and all relevant federal agency policy and procedures and reflects comments and expert input provided by NOAA, DOI, USDA, and USEPA as cooperating agencies. For example, the Final MBSD EIS includes:

- a discussion of the Proposed Action and purpose and need for the action;
- an evaluation of a reasonable range of alternatives to the Proposed Action, including a No Action Alternative, and alternatives to mitigate adverse effects;
- a description of the affected environment;
- a description of the environmental impacts of the Proposed Action and alternatives, including direct, indirect, and cumulative impacts;
- an identification and evaluation of reasonable mitigation measures to avoid or minimize adverse impacts; and
- a listing of agencies consulted.

The federal trustees independently reviewed the Final MBSD EIS and determined the USACE adequately evaluated the direct, indirect, and cumulative impacts of their proposed action and alternatives, including all mitigation, stewardship, and MAM actions. This evaluation included a detailed environmental review of the potential impacts to physical, biological, and socioeconomic resources under jurisdiction of the federal trustees. In addition, the federal agencies conclude the impacts evaluated by the USACE are the same as the impacts of the Louisiana TIG's Proposed Action and thus the MBSD Final EIS is sufficient to inform the Louisiana TIG's decision regarding the implementation of the Proposed MBSD Project.

In particular, the MBSD Final EIS contains an adequate evaluation of the direct, indirect, and cumulative impacts on all federally-listed species and their habitats identified as occurring within the Project area. In addition, the Louisiana TIG and the USACE prepared biological assessments fully evaluating impacts to ESA species and initiating ESA consultation with USFWS and NMFS. The USFWS and NMFS individually issued Biological Opinions, which concur with the *not likely to adversely affect* determinations, determine that the Proposed MBSD Project would not jeopardize the continued existence of pallid sturgeon (USFWS) and green, Kemp's ridley, and loggerhead sea turtles (NMFS), and concur that the Proposed MBSD Project would not result in adverse modification to critical habitat. The NMFS Biological Opinion also determined that the giant manta ray is *not likely to be adversely affected* by the

Project, which the USACE originally indicated would not be affected by the Project. The Biological Opinions include Incidental Take Statements (setting forth allowable incidental take for adversely affected species), reasonable and prudent measures (to minimize impacts of takings on specific species) and Conservation Recommendations (voluntary conservation measures to assist species' recovery) as applicable. In addition to summarizing the Endangered Species Act determination made in the Biological Assessment, the USACE also fully evaluated and made a corresponding NEPA determination of impact based on the definitions provided in the PDARP/PEIS. The federal agencies reviewed those determinations and find that such impacts to federally listed species and their habitats have been fully evaluated in context of the Trustee's proposed action.

The federal agencies independently reviewed the Final MBSD EIS and determined the USACE adequately evaluated the direct, indirect, and cumulative impacts of their proposed action and alternatives on marine mammals, in particular the Barataria Bay Estuarine System Stock of dolphins and their habitat. As directed by the Bipartisan Budget Act of 2018 (Public Law 115-123), NMFS issued a Marine Mammal Protection Act waiver for the MBSD on March 15, 2018. Section 20201 of Title II of Public Law No. 115–123 also requires that the State of Louisiana, in consultation with NMFS: "(1) to the extent practicable and consistent with the purposes of the projects, minimize impacts on marine mammal species and population stocks; and (2) monitor and evaluate the impacts of the projects on such species and population stocks." The proposed measures developed in recognition of the impacts on marine mammals have been included in Appendix R to the Final MBSD EIS.

The federal agencies also provided substantial comments on other marine resources affected by the USACE's proposed action, including commercial fisheries and EFH which the USACE considered and discussed with NMFS. EFH consultation is required for federal actions that may adversely impact EFH, which includes all types of aquatic habitat as described in the MBSD EIS. In parallel with the preparation of the MBSD EIS, consultation with NMFS Southeast Regional Office, Habitat Conservation Division in accordance with the MSFCMA was undertaken to assess potential impacts on EFH. The USACE's evaluation, based on the "*Mid-Barataria Sediment Diversion Essential Fish Habitat Assessment*" prepared by the Louisiana TIG, determined that the Proposed MBSD Project would result in adverse impacts as well as benefits over time from marsh creation. NMFS concurred with the determination made by the USACE and provided conservation recommendations for the Proposed MBSD Project that include monitoring and adaptive management of the Proposed MBSD Project and continued development of ecosystem modeling by CPRA and the Louisiana TIG.

The federal agencies reviewed the MBSD EIS and the associated evaluation of impacts from the Proposed MBSD Project on wetland resources and waters of the U.S. While construction of the Proposed MBSD Project would result in adverse impacts on wetlands, its operation would result in greater wetland acreage within the Barataria Basin as compared to the No Action Alternative. Therefore, the Proposed MBSD Project was determined to be consistent with Executive Order 11990 for the Protection of Wetlands, requiring federal agencies to "minimize the destruction, loss or degradation or wetlands and to preserve and enhance the natural and beneficial values of wetlands."

The federal agencies reviewed the MBSD EIS and the associated evaluation of impacts from the Proposed MBSD Project on floodplain management. The evaluation considered whether construction of the Proposed MBSD Project in the floodplain is in the public interest; whether the impacts of potential flooding on human health, safety and welfare; and the risks of flood losses would be minimized by mitigation measures described in Chapter 4 Section 4.27 Mitigation Summary and Appendix R1 of the MBSD EIS). Therefore, the Proposed MBSD Project was determined to be consistent with Executive Order 11988: Floodplains Management.

Consistent with the FWCA, the USACE consulted with USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. The USFWS produced a Fish and Wildlife Coordination Act Report that detailed existing fish and wildlife resources in the Project area, potential impacts due to the Proposed MBSD Project, and provided conservation recommendations for the Project. In reviewing the Final MBSD EIS, the federal agencies determined the USACE adequately considered those recommendations and responded to the Conservation Recommendations as provided.

The federal agencies reviewed the MBSD EIS and associated evaluation and determined the USACE adequately evaluated the direct, indirect, and cumulative impacts of their proposed action and alternatives with respect to the National Historic Preservation Act (NHPA). The USACE led the Section 106 of the NHPA of 1966 compliance effort and the Louisiana TIG signed the Programmatic Agreement as concurring parties. The USACE determined that the Project would have an adverse effect on NRHP-eligible and NRHP-potentially eligible resources. The Section 106 Consultation concluded with execution of a Programmatic Agreement. The Programmatic Agreement is provided in Appendix K of the Final MBSD EIS and attached as Appendix A to the Final Mitigation and Stewardship Plan.

5 Conclusion and Finding

Based on its review of the information presented herein, along with the analysis in the USACE's Final MBSD EIS and in accordance with 40 CFR 1506.3, each of the federal trustees of the Louisiana TIG is adopting the *U.S. Army Corps of Engineers, New Orleans District* Final *Environmental Impact Statement for the Proposed Mid-Barataria Sediment Diversion Project; Plaquemines Parish, Louisiana* to satisfy its independent NEPA requirements related to its decision to implement the Proposed MBSD Project pursuant to OPA 15 CFR 990 et seq. Furthermore, based on our determination of the sufficiency of the USACE's Final MBSD EIS, the federal agencies of the Louisiana TIG have determined that it is appropriate to adopt the Final MBSD EIS without the need for recirculation in accordance with 40 CFR 1506.3.

Attachment 7: Summary of Impacts

Summary of Impacts

The following are summaries of impacts as evaluated in Chapter 4 of the Final Mid Barataria Sediment Diversion EIS (Final MBSD EIS/Final EIS).

1. Surface Water and Coastal Processes

The Delft3D Basinwide Model was used to project impacts of the Mid Barataria Sediment Diversion Project (the MBSD, Alternative 1, or the Project) on bed elevations, water levels, and tidal values in the Barataria Basin taking into account the ongoing operations of the Davis Pond Freshwater Diversion Project, the Caernarvon Freshwater Diversion Project, and other natural and human-made existing Mississippi River diversions and hydrologic influences.

Bed Elevations: The Project would have permanent, major, beneficial impacts on bed elevations in the Barataria Basin from the influx of sediments (approximately 275 million tons over 50 years). This in turn would have permanent, major to minor, beneficial impacts on land building and marsh creation in the Barataria Basin, with impacts decreasing with distance from the immediate outfall area. Although ongoing trends of subsidence and local erosion would continue to impact the basin, sediments introduced through the diversion would help to offset land loss and sustain or increase bed elevations, primarily within roughly 100-square-miles of the diversion. The most substantial impacts on bed elevations would occur within approximately 10 miles of the diversion structure with a maximum increase of 3.7 feet by 2070 within the immediate outfall area of the diversion, and moderate and minor impacts extending farther, primarily southward. Negligible impacts on bed elevations would occur near the northern, western, and southern ends of the basin. The Project would have permanent, moderate, adverse impacts on bed elevations in the birdfoot delta due to the reduced sediment load reaching the delta.[1]

In the Mississippi River, the Project would have permanent, moderate, and adverse impacts, with general trends of increased erosion immediately upstream of the diversion and increased deposition immediately downstream of the diversion. The driving force for these impacts would be the reduced flow and consequently slower water velocity downstream of the diversion from the rerouting of river water through the diversion.

Water Levels: Operational impacts on water levels in the Barataria Basin from the Project would be permanent, adverse, and range from major to minor, depending on the location in the basin, with maximum increases of 1.1 foot in the immediate outfall area. Higher water levels would primarily occur when the diversion is flowing above base flow (greater than 25,000 cfs and up to 75,000 cfs depending on flows in the river). Impacts on water levels in the basin would decrease with increasing distance from the diversion structure, with negligible impacts on water levels occurring near the northern, western, and

[1] In the MBSD RP #3.2, there are references to the Project causing or resulting in land or marsh losses in the birdfoot delta. It is important to note that there is not a linear relationship between the operation of the Project and land loss in the birdfoot delta. The net land change in the birdfoot delta is dependent on the evolution of a highly dynamic system. It is correct that the operation of the Project will divert water and sediment from the Mississippi River at RM 60.7, and this diversion results in a reduction in “stream power” downriver from the diversion. That loss of stream power triggers various changes down river (e.g., changes in the location and degree of overbanking and the evolution of crevassing at various locations from RM 60.7 to the birdfoot delta). The collective effect of all of those changes leads to the land changes in the birdfoot delta. Thus, although the MBSD RP #3.2 sometimes states that the diversion causes land loss in the birdfoot delta, changes in the birdfoot delta result from numerous interacting variables which include, but are not limited to, the diversion operation.

southern ends of the basin. Minor impacts on water levels in the basin near the birdfoot delta are projected. More detail regarding water levels effects in the Basin are discussed in Section 5.1.12 below.

The Project is projected to have intermittent, minor, beneficial impacts on water levels in the Mississippi River during Project operations. Water levels are projected to decrease upriver and downriver of the diversion structure due to diverting water from the river into the basin, with a maximum modeled change of 1.1 foot in the river when the river is flowing at 1 million cfs.

Tides, Currents, and Flow: Operational impacts of the MBSD on currents and flow in the Barataria Basin would be permanent and minor to major (depending on distance from the immediate outfall area) due to widespread and readily apparent impacts on water flow velocity and direction when the Project is operating above base flow (greater than 25,000 cfs and up to 75,000 cfs depending on flows in the river). These current and flow impacts would be beneficial for reestablishing deltaic processes in the basin and adverse on the larval transport and juvenile recruitment of some aquatic species. Tides would not be impacted, other than from overall impacts of higher water levels. The fresh water flowing out of the diversion structure would create a general north to south flow in the basin as the fresh water moves towards the Gulf.

In the Mississippi River, Project impacts on the existing flow of the river would be permanent and moderate because the rerouting of river water from the Mississippi River into the diversion intake channel may create cross-currents (perpendicular to the existing general downstream flow) near the diversion site. This impact would be adverse due to impacts on shallow-draft vessels transiting past the site on the west side of the river and on the pallid sturgeon.

2. Surface Water and Sediment Quality

Monthly average concentrations of water quality parameters were modeled to determine the projected impacts due to operations of the Project. Permanent, minor to moderate reductions in salinity in the Barataria Basin and permanent, minor increases in salinity in the birdfoot delta would be expected to occur during Project operations. These salinity impacts would be beneficial for some wetland types and aquatic species and adverse for others. The introduction of Mississippi River water containing elevated fecal coliform concentrations into oyster propagation areas could cause permanent, major, direct, adverse impacts on water quality by occasionally elevating fecal coliform concentrations in oyster propagation areas during Project operations. There would be intermittent, permanent, minor decreases in water temperatures, and permanent, minor to moderate impacts on average nitrogen concentrations, average phosphorus concentrations, average dissolved oxygen (DO) concentrations, average total suspended solids concentrations, and average sulfate concentrations in the Barataria Basin. Movement of sediment from the Mississippi River to the basin is not expected to result in measurable impacts on sediment quality in the basin.

3. Wetland Resources and Waters of the U.S

The Project would divert freshwater, sediment, and nutrients into the Barataria Basin in order to build, sustain, and maintain wetlands in an area that has been largely isolated from natural flooding inputs from the Mississippi River. Sediment accretion would raise the land elevation in submerged areas to allow wetland vegetation to establish and grow; nutrients transported as part of the Project could contribute to increased primary production (above and below ground plant biomass); and changes in average annual salinity would allow for freshwater and intermediate wetland species to establish, survive, and potentially expand in areas that have been adversely impacted by saltwater intrusion. Because of these changes, the Project would have major, permanent, beneficial impacts on wetlands in the delta formation area and new marsh/marsh creation projects in the diversion outfall area in the Barataria Basin where wetlands would be sustained or created by the diversion of sediment and freshwater. While the Project would sustain and create wetlands in the Project area, substantial wetland loss across the region due to subsidence and sea-level rise would be ongoing, resulting in a net loss of wetland acreage over the 50-year analysis period. With Project operations, by year 2070, total wetland acres in the Barataria Basin would be 85,500 and wetland losses would be 17.4 percent less than the No Action Alternative, which is projected to have 72,800 acres in the Barataria Basin by 2070.

The Project is expected to cause moderate, permanent, adverse impacts on wetlands in the birdfoot delta where wetlands would be lost due to reduced sediment and freshwater inputs. By year 2070, total wetland acres in the birdfoot delta would be reduced to 3,510 acres with the Project while the No action Alternative is projected to have 6,410 acres in the birdfoot delta by 2070. Decreases in sedimentation in the birdfoot delta would result in decreased land building and an increased rate and extent of wetland loss over time, which would affect various species populations that utilize marsh habitat. Due to the loss of wetlands in the birdfoot delta, moderate adverse impacts on the Delta National Wildlife Refuge (NWR) and Pass A Loutre Wildlife Management Area (WMA) would also occur.

As projected by the Delft3D Basinwide Model, the Project would reduce salinities in the basin, which would reduce the number of days the Davis Pond Freshwater Diversion operates over the 50-year analysis period. However, the acreage of freshwater wetlands benefited by the Davis Pond Freshwater Diversion (located in the northern portion of the Barataria Basin) is not projected to be affected.

The Project is projected to cause minor to moderate, permanent, adverse impacts from the spread of invasive species in the Barataria Basin, since operation of the Project could result in the introduction or spread of invasive wetland plant species in created wetland areas. Invasive plant species are already present in the Barataria Basin under current conditions; however, the water and sediment transported from the Mississippi River into the Barataria Basin would provide a vector for the spread and establishment of invasive plants. Freshwater and brackish wetland invasive plants could also expand as a result of reduced salinity and increased nutrients. The Project is expected to cause negligible to minor, permanent, beneficial impacts in the birdfoot delta since the range of certain invasive species may be restricted by saltwater intrusion and wetland loss.

4 Noise

During construction of the Project there would be temporary, minor to moderate, adverse noise impacts associated with general combustion-powered construction equipment, dredging, and pile driving that would produce sound that would be perceptible in the vicinity of the Project. Impacts would be greatest near the diversion complex and adjacent auxiliary structures, where pile driving is planned. In addition, the Project has the potential to produce underwater sound from construction activities including pile driving, dredging, and the transit of Project-related vessels. Impacts on marine and aquatic species due to underwater noise are addressed further in their specific resource section.

Operation of the Project would create permanent, negligible to minor, and adverse noise impacts from activation of the diversion component, such as opening and closing diversion gates; water flow through the diversion; and intermittent use of a backup generator for electricity. Impacts on marine and aquatic species due to noise from maintenance dredging would be intermittent and limited to maintenance dredging activities and are addressed further in their specific resource section.

5 Aquatic Resources

Impacts on aquatic fauna are generally influenced, either positively or negatively, by changes in available habitat. Aquatic fauna benefit from the presence of vegetation coverage and habitat structure (wetlands, submerged aquatic vegetation [SAV], and oyster reefs) over open water and soft bottom habitats, favorable salinities and temperatures (which vary by species), and suitable nutrient and DO levels. Adverse impacts occur with increased turbidity and sedimentation, when water flow and tidal transport mechanisms change to the extent that larval recruitment is affected, and/or when other favorable habitat characteristics (such as habitat structure and water quality) are lost or altered to the extent that would translate to varying beneficial or adverse impacts on aquatic fauna; however, the impacts are predominantly related to increases in marsh habitat in the Barataria Basin and moderate decreases in salinity.

Individual aquatic species may experience moderate or major, adverse impacts where altered salinities and temperatures are outside of a species' optimal range, especially in areas closer to the diversion outfall where these impacts are typically more pronounced. Similarly, increased turbidity in the outfall may result in up to moderate adverse impacts for species that are less tolerant of turbidity. The Project would likely initially result in major adverse impacts on SAV in the basin from a relatively quick decrease in salinity, which may result in die-offs of species intolerant of the new salinity regime early in the Project analysis period; however, these impacts would be offset by the major benefits to SAV that are anticipated once the salinity regimes stabilize and new freshwater or intermediate communities become established. In addition, minor to major adverse impacts may occur on the recruitment of estuarine species, where high diversion flows overlap with peak larval transport periods for individual species.

Overall, the Project would likely have major, adverse impacts on the Barataria population of eastern oysters (predominantly from salinity changes and sedimentation) and brown shrimp (predominantly from changes in salinity and precluded larva recruitment). Other species with projected adverse impacts include spotted seatrout (minor) and southern flounder (negligible to minor). Beneficial impacts would be expected for white shrimp (negligible to minor), blue crab (negligible to minor), bay anchovy (minor), Gulf menhaden (moderate), red drum (moderate), largemouth bass (moderate), and freshwater fishes (moderate). Negligible impacts are expected for Atlantic croaker.

6 Marine Mammals

The only marine mammal stock likely to be impacted by the Project is the Barataria Bay Estuarine System (BBES) stock of bottlenose dolphins. Impacts on BBES dolphins include immediate and permanent, major, adverse impacts on survival largely due to prolonged exposure to low salinities throughout the BBES stock area. The Project would also cause adverse impacts on health and reproduction from multiple stressors including low salinity exposure, wetland loss in the BBES stock area, lower temperatures, and increased risk of harmful algal blooms (HABs) and the residual effects from the DHW oil spill. These impacts would result in decreased survival rates of BBES dolphins, with some studies projecting the functional extinction of BBES dolphins present near the barrier islands by the end of the 50-year assessment period.

7 Threatened and Endangered Species

Federally listed species with the potential to be impacted by MBSD include the West Indian manatee, five species of sea turtles in their aquatic habitat (as well as the loggerhead sea turtle on nesting beaches), the pallid sturgeon, two shorebirds (piping plover and red knot), the black rail, and the giant manta ray. Other species of concern considered include the saltmarsh topminnow and bald eagle. These species were assessed in accordance with National Environmental Policy Act and the Endangered Species Act.

Pallid sturgeon may become entrained in the flow and diverted into Barataria Basin, where it is presumed they would be unable to access the Mississippi River and would become functionally separated from the listed population. Because of this entrainment potential, the Project is likely to have moderate, adverse impacts on the pallid sturgeon. The Project is likely to have minor to moderate and adverse impacts on the Kemp's ridley, green, and loggerhead sea turtles based on the potential increase in commercial shrimping interactions (each species) and presence of core use habitat in the Barataria Basin (Kemp's ridley). Negligible to minor, adverse impacts on the piping plover (or its critical habitat), red knot (or its proposed critical habitat), black rail, and giant manta ray are anticipated. Negligible to moderate, permanent, indirect, and adverse impacts on the bald eagle are anticipated from potential contaminant uptake. Operational impacts of the Project on West Indian manatees, and on hawksbill and leatherback green sea turtles in marine environments, are expected to be negligible to minor and adverse. Impacts on loggerhead sea turtles on nesting beaches are expected to be negligible and no impacts would occur on the four other sea turtle species on nesting beaches, or on loggerhead critical habitat. Minor to moderate, permanent, beneficial impacts are expected on the saltmarsh topminnow.

As required under the ESA, the U.S. Army Corps of Engineers (USACE) provided a Biological Assessment to the National Marine Fisheries Service (NMFS) on February 24, 2021, and to the U.S. Fish and Wildlife Service (USFWS) on July 2, 2021, along with the requests to initiate formal consultation and develop Biological Opinions for species that the Project *may affect and is likely to adversely affect* (the pallid sturgeon and the Kemp's ridley, green, and loggerhead sea turtles). On December 13, 2021, the USFWS and NMFS individually issued Biological Opinions that concluded that the Project would have *no effect* or *is not likely to adversely affect* the remaining species noted above or any critical habitat in the Project area. The Biological Opinions further determined that the Project would not jeopardize the continued existence of pallid sturgeon (USFWS) and green, Kemp's ridley, and loggerhead sea turtles (NMFS). The Biological Opinions include Incidental Take Statements (setting forth allowable incidental take for adversely affected species), reasonable and prudent measures (to minimize impacts of takings on specific species), and Conservation Recommendations (voluntary conservation measures to assist species' recovery) for the pallid sturgeon and the green, Kemp's ridley, and loggerhead sea turtles. Consultation under the ESA is complete.

8 Socioeconomics

The Project is expected to cause minor to moderate, permanent, adverse impacts on the economy, population, housing and property values, tax revenues, public service, and community cohesion in communities near the immediate outfall area (within 10 miles north and 20 miles south) outside of flood protection due to increased tidal flooding and outmigration. Negligible to minor increases in the risk of levee overtopping gulfward (south) of the immediate outfall area may occur following delta formation (after approximately 20 years of Project operations) and may contribute to impacts in communities inside levees, with the greatest increases in communities within the New Orleans to Venice Non-Federal Levee (NOV-NFL) system closest to the Project. Federally backed flood insurance is anticipated to remain available for all residents of National Flood Insurance Program-participating communities under the MBSD. Considering the ongoing implementation of Risk Rating 2.0, it is difficult to predict how flood insurance rates may change in the future. If the Federal Emergency Management Agency were to revise the estimated flood risk of properties in the Project area, flood insurance rates could change relative to the No Action Alternative. In particular, in communities projected to experience increases in tidal flooding and/or storm hazards due to Project operations, some properties may experience increases in flood insurance rates relative to the No Action Alternative in earlier years of the Project. In the west bank New Orleans area north of the diversion, the Project would be expected to have minor, permanent, beneficial impacts on the economy, population, housing and property values, public service and tax revenues as the land gained as a result of the Project would decrease the risks of storm hazards. Moderate to major, temporary, beneficial impacts from job creation and increased economic activity in the Project area are also anticipated.

9 Environmental Justice

The construction of the Project could have minor to moderate, temporary, adverse impacts on low-income and minority populations within 0.5 mile of the construction footprint. Construction impacts on minority and low-income populations, including the population of Ironton, could be disproportionately high and adverse depending on the unique vulnerabilities of those populations.

The operation of the Project could lead to long-term, minor to major, adverse impacts on communities not protected by federal levees from acceleration of increases in tidal flooding and, storm hazards, and major, permanent, adverse impacts on commercial fisheries, and subsistence fisheries. These impacts could be disproportionately high and adverse on some low-income and minority populations in the Project area as compared to the No Action Alternative. These impacts would result from acceleration of changes in the frequency of tidal flooding and the severity of storm hazards relative to the No Action Alternative, particularly in the 2020s and 2030s.

Disproportionately high and adverse impacts could occur on low-income and minority populations within the communities of Myrtle Grove, Hermitage, Grand Bayou, and Happy Jack to the extent that affected populations lack resources to avoid or otherwise respond to the impacts. Because it is within the federal levee system, Ironton is not expected to be impacted by increases in frequency and duration of tidal flooding due to Project operations. However, the increased risk of NOV-NFL Levee overtopping during certain 1 percent storm events gulfward of the immediate outfall area following delta formation (after approximately 20 years of operations) could result in disproportionately high and adverse impacts on low-income and minority populations in Ironton to the extent that overtopping leads to flooding in that community. To a lesser extent, tidal flooding could increase in the Lafitte area, which includes multiple communities with varying levels of existing non-federal flood protection. In addition, disproportionately high and adverse impacts on low-income and minority populations could occur in some communities where reductions in abundance of oysters, brown shrimp, and certain finfish species are anticipated as a result of the Project. These impacts could occur to the extent that affected populations engage in or are heavily reliant on commercial and subsistence fishing for these species. Impacts would vary according to levels of engagement and dependence.

For low-income or minority populations located in areas farther than about 10 miles north or 20 miles Gulfward of the immediate outfall area, impacts from increased tidal flooding and storm surge caused by operation of the Project are expected to be negligible. For low-income or minority populations located in areas north of the diversion, the Project is expected to have some beneficial impacts related to additional protection from storm hazards due to reduced storm surge and wave heights as a result of land building.

10 Commercial Fisheries

Construction of the Project would likely have temporary, minor, adverse impacts on commercial fishing activities. Southbound roadway capacity on LA 23, the main thoroughfare along the west bank of the Mississippi River, would be reduced at times, which could impact access for those engaged in commercial fishing activities.

The operation of MBSD is expected to have both beneficial and adverse direct and indirect impacts on fish abundance in the Project area, which would have beneficial impacts on the commercial catch of some targeted species, and adverse impacts on the commercial catch of other targeted species. Due to the anticipated decrease in abundance of eastern oysters and brown shrimp during Project operations, the MBSD Project is expected to cause adverse impacts on oyster and shrimp fisheries (and fishers) within the Barataria Basin.

Overall, moderate to major, adverse, permanent direct and indirect impacts are anticipated on shrimp fisheries in the Project area due to expected negligible to minor, permanent, beneficial impacts on white shrimp, and major, permanent, adverse impacts on brown shrimp abundance. While some substitution of targeted species may be possible, such substitution would require additional investment by individual fisheries, which may or may not be financially feasible. Declines in shrimp abundance may also exacerbate trends in the aging workforce to leave the industry. Adverse impacts on brown shrimp abundance and subsequent adverse impacts on the overall shrimp fisheries would begin at the onset of operations and last permanently throughout the 50-year analysis period. Any benefits on shrimp abundance in the Project area associated with increased marsh habitat later in the analysis period would not substantially alter the stated impacts on the shrimping industry in the Project area. While the availability of shrimp from the basin would decrease, shrimp from Louisiana would continue to be available to restaurants, potentially at higher prices. Restaurants willing to pay a premium for local seafood would likely do so and additional importing would likely also occur. Under both the Project and the No Action Alternative, consumers in Louisiana would experience higher prices for locally caught seafood, or would consume additional imported shrimp over time. However, impacts due to decreased local shrimp availability would occur decades sooner under the Project than under the No Action Alternative.

Overall, the eastern oyster fishery in the Project area is expected to experience major, permanent, adverse impacts under the Project, although it is possible that areas near the barrier island could be used as seed grounds and growing areas for adults when salinities are too low throughout the rest of the Barataria Basin. This determination considers expected impacts on oyster abundance as well as the anticipated response from commercial fishers.

Negligible to minor, permanent beneficial impacts are expected on blue crab fisheries due to changes in species abundance. Communities reliant on employment and expenditures associated with this industry may also benefit, as expenditures associated with employment and support industries may be increased under this preferred alternative.

Impacts ranging from minor, adverse to moderate, beneficial are anticipated for finfish fisheries. This determination considers potential impacts on finfish abundance as well as the anticipated response from the commercial fishing industry. The abundance of these species directly impacts commercial fishing for these species. Reductions in catch would discourage entrants into the fishery and encourage exits. For species where increases in abundance and catch would be anticipated, the converse would be true. Alternatively, adaptation may be more feasible for new entrants. Overall impacts of the Project on the saltwater finfish commercial fishery would range from moderate, permanent, beneficial (Gulf menhaden), to minor, permanent, beneficial (bay anchovy) to negligible (Atlantic croaker), to negligible to minor, permanent adverse (southern flounder), to minor, permanent adverse (spotted seatrout).

The Project is also expected to result in minor, permanent, beneficial, direct and indirect impacts on alligator populations in the Project area due to the retention of suitable habitat near the outfall and negligible impacts on the aquaculture industry.

There could also be impacts on commercial fishing related to changes in access that could result from the Project. Minor, permanent, adverse impacts on commercial fishing would occur as a result of increased tidal flooding of launch sites, sediment accretion in the Myrtle Grove area, or the expansion of thick mats of aquatic invasive plant species. This could impact commercial fishing by increasing travel distances to, or closure of, certain water access points. These accessibility impacts would be less adverse for smaller vessels, such as those used for recreational boating. Project-induced sedimentation affecting some Barataria Basin navigation channels and marine infrastructure would result in permanent, moderate, adverse impacts on commercial fishing vessels using the affected channels and marinas if no mitigation efforts are taken to maintain channel depths. However, larger ports, including Port Sulphur, Venice, and Buras, would not be affected by increased tidal flooding or by sediment accretion related to the Project.

11 Recreation and Tourism

The Project would have long-term, minor to moderate, adverse impacts on site accessibility, recreational boating, and boat-based recreational fishing due to increased tidal flooding at access points in Lafitte, Myrtle Grove, and Grand Bayou and permanent, moderate, adverse impacts due to sedimentation in some of the Project-area navigation channels used to access recreation sites. In addition, there could be moderate, permanent, adverse impacts on recreational boating and boat-based recreational fishing due to increases in the introduction and expansion of invasive plant species in the basin, which would clog canals and impede boating.

Minor, permanent, adverse impacts would be expected on recreational fishing for spotted seatrout, as well as moderate, permanent, beneficial impacts on recreational fishing for red drum. Beneficial impacts would be expected on hunting and wildlife watching due to an increase in wetland habitat in some areas of the Barataria Basin; adverse impacts would be expected due to wetland loss in other areas such as in the birdfoot delta. Overall benefit to these activities is anticipated to be minor to moderate and permanent.

Minor, permanent, adverse or beneficial impacts on the regional economy associated with recreational expenditures in the region is expected. Adverse impacts would be associated with localized site accessibility impacts and potential decrease in abundance of spotted seatrout while beneficial impacts would be associated with potential increase in abundance of red drum.

With respect to tourist expenditures in restaurants in the region, while availability of shrimp and oysters from the basin would decrease with the Project, shrimp and oysters from Louisiana would continue to be available to restaurants, potentially at higher prices. Restaurants willing to pay a premium for local seafood would likely do so and additional importing would likely also occur. Under both the Project and the No Action Alternative, consumers in Louisiana would experience higher prices for locally caught seafood, or would consume additional imported shrimp over time. However, impacts of decreased local shrimp and oyster availability and increased local shrimp and oyster prices would occur decades sooner under the Project than under the No Action Alternative.

12 Public Health and Safety, Including Flood Risk Reduction and Shoreline Protection

Water levels and land change projected in the Barataria Basin and birdfoot delta through Delft3D Basinwide Modeling were used in conjunction with topography analysis to quantify existing tidal flood risk within the Project area, and to project potential impacts on such risk associated with the Project. In addition, the coupled ADvanced CIRCulation (ADCIRC) and Simulating WAves Nearshore (SWAN) high fidelity models (referred to as ADCIRC in the Final EIS) were used to quantify existing coastal storm hazards (surge and wave height magnitude) in the Project area, and to project potential impacts on storm surge and wave height magnitude associated with the Project.

1. **Floodplains and Tidal Flooding:** The Project would increase water levels during operation, which would have long-term, minor to major adverse impacts (depending on location) on public health and safety by increasing the frequency of tidal flooding in the Barataria Basin communities located outside levee protection, specifically within areas approximately 10 miles to the north and 20 miles to the south of the immediate outfall area. These communities could experience an increased percentage of days of inundation due to tidal flooding as compared to the No Action Alternative, with the greatest impacts, in general, in communities closest to the diversion outfall, and potential impacts decreasing with distance from the immediate outfall area. Impacts on public health and safety in Project-area communities within federal levee systems would be negligible, as still water levels are not expected to exceed authorized levee heights for federal levee systems within the Project area during periods when the diversion is operating above base flow.
2. **Storm Hazards:** Operation of the Project would have permanent, minor to moderate, beneficial impacts on communities outside of federal levee systems north of the diversion (Lafitte and Des Allemands), and permanent, minor to moderate, adverse impacts on public health and safety risks associated with storm hazards in communities outside of federal levee systems south of the diversion (including Myrtle Grove and Grand Bayou). The Project is projected to cause a maximum decrease in storm-surge elevations of 1.0 foot at the West Bank and Vicinity (WBV) Levees near New Orleans during a 1 percent Annual Exceedance Probability (AEP) (100-year) storm. At the same time, operation of the MBSD is anticipated to cause increases in storm surge of up to 1.7 feet near Myrtle Grove in 2070. The greatest impacts on surge elevation and wave heights are projected to occur within the vicinity of the Project immediate outfall area and would be reduced to negligible in areas farther from the outfall.
3. **Risk Reduction Levees:** The MBSD would have a permanent, negligible to minor, beneficial impact on public health and safety in northern reaches within the NOV-NFL Levee system, and a small portion of communities within the WBV system, by reducing surge elevation and wave height. However, the decrease in surge elevation and wave height north of the diversion (for a representative 1 percent AEP [100-year] storm) is not projected to be substantial enough to prevent overtopping of the NOV-NFL Levee as it was designed and built to reduce the risk of hurricane and storm damage up to either a 2 percent AEP (50-year) storm (from Oakville to LA Reussite), or a 4 percent AEP (25-year) storm (from La Reussite to St. Jude). Conversely, the Project would have permanent, minor, adverse impacts in some communities within the NOV-NFL and NOV systems south of the outfall area by increasing storm surge, causing maximum water levels to overtop some NOV-NFL Levee reaches, which would not otherwise be overtopped without the Project. The impact of the Project on storm surge is not anticipated to have more than a negligible to minor (localized) impact on public health and safety within other levee systems within the basin.

13 Navigation

In the Barataria Basin, the Project would cause moderate increases in dredging in the Barataria Bay Waterway due to increased sedimentation in the basin. Bayou Lafourche and the Gulf Intracoastal Waterway would experience minor to negligible increases in dredging, respectively. Project impacts on navigation traffic in the basin during construction and operations would be negligible to minor.

During construction, the Project would have minor, temporary, adverse impacts on the safety and efficiency of shallow-draft vessels transiting past the Project site in the Mississippi River due to waterway obstructions associated with the cofferdam of the river intake system. During operations, the Project would have moderate, intermittent but permanent, adverse impacts on marine traffic efficiency and safety for shallow-draft vessels in the Mississippi River due to cross-currents extending into the channel from the intake of water into the diversion. Some congestion may be unavoidable and could cause transit delays. The Project would also cause minor to moderate, permanent, adverse increases in dredging requirements in some portions of the Mississippi River navigation channel downriver of the Project site and in the birdfoot delta due to Project-induced changes to typical shoaling patterns and locations.

14 Land-based Transportation

The MBSD would cause temporary, moderate, adverse impacts on roadway transportation during construction due to traffic delays and congestion from increased construction traffic. LA 23 would provide the primary vehicular access for transporting equipment, materials, and personnel to and from the construction site during the 5-year construction period.

Construction of the diversion complex would require that a portion of the New Orleans Gulf Coast Railway be permanently raised and relocated over the intake channel with a maximum grade of 1.5 percent. To avoid disruptions to railroad operations and maintain rail service during the construction period, Louisiana Coastal Protection and Restoration Authority (CPRA) would construct a temporary railroad spur extending from the existing railroad along the north side of the conveyance channel prior to construction.

15 Cumulative Impacts

A cumulative impacts analysis was conducted that assessed the impacts of the MBSD Project action alternatives when added to relevant past, present, and reasonably foreseeable future projects that could continue to impact the same resources in the same approximate spatial extent and timeframe (Section 4.25 of the Final EIS). Only those resources expected to be directly or indirectly impacted by the MBSD Project action alternatives based on evaluations in Section 4.2 through 4.24 of the Final MBSD EIS were analyzed for cumulative impacts. Cumulative impacts were considered in context of both construction and operation of the Project. Based on the analysis, the Louisiana Trustee Implementation Group (TIG) concluded that when considered in context with past, present, and reasonably foreseeable future projects in the Area of Influence (AOI), numerous physical, biological, and socioeconomic benefits as well as adverse impacts would be expected to result from any of the six alternatives. Cumulative impacts would vary between construction-related impacts and operation-related impacts. Some resources would encounter primarily adverse cumulative impacts for at least one component of the term of the project (construction or operation) as a result of reasonably foreseeable future projects in addition to the MBSD Project action alternatives: tides, currents, and flows (operation); air quality (construction); underwater noise (construction); fecal coliform (operation); wetland types and extent (construction); airborne noise (construction); terrestrial and wildlife habitat (construction); upland vegetation and wildlife (operation); aquatic resources (construction); marine mammals (operation); threatened and endangered riverine and terrestrial species (construction and operation); commercial fisheries (construction); Environmental Justice (operation); recreation and tourism (construction); public lands (construction); land use and land cover (construction); aesthetic and visual resources (construction); floodplains (construction); storm hazards (construction); commercial navigation; traffic (construction, operation); land-based traffic (construction); and cultural resources (operation). Those impacts would range from temporary to long-term and negligible to major adverse.

Other resources would encounter both beneficial and adverse cumulative impacts during either construction, operation, or both phases: geology (operation); mineral resources (operation); soils (operation); surface water and coastal processes – bed elevations (operation); surface water and sediment quality (construction); Total Suspended Solids (operation); wetland invasive plants (construction); soil shear strength (operation); land accretion (operation); wetland invasive plants (operation); terrestrial wildlife in wetlands (operation); aquatic resources (operation); threatened and endangered species – marine and estuarine species (operation); socioeconomics (construction, operation); commercial fisheries (operation); Environmental Justice (construction); recreation and tourism (operation); public lands (operation); aesthetic and visual resources (operation); floodplains (operation); storm hazards (operation); and risk reduction levees (operation).

The following material summarizes the cumulative impacts by resource category as evaluated in Chapter 4 of the Final MBSD EIS.

Geology: Cumulative impacts from operation of the reasonably foreseeable actions combined with operation of the Project action alternatives would likely be permanent major and beneficial on land building in the Barataria Basin. In the birdfoot delta, those cumulative impacts would likely be permanent, minor and adverse for the first four decades of operation rising to permanent, moderate and adverse by 2070. Those impacts appear relatively large because the impacts of sea-level rise and subsidence become predominant and even small changes in wetland acreage represent a large portion of what remains. Cumulatively, additional beneficial impacts on the volume of sediment retained in the basin would result as compared with reasonably foreseeable projects on their own. Long-term to permanent, minor, and both beneficial and adverse impacts on mineral resources can be expected from operations, and those impacts would be similar across the MBSD Project action alternatives. Soils would be impacted by minor to moderate, both short-term to permanent, and both adverse and beneficial impacts from operations. Those impacts would be more minor from reasonably foreseeable projects than those from the MBSD Project action alternatives.

Surface Water and Coastal Processes (operation): When combined, overall cumulative impacts of operations of the MBSD Project action alternatives and the reasonably foreseeable projects would result in minor to moderate, permanent, impacts on bed elevations in the Lower Mississippi River during the operation of the MBSD Project. Permanent, moderate decreased and increased bed elevations immediately upstream and downstream, respectively, of the Mid-Breton Sediment Diversion structure and the MBSD Project diversion structure. Those impacts would be localized and not cumulatively overlap geographically. Decreased bed elevations from RM 13.4 above Head of Passes to RM 22 below Head of Passes would be beneficial for deep draft navigation in the river. Permanent, moderate to major, adverse decreased bed elevations in the birdfoot delta due to the combined operations of the diversions, and those impacts may be more widespread. Decreases in water levels during operations may be beneficial for flood control purposes. In the Barataria Basin, given the negligible impacts from the reasonably foreseeable projects on water levels, overall, the cumulative impacts on water levels would be consistent with those operational impacts identified resulting from the MBSD Project action alternatives. Cumulative impacts on sediment transport from operations would be major, beneficial, and permanent in the Barataria Basin. The combined impacts of transporting sediment from the Mississippi River to the Barataria Basin would play a significant role in creating and sustaining wetlands in the basin.

Surface Water and Sediment Quality: Cumulative impacts on surface water quality from construction of the reasonably foreseeable projects planned along the Mississippi River within 1 mile of the MBSD construction footprint would be temporary, minor, and adverse. The impacts on water quality in the river could be exacerbated in the vicinity of these projects. Turbidity and sediment contributions from the five actions occurring simultaneously (Gulf Coast Methanol Complex, Loading Dock on Mississippi River, NOLA Oil Terminal, Tallgrass PLT, and the MBSD Project), would have a minor, temporary, adverse cumulative effect on water quality. Accidental spills during routine construction activities such as fueling construction vehicles would likely be temporary, minor, and adverse. These types of spills would be controlled and mitigated in accordance with the SPCC Plan for each planned project. A spill or leak from any of the projects could be significant; however, it is unlikely that multiple actions would result in spills or leaks in the same relative timeframe to produce a significant cumulative effect given the regulatory environment regarding spill prevention. Therefore, the cumulative impacts of potential spills resulting from simultaneous construction of the MBSD Project action alternatives and reasonably foreseeable projects are expected to be temporary, adverse, and minor. Any accidental spills or inadvertent releases of contaminants from operation of the nearby Tallgrass PLT facility could have adverse impacts on surface water and sediment quality in the Barataria Basin depending on the nature of the release. These impacts would be minimized and mitigated in accordance with the facilities' Spill Prevention, Control, and Countermeasure (SPCC), Stormwater Pollution Prevention Plan (SWPPP), and accident prevention plans. In the event of oil spills and other hazardous discharges into the Mississippi River upstream of the MBSD intake structure, the diversion structure would be closed (see Appendix F MBSD Design and Operations Information). Cumulative impacts on Total Suspended Sediments (TSS) from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives may be considered beneficial if TSS drops out of the water column, as the MBSD Project action alternatives are designed to increase sediment in the Barataria Basin. However, these impacts may indirectly result in adverse impacts on turbidity in some areas of the basin. Louisiana has not adopted water quality standards for TSS. Cumulative impacts on sulfate concentrations from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives would likely be minor to moderate and permanent, with general decreases in the basin as compared to the No Action Alternative. The general lowering of sulfate concentrations would improve water quality conditions and as such the impact may be considered minor to moderate, permanent, and beneficial. Cumulative impacts on fecal coliform from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives would likely be permanent, major, and adverse.

Wetland Types and Extent: Cumulative impacts on wetlands from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would be temporary to permanent, negligible to moderate, and adverse. Impacts on wetlands resulting from the MBSD Project action alternatives would be adequately minimized and mitigated by operational benefits and applicable compensatory mitigation. Any wetland mitigation requirements for Tallgrass PLT and NOV-NF-W-05a.1 projects would offset the impacts on wetlands from those projects. Cumulative impacts on wetland invasive species from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would include minor, direct, permanent, beneficial impacts where invasive species are removed from wetlands converted to developed land and open water. Minor to moderate indirect, long-term, adverse impacts would occur in the event that disturbance of the construction footprint of the projects results in the spread of aquatic invasive species. Overall, the cumulative impact on soil shear strength from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives would likely be permanent, and to vary from adverse to beneficial, depending on localized nutrient loading and sediment deposition. Cumulative impacts on wetland accretion from operation of the reasonably foreseeable future projects combined with operation of the MBSD project action alternatives would likely result in fewer losses in wetlands in both the Barataria Basin and birdfoot delta, but most notably in the Barataria Basin where implementation of the MBSD Project action alternatives would prevent the loss of an additional 26,000 acres. The MBSD Project action alternatives in combination with other reasonably foreseeable projects would contribute major, direct, permanent, beneficial impacts on wetlands in

Barataria Basin. Both the MBSD Project action alternatives and Mid-Breton Sediment Diversion would reduce sediment transport to the birdfoot delta, thereby reducing the capability of wetlands to build land at a rate sufficient to offset relative sea-level rise. Overall, cumulative impacts of the MBSD Project action alternatives and the reasonably foreseeable projects on land accretion in the birdfoot delta would be adverse, moderate, and permanent (a loss of 2,060 acres by 2070 as compared with the No Action Alternative). The direct and indirect impacts operation of all other action alternatives combined with foreseeable projects would be the same as for the MBSD Project action alternatives, with major, permanent, beneficial impacts in the Barataria Basin and moderate, permanent, adverse impacts in the birdfoot delta. Cumulative impacts on the spread and introduction of invasive species in wetlands from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives would likely be minor to moderate, permanent, and adverse in the Barataria Basin and negligible to minor, permanent, and beneficial in the birdfoot delta.

Air Quality: If construction of the reasonably foreseeable projects planned along the Mississippi River (Loading Dock on Mississippi River, NOV-NF-W-05a.1 Project, and Tallgrass PLT) were to occur at the same time as construction of the MBSD Project action alternatives, concurrent construction would result in cumulative, adverse impacts on air quality (for example, increased emissions of criteria pollutants from operation of combustion-powered equipment or fugitive dust).

Underwater Noise (construction): If in-water construction work for the MBSD Project action alternatives and the reasonably foreseeable projects were to occur at the same time, there would be higher injury potential to fish as they could be exposed to injurious sound levels in a larger area. Although it is not likely that in-water work for all projects would occur at the same time, overlapping in-water noise would result in minor, adverse, temporary, and direct cumulative impacts on fish in the Mississippi River.

Airborne Noise: Concurrent operation of the reasonably foreseeable projects planned in the AOI with the MBSD Project action alternatives would result in permanent increases in noise where sound from more than one project overlaps at nearby NSAs. Therefore, the cumulative impacts from the MBSD Project action alternatives, combined with other reasonably foreseeable projects, on noise in the AOI are expected to be permanent, negligible to minor, and adverse during operations.

Terrestrial Wildlife: Although additional habitat would be cleared, likely further reducing the size of some local populations, the cumulative adverse impact on terrestrial wildlife and vegetation from the construction of the MBSD Project action alternatives combined with construction of the reasonably foreseeable future projects would be minor to moderate, temporary to permanent, and adverse. With the addition of over 500 acres of forested land and upland agricultural land that would be permanently encumbered by the MBSD Project action alternatives, adverse impacts on upland vegetation would be moderate and permanent, and impacts on upland wildlife would be moderate to potentially major, particularly for wildlife that are present between the MBSD Project alternatives and the Plaquemines LNG/Gator Express Pipeline. Impacts from all reasonably foreseeable projects on invasive wildlife and plant species would be minor given that invasive wildlife are likely present in adjacent habitats already and much of the cumulatively disturbed habitat would be permanently converted to nonvegetated land, limiting the spread of invasive species. A major gain in wetlands is projected for the Barataria Basin over time as compared to the No Action Alternative, and a cumulatively moderate to major, permanent, beneficial impact on wetland-associated terrestrial species is anticipated. Adverse impacts in the birdfoot delta would be moderate due to the permanent loss of cumulative acreage (about 2,000 acres) by 2070, which would result in minor to moderate, permanent, and adverse impacts on wetland-associated terrestrial species.

Aquatic Resources: Construction-related impacts from the combined MBSD Project alternatives and reasonably foreseeable projects in the Mississippi River would be mitigated through BMPs required through CWA Section 10, 401,402 and 404 permits, as well as through implementation of each project's SWPPP and SPCC. Further, turbidity and suspended sediment loads are normally high in the Mississippi River, such that turbidity and sediment contributions from construction of the three reasonably foreseeable projects combined with the MBSD Project action alternatives, if occurring simultaneously, would have minor, adverse cumulative impacts on aquatic resources, ranging from temporary turbidity impacts on permanent loss of riparian habitat (shading). In operation, the addition of the MBSD Project 150,000 cfs Alternative would result in less wetland loss in the Barataria Basin, where an additional 26,000 acres would be maintained or created (and a likely similar, but smaller, gain associated with the other action alternatives), representing a major, permanent, and beneficial impact on wetland habitat in the Barataria Basin. Cumulatively, the birdfoot delta is projected to lose an additional 2,000 acres of wetlands if the reasonably foreseeable projects are built, as compared with the No Action Alternative, by 2070. Cumulative impacts on wetlands from these projects combined with the MBSD action alternatives would result in similar wetland losses; however, the Project action alternatives would contribute to greater wetland losses in the birdfoot delta between 2020 and 2060. Losses in the birdfoot delta would be substantially less than the wetland gains described above for the Barataria Basin. This overall gain in wetland habitat, along with the decrease in salinity in the Barataria Basin would result in major, permanent, beneficial impacts on the abundance of SAV over time in the Barataria Basin. Similarly, over time the projects would result in minor to moderate, permanent, and beneficial impacts in the benthic community from the increased availability of wetland habitat in the Barataria Basin. Because of the overall increase in structured habitat (wetlands and SAV), the projects would also have a major, permanent, and beneficial impact on Endangered Fish Habitat (EFH). Conversely, the decrease in wetlands, and the increased water depth in the birdfoot delta would have a permanent, moderate, and adverse impact on EFH (structured habitat) and the benthic community (but negligible impacts on SAV) compared to the No Action Alternative. The MBSD Project action alternatives are anticipated to cause near-term population decreases for various aquatic fauna species due to immediate decreases in salinity and related changes in habitat and biota.

Marine Mammals: The Delft3D Basinwide Model, when including both the applicable reasonably foreseeable projects and the MBSD Project action alternatives, projects moderate decreases in the cumulative average monthly salinity in the AOI (see Final EIS Section 4.25.5 Surface Water and Sediment Quality, Table 4.25.5-3), but less wetland loss in the AOI (up to an additional 26,000 acres would be maintained or created under the 150,000 cfs + Terraces Alternative [see Section 4.25.6 Wetland Resources and Waters of the U.S., Table 4.25.6-1], and a likely similar, but smaller, gain associated with the other action alternatives), however these changes are unlikely to affect the overall major adverse impact determination for BBES dolphins. The simultaneous construction/operation of the reasonably foreseeable projects with the MBSD Project action alternatives also introduces a higher, cumulative potential for HABs, contaminants, and low DO, which would affect BBES dolphins and their prey. The reasonably foreseeable projects would also contribute additional stressors related to potential spills of hazardous materials; increases in turbidity, sedimentation, vessel traffic and noise; and modification of habitat. Cumulatively, the MBSD Project action alternatives and the reasonably foreseeable projects would likely have a permanent, major, adverse impact on BBES dolphins.

Threatened and Endangered Species: Cumulative impacts on the pallid sturgeon from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would include disturbance or modifications of available habitat, particularly if these actions were to occur simultaneously. In addition, if in-water construction were to occur at all sites simultaneously, the ability of individuals to transit the Mississippi River without experiencing increased sound levels (whether they be injurious or behavioral levels) would decrease, resulting in a higher potential for take of an individual. Therefore, cumulative impacts on the species from construction of the reasonably foreseeable future projects combined with construction of the MBSD Project action alternatives would likely be moderate, adverse, and temporary to permanent without adequate mitigation. The cumulative effect of operation of the MBSD Project action alternatives combined with operation of the other reasonably foreseeable projects (primarily the Mid-Breton Sediment Diversion) would be moderate to major, adverse, and permanent, as the Mid-Breton Sediment Diversion would also have a high potential for take of pallid sturgeons. However, any take authorized by the USFWS for the Project would be considered during the ESA permitting process for the Mid-Breton Sediment Diversion to ensure that the cumulative effect of this project does not jeopardize the continued existence of the species. In consideration of terrestrial threatened and endangered species, cumulative effects from the MBSD Project action alternatives and reasonably foreseeable projects in the AOI would be predominantly restricted to potential impacts on potential nesting habitat and activities of the black rail. If present in habitat that is cleared during construction of any of the reasonably foreseeable projects, the species may incur adverse impacts; however, based on likely low density in the AOI, impacts are anticipated to be negligible. Resulting from operations, although the model projects a slight increase in wetland losses in the birdfoot delta, there would be an overall gain in wetland habitat in the AOI. Therefore, there would likely be a negligible to minor, beneficial, long-term to permanent, impact on the black rail given the relative increase in potential habitat availability, although the use of this new habitat is unknown given the anticipated low species density. The changes in marsh would likely represent a negligible benefit to bald eagles as their varied diet would allow for them to adjust their foraging strategies as prey congregation around available marsh increases or decreases. However, the MBSD Project action alternatives and other reasonably foreseeable projects in the Barataria Basin would likely increase contaminant levels in the water from increased diversion of waters from the Mississippi River, runoff from adjacent agricultural lands, and spills of hazardous chemicals (although the potential for spills would be minimized by implementation of the various projects' SWPPP and SPCC Plans, as applicable). If the increasing contaminants accumulate in aquatic prey species and bald eagles consume contaminated prey, there is the potential for adverse impacts on bald eagles, such as reduced reproductive success. Therefore, cumulative impacts on bald eagles would be negligible to moderate, adverse, and permanent. Cumulative impacts on threatened and endangered marine/estuarine species from operation of the MBSD Project action alternatives and operation of the other reasonably foreseeable projects would most likely occur from changes in wetland/SAV extent in the Barataria Basin, which would be primarily driven by sea-level rise and changing salinity, as well as from changes in the food web, which would be primarily driven by changes in marsh coverage, water flow, temperature, and salinity. Although there would be a slight increase in wetland losses in the birdfoot delta, there would be an overall gain in wetland habitat in the AOI. West Indian manatees (although rare in the basin), green sea turtles, and saltmarsh topminnows would likely experience the negligible to moderate, beneficial, short-term to permanent impacts associated with increased food sources (SAV) or the presence of quiet waters near marsh (saltmarsh topminnow). Although the increased marsh/SAV availability would be beneficial to the overall food web in the AOI, certain key species, including some prey species of the Kemp's ridley would be adversely affected by changes in temperature, salinity, and water flow, which would occur as a result of the MBSD Project action alternatives. Most notably, the brown shrimp population in the Barataria Basin is anticipated to decrease, while the white shrimp population is anticipated to have negligible to minor increases. If the shifting shrimp populations results in a shift of fishermen to focus on areas of the lower basin, it is possible that increased fisheries interactions with sea turtles would occur. Although fishing interactions (as well as general vessel activity from construction of reasonably foreseeable projects) could affect all species of sea turtles, the effects on hawksbill and leatherback turtles would likely experience negligible effects due to their expected presence only in areas near to, or outside of, the barrier islands. As the Kemp's ridley sea turtle, green, and loggerhead sea turtles may occur in higher abundance in the Barataria Basin (and are more likely to occur in the mid-basin), they may be more susceptible to fishing or vessel interactions, and could experience minor to moderate, adverse, temporary to permanent impacts from the Project and other reasonably foreseeable projects. Estuarine projects in the lower basin, where the giant manta ray is anticipated to occur, include various marsh creation/restoration projects that would convert open waters to marsh habitat, removing that habitat from potential use. However, the giant manta ray is a wide-ranging species that could use adjacent suitable habitat, including waters offshore of the barrier islands; therefore, the species would likely experience negligible impacts from the Project and other reasonably foreseeable projects.

Socioeconomics: Cumulative impacts from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would likely be temporary, major, and adverse on businesses and residents located near or traveling past the MBSD construction footprint due to traffic congestion and increased noise and dust. Moderate adverse impacts on property values in localized areas and associated tax receipts would occur associated with construction activities. There would also be temporary, major, beneficial cumulative impacts on job creation and the local economy. Temporary, major, beneficial impacts associated with employment for reasonably foreseeable future projects are anticipated. This could include moderate to major, short-term, beneficial impacts on sales and use and income taxes, as well as public services associated with construction spending. The cumulative impacts from operation of the MBSD Project action alternatives combined with operation of reasonably foreseeable future actions on socioeconomics (including economy, employment, businesses and industrial activity; population; housing and property values; tax revenues; public services; community cohesion; and protection of children) are expected to range from minor to major adverse to minor beneficial and permanent, as described below. Ongoing trends in increasing sea-level rise, subsidence, flooding, and storm hazards in the Project area has and will likely continue to result in infrastructure damages, increased frequency of business disruptions and losses, and diminished employment opportunities. These have and will result in major, adverse, permanent impacts on many economic activities as well as resident populations. The operations of reasonably foreseeable projects would also provide minor to moderate adverse and minor beneficial effects to socioeconomic resources, associated primarily with hurricane and flood risk reduction projects and operations of major industrial projects in the Barataria Basin. The operations of major industrial projects would have permanent impacts from the ongoing economic activity and at least 285 jobs created by these projects with negligible traffic increases during operations.

Commercial Fisheries: Cumulative impacts from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives (depending on the amount of overlap of reasonably foreseeable projects with each other), would result in temporary minor to moderate adverse impacts on commercial fishing activities by delaying and disrupting activities in the AOI as well as increasing marine noise impacts. Limited changes to commercial fishing are expected to occur during the 5-year analysis period for construction of MBSD alternatives. Depending on the amount of overlap of projects with each other, reasonably foreseeable future projects could result in temporary minor to moderate adverse impacts on commercial fishing activities by delaying and disrupting activities in the AOI. The cumulative impacts from operation of the MBSD Project action alternatives combined with operation of the reasonably foreseeable future actions on commercial fishing activities are expected to range from minor to major adverse to minor beneficial and permanent depending on the fishery. Over time, gradual and continual increases in salinity and decreases in marsh habitat in the Project area are anticipated to affect habitat suitability for commercially targeted species in the Project area. These changes would affect the abundance and location of key species targeted commercially in the Project area, which would adversely affect the commercial fishing industry. Reasonably foreseeable projects would also provide minor long-term beneficial effects on commercial fishing resources, associated primarily with hurricane and flood risk reduction projects.

Environmental Justice: Cumulative impacts from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would likely be temporary, minor to moderate, and adverse on low-income and minority populations located near or traveling past the MBSD construction footprint due to traffic congestion and increased noise and dust. These impacts could particularly affect the community of Ironton, which is immediately south of the MBSD Project. There would also be the potential for temporary, minor, beneficial cumulative impacts on job creation and the local economy in some low-income and minority populations in the AOI, depending on the source of construction labor utilized. Cumulative impacts from operation of the reasonably foreseeable future projects combined with operation of the MBSD Project action alternatives would likely be disproportionately high and adverse to some low-income and minority populations from changes in tidal flooding, storm hazards, commercial fisheries, and subsistence fisheries. Low-income and minority populations have and will continue to be impacted by declines in natural resource industries, such as commercial fishing, that accompany changes in environmental conditions in the Project area such as increases in storm surge and flooding caused by sea-level rise, land subsidence, and the continued loss of wetlands.

Recreation and Tourism: Cumulative impacts on recreation and tourism from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would be temporary, minor, and adverse. Limited impacts on recreational fishing activities are expected to occur during the 5-year analysis period for construction of MBSD Project action alternatives. Depending on the amount of overlap of projects with each other, the combination of the MBSD Project action alternatives and reasonably foreseeable future projects could result in temporary minor to moderate adverse impacts on recreational activities by delaying and disrupting activities in the AOI. Cumulative impacts from operation of the MBSD Project action alternatives combined with operation of the reasonably foreseeable future project on recreation and tourism are expected to range from minor to moderate adverse to minor beneficial over the long-term. In the future, sea-level rise and subsidence would increase the occurrence of tidal flooding at recreational access points outside of federal levee systems such as boat launches, marinas, wildlife and bird watching sites, and roads leading to these access points, making access to these sites increasingly more difficult throughout the Barataria Basin. Over time, gradual and continual increases in salinity and decreases in marsh habitat in the Project area are also anticipated to affect habitat suitability for recreationally targeted species in the Project area. The reasonably foreseeable projects would likely provide minor adverse and minor to moderate beneficial effects to recreation and tourism, particularly to hunting and wildlife watching, associated with the restoration and other improvements in wetlands in the Barataria Basin.

Public Lands: Depending on the amount of overlap of construction timeframes with each other, cumulative impacts on traffic from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would be temporary, minor, and adverse on visitation to public lands for motorists accessing public lands via LA 23. The cumulative impacts on public lands from operation of the reasonably foreseeable projects combined with the operation of the MBSD Project action alternatives would be minor, permanent, and beneficial on wetlands and ecosystem habitat in the Jean Lafitte Natural Historical Park and Preserve—Barataria Preserve and minor to moderate, permanent, and adverse on public lands in the birdfoot delta due to wetland and ecosystem habitat loss. Overall cumulative impacts on the Jean Lafitte Natural Historical Park and Preserve—Barataria Preserve would be minor, permanent, and beneficial. Operation of the MBSD Project action alternatives on their own would mainly cause negligible to minor impacts on this preserve due to negligible to minor, adverse impacts on wetland habitat. However, when combined with the above restoration projects, which would increase the extent of wetland habitat, the ability of state and federal agencies to meet conservation and recreational objectives at the preserve would be improved. Based on the Delft3D Basinwide Model output, the combined cumulative impacts of the MBSD Project action alternatives and the foreseeable projects, including the Mid-Breton Sediment Diversion Project, would be moderate, permanent, and adverse by causing a combined additional loss of 2,056 acres of wetlands by 2070 as compared to the No Action Alternative. Most of these wetland losses would occur within the boundaries of or adjacent to the Delta NWR and Pass A Loutre WMA. Wetland increases in the birdfoot delta may occur in the future from reasonably foreseeable restoration projects not included in the Delft3D Basinwide Model output, including periodic beneficial use of dredged material occurring as part of CEMVN's maintenance dredging in Southwest Pass, and the Pass A Loutre WMA Crevasses project. As part of its responsibilities under the Fish and Wildlife Coordination Act and as operator of the Delta NWR, the USFWS recommended the creation of crevasses to build land in the birdfoot delta to offset MBSD Project-induced wetland losses of 926 acres in the Delta NWR and 37 acres in the Pass A Loutre WMA. In response to USFWS' Coordination Act Report Recommendation, CPRA agreed that, "Within 5 years of the commencement of Project operations, CPRA or the Louisiana TIG will provide $10,000,000 of additional funding for wetland preservation and restoration work in the Delta NWR and the Pass A Loutre WMA to offset modeled acres of indirect wetland losses in those areas. That funding may be accomplished through additional funding through the CWPPRA program, through additional restoration work sponsored by the Louisiana TIG (for example, construction of the E&D work discussed in the DWH Louisiana TIG's Restoration Plan and Environmental Assessment #7), or through a direct contribution for additional work. The funding would be proportioned between the Delta NWR and Pass A Loutre WMA based on the magnitude of the predicted wetland loss in each area." These benefits may offset some of the wetland losses in the birdfoot delta public lands projected to occur by 2070. However, this offset would not affect the overall cumulative impact determination of moderate, permanent, and adverse cumulative impacts.

Land Use and Land Cover: Cumulative impacts of the reasonably foreseeable future actions combined with the MBSD Project action alternatives would convert more than 2,100 acres of land in Plaquemines and Jefferson Parishes from the current land uses to developed land. Following construction, about 1,300 acres would be encumbered by the project facilities for these projects resulting in moderate, permanent, adverse cumulative impacts on existing land use. The cumulative impacts from construction and operation of the MBSD Project action alternatives combined with other reasonably foreseeable projects on land use and land cover are expected to be minor to moderate and temporary to permanent.

Aesthetic and Visual Resources: The cumulative impacts from construction of the MBSD Project action alternatives combined with the construction of the other reasonably foreseeable projects on visual resources would be temporary, moderate and adverse. Concurrent construction of the MBSD Project action alternatives and reasonably foreseeable projects would result in changes in the existing viewshed over a larger area and possibly over a longer period. Operation of the MBSD Project action alternatives and reasonably foreseeable projects would require the conversion of about 232 acres of forest land to open or developed land resulting in long-term to permanent, moderate, adverse cumulative impacts on visual resources. While the newly built structures associated with these projects would be visible as new features in the viewshed, they would generally be consistent with the existing landscape. Whether these changes in the viewshed are perceived as beneficial or adverse depends on the individual's perspective.

The cumulative impacts on visual resources from operation of the MBSD Project action alternatives combined with other reasonably foreseeable projects within the 0.25-mile AOI are expected to be minor to moderate, permanent, and adverse; while the cumulative impacts on visual resources within the Barataria Basin would likely be negligible.

Public Health and Safety, Including Flood and Storm Hazard Risk Reduction: Overall, floodplain alteration from construction of the MBSD Project action alternatives combined with the construction of these reasonably foreseeable projects would have no cumulative impact on public health and safety. Cumulative impacts on public health and safety from potential inadvertent releases of contaminants from the combined projects have the potential to range from no impact to moderate and adverse, depending upon the nature and timing of any release in relation to the nature and timing of any other construction-related releases. Cumulative impacts on public health and safety from potential construction site inundation and related release of contaminants or debris during construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would likely range from minor to moderate and adverse, depending on the scope of inundation, nature of the release, and whether multiple construction sites have such releases during a given storm event. In communities near the MBSD Project immediate outfall area, the intensity of the cumulative impacts resulting from operations would be more influenced by, and more similar to, the intensity of impacts of the MBSD Project action alternatives alone. The adverse impacts of the MBSD Project related to increased storm surge in areas immediately south of the immediate outfall area would increase the risk of overtopping and inundation on the protected side of the NOV-NF-W05a.1 levee reach, despite the increased level of protection provided by this levee. In communities farther from the immediate outfall area, the intensity of the cumulative impacts would be less influenced by the MBSD Project action alternatives, and more similar to the intensity of impacts of the reasonably foreseeable projects without the MBSD Project action alternatives. The magnitude of increase or decrease in storm hazard risk in communities outside of the federal levee system is related to the magnitude of diversion flow. The cumulative impact of the 50,000 cfs alternatives and reasonably foreseeable projects would be less than the 75,000 cfs Project and reasonably foreseeable projects. The cumulative impact of the 150,000 cfs alternatives and reasonably foreseeable projects would be greater than the 75,000 cfs Project and reasonably foreseeable projects, as restoration projects would be expected to have a less detectable benefit. These cumulative impacts would be long-term but not permanent; as the influence of relative sea-level rise increases, the intensity of the adverse impact of the diversion and beneficial impact of the reasonably foreseeable projects would decrease over time as compared to the No Action Alternative. The influence of sea-level rise would also decrease the differences between the intensity of cumulative impacts of the reasonably foreseeable projects in combination with the 50,000 cfs, 75,000 cfs, and 150,000 cfs alternatives over time.

Cumulative impacts from increased water levels and associated increases in tidal flooding in communities outside the federal levee system during operation of the MBSD Project action alternatives combined with the reasonably foreseeable projects would range from negligible to major, adverse, depending on community location and the diversion flow capacity. In communities with adjacent restoration or risk reduction projects, these projects may decrease the rate at which the community experiences increased tidal flooding impacts from operation of the diversion. The magnitude of increase in the projected tidal flooding inundation frequency in communities outside of the federal levee system is related to the magnitude of diversion flow. The cumulative impact of the 50,000 cfs Alternatives and reasonably foreseeable projects would be less than the 75,000 cfs Project and reasonably foreseeable projects, ranging from negligible to minor. The cumulative impact of the 150,000 cfs alternatives and reasonably foreseeable projects would be greater than the 75,000 Project and reasonably foreseeable projects, ranging from minor to major. These cumulative impacts would be long-term but not permanent; as the influence of relative sea-level rise increases, the intensity of the adverse impact of the diversion and beneficial impact of the reasonably foreseeable projects would decrease over time as compared to the No Action Alternative. The influence of sea level rise would also decrease the differences between the intensity of cumulative impacts including the 50,000 cfs, 75,000 cfs, and 150,000 cfs alternatives over time.

Cumulative impacts on public health and safety from storm hazards in communities inside federal levee systems during operation of the MBSD Project action alternatives combined with operation of the reasonably foreseeable projects would be beneficial and adverse, and range from negligible to minor, depending on a given storm's characteristics and the level of risk reduction provided by infrastructure such as levees and floodwalls for a given populated area. The adverse impacts of the MBSD Project related to increased storm surge in areas immediately south of the immediate outfall area would increase the risk of overtopping and inundation on the protected side of the NOV-NF-W-05a.1 levee reach, despite the increased level of protection provided by this levee. In communities farther from the immediate outfall area, the intensity of the cumulative impacts would be less influenced by the MBSD Project action alternatives, and more similar to the intensity of impacts of the reasonably foreseeable projects without the MBSD Project action alternatives.

Commercial Navigation Traffic: Reasonably foreseeable projects would not appreciably contribute impacts on marine traffic in the Mississippi River during Project construction or operations. Therefore, cumulative impacts on navigation traffic in the river during construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would not appreciably differ from those impacts of the MBSD Project action alternatives alone: temporary, minor, adverse impacts on the safety and efficiency of shallow-draft vessels transiting past the cofferdam and protection cells in the river. Cumulative impacts on navigation safety and efficiency in the river during operations would not appreciably differ from those impacts of the MBSD Project action alternatives alone: intermittent but permanent, moderate, and adverse impacts on the safety and efficiency of shallow-draft vessels transiting past the intake structure during operations. The combined cumulative impacts from operation of the MBSD Project action alternatives and operation of the foreseeable projects on dredging in the Mississippi River from Venice to the Gulf would be moderate to major, adverse, and permanent. When Mid-Breton Sediment Diversion operations are added to those of the MBSD operations, dredging requirements in Southwest Pass would increase as compared to the MBSD Project action alternatives operating alone. As is sometimes done for material dredged in Southwest Pass, some of the increased dredged material may be placed into the hopper edge disposal areas (HDDA) and subsequently used beneficially to create and restore coastal habitat in compliance with USACE engineering regulations. Additional analysis of the cumulative impacts of these two projects will be included in a forthcoming EIS for the Mid-Breton Diversion Project once the impacts of the Mid-Breton Sediment Diversion are better understood through EIS development.

Land-based Traffic: Cumulative impacts on traffic from construction of the reasonably foreseeable future actions combined with construction of the MBSD Project action alternatives would likely be major, adverse, and temporary and could cause substantial traffic delays on LA 23, especially during commute periods for construction workers.

Cultural Resources: Federal and state authorizations for each project are contingent on the management of impacts on historic properties. The USACE Mississippi Valley Division, New Orleans District (CEMVN) has determined that the MBSD Project action alternatives would have an adverse effect on historic properties within the Operational Impacts Area of Potential Effect. However, since the effects of the other reasonably foreseeable projects in and adjacent to the MBSD Operational Impacts APE are not fully known, it is not possible to complete a cumulative impacts analysis at this time.

Gateway Terminal and LIT Projects and MBSD: The reasonably foreseeable Gateway Terminal and LIT (as well as the Mississippi River Levee Myrtle Grove and Alliance Revetment Installation during its construction) are expected to increase the volume of shallow-draft vessels transiting past the MBSD cofferdam enough to result in an overall cumulative impacts determination on navigation of temporary, moderate, and adverse during MBSD construction. The overall cumulative impacts determination on Mississippi River navigation during MBSD operations would not appreciably differ from the anticipated impacts of the MBSD Project action alternatives alone, which would be intermittent but permanent, moderate, and adverse due to crosscurrents extending about 200 feet into the river due to the rerouting of river water into the intake channel.

Attachment 8: Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated) [Table 2.9 of Final MBSD EIS]

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

<table>
<tr><th>Resource</th><th>No Action Alternative</th><th>75,000 cfs Alternative (Applicant's Preferred)</th><th>50,000 cfs Alternative</th><th>150,000 cfs Alternative</th><th>Terrace Alternatives</th></tr>
<tr><td>Geology and Soils (Section 4.2)</td><td>Continued land loss in the Barataria Basin and birdfoot delta would cause major, permanent, and adverse impacts due to subsidence and sea-level rise.</td><td>Construction:
Moderate, permanent, adverse impacts on the existing topography, geology, and geomorphology of the construction footprint from excavation, dredging, compaction, grading, or filling.
Moderate, permanent, beneficial and adverse impacts on the geology and geomorphology of the open-water, shallow-bay bottom, and emergent marshes in the Project outfall area from the emplacement of dredged material for beneficial use and from access dredging, respectively.
Moderate, permanent, adverse impacts on soils present in the construction footprint, including prime farmland soils.
Minor, temporary, adverse impacts on the extraction of mineral resources due to the relocation of infrastructure or temporary, minor delays during transport.
Operational:
Major, permanent, beneficial impacts on land building in the Barataria Basin due to the diversion of flow and sediment load into the Barataria Basin. Approximately 17,300 acres of wetland are projected to be created and sustained in the Barataria Basin by 2050 (third decade of operations), decreasing to 13,400 acres of wetlands by 2070 due to the ongoing effects of sea-level rise and subsidence. Modeled land areas and changes presented in this table have been rounded to three significant digits. Land areas are considered accurate to within plus or minus 200 acres.
Moderate, permanent, adverse impacts on land building in the birdfoot delta due to the diversion of flow and sediment load into the Barataria Basin that would otherwise be transported downstream. Wetlands in the birdfoot delta would be reduced by 3,000 acres by 2070.
Moderate, short-term to permanent adverse and beneficial impacts on soils in the outfall area.
Minor, long-term to permanent, adverse and beneficial impacts on mineral resources due to deposition of sediment that may prevent access to oil and gas extraction infrastructure (adverse impact) and protect pipelines from wave and collision exposure (beneficial impact).</td><td>Impacts would be similar to the Applicant's Preferred Alternative.
9,660 acres of wetlands would be created and sustained in the Barataria Basin by 2070.
Wetlands in the birdfoot delta would be reduced by 2,820 acres by 2070.</td><td>Impacts would be similar to the Applicant's Preferred Alternative.
29,200 acres of wetlands would be created and sustained in the Barataria Basin by 2070.
Wetlands in the birdfoot delta would be reduced by 2,820 acres by 2070.</td><td>Construction:
As compared to the No Action Alternative, the terrace alternatives would cause additional construction impacts, both adverse and beneficial, as compared with the corresponding capacity alternatives without terraces) in that they would modify the existing natural topography (adverse) but result in emergent uplands with higher ecological value (beneficial).
Operational:
The presence of terraces would yield only slight increases in land building in the Barataria Basin and slight decreases in land loss in the birdfoot delta as compared with the corresponding capacity alternatives without terraces. These differences would vary from decade to decade. Otherwise, these alternatives are substantially similar to the corresponding capacity alternatives without terraces.</td></tr>
<tr><td>Groundwater (Section 4.3)</td><td>Existing agricultural, industrial, and commercial land use trends would continue in the location of the proposed diversion complex, where shallow groundwater flow and depths have historically been and would continue to be altered through the operation of drainage canals and pumping to reduce flooding. Use of the groundwater from the deeper aquifer systems underlying the Project area for irrigation or other purposes would remain restricted.
Current trends in saltwater intrusion and water well use would continue.</td><td>Construction:
Temporary, minor, adverse impacts on overland water flow, groundwater flow direction, and local water table elevations of shallow aquifers would be caused by clearing, grading, dewatering, and near-surface soil compaction of the work areas.
Negligible impacts on the Mississippi River Alluvial Aquifer and the Chicot Equivalent Aquifer System.
Temporary and negligible to long-term and moderate adverse impacts on groundwater quality depending on the severity of potential spills and leaks of hazardous materials and the effectiveness of the spill response action. Impacts would be negligible with the implementation of an effective Project Spill Prevention, Control, and Countermeasure Plan (SPCC Plan).
Operational:
Permanent, minor, adverse impacts on shallow groundwater elevations and flow direction in surficial aquifers due to the presence of Project structures and modifications to existing drainage channels and forced drainage pumping.
Negligible impacts on groundwater use.
Minor short- and long-term impacts on shallow groundwater quality due to the introduction of fresh water in the outfall area during operations. These</td><td>Impacts would be similar to the Applicant's Preferred Alternative.</td><td>Impacts would be similar to the Applicant's Preferred Alternative.</td><td>Construction and Operational:
As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).</td></tr>
</table>

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
		impacts may be either beneficial or adverse depending on the nature of the chemical changes and their indirect impacts on vegetation and aquatic life. Although saltwater intrusion would continue to impact groundwater in the Project area, the freshwater inputs may temporarily reduce shallow groundwater salinity and specific conductance in the outfall area.			
Surface Water and Coastal Processes (Section 4.4)	• Continued processes of land subsidence and sea-level rise leading to major, permanent, adverse impacts by lowering bed elevations and increasing water levels. • Moderate, permanent, adverse trends in tidal influence extending farther northward into the basin and circulation patterns changing, as sea level continues to increase.	Construction: • Minor, temporary, adverse impacts on water flows and sediment transport in the Mississippi River due to the presence of the cofferdam, including localized increases in water velocity, scouring near the cofferdam, and deposition downstream of the cofferdam. • Moderate, short-term, adverse impacts on existing bed elevations in the basin due to dredging and the placement of material for beneficial use compared to the No Action Alternative with impacts becoming beneficial over the long term as wetlands are created and sustained in the beneficial use areas. Operational: • Major to minor, permanent, beneficial impacts in Barataria Basin bed elevations and land building from the influx of sediments (~275 million tons over 50 years) with impacts decreasing with distance from the diversion structure (maximum increase of 3.7 feet in the immediate outfall area by 2070). • Moderate, permanent, adverse impacts on bed elevations and land building in the birdfoot delta from the diversion of water and sediment out of the river. • Major to minor, permanent, adverse impacts on water levels in the basin from the input of fresh water, with impacts decreasing with distance from the diversion structure (maximum increase of 1.0 foot in the immediate outfall area). • Major to minor, permanent, adverse impacts on the speed and direction of currents and flows in the Barataria Basin and moderate, permanent, adverse impacts on water levels and flows in the Mississippi River near the intake structure. • Minor, intermittent, beneficial impacts on water levels in the Mississippi River, with local reductions of up to 1.0 foot during maximum Project operations. • Moderate, permanent, and adverse impacts on currents and flow in the Mississippi River due to the creation of a cross-stream (perpendicular to the existing general downstream flow) velocity component near the proposed diversion site. • Negligible impacts on stormwater management and drainage in the land between the levees where the diversion structure would be located; minor, permanent, adverse impacts on stormwater management and drainage in the immediate outfall area due to increased water levels and head differential between the basin and protected side of levees, requiring increased pumping.	• Major to minor, permanent, beneficial impacts in Barataria Basin bed elevations and land building from the influx of sediments (~190 million tons over 50 years) with impacts decreasing with distance from the diversion structure (maximum increase of 2.9 feet in the immediate outfall area by 2070). • Major to minor, permanent, adverse impacts on water levels in the basin from the input of fresh water, with impacts decreasing with distance from the diversion structure (maximum increase of 0.7 foot in the immediate outfall area). • All other impacts would be similar to the Applicant's Preferred Alternative.	• Minor, intermittent, beneficial impacts on water levels in the Mississippi River, with local reductions of up to 1.0 foot during maximum Project operations. • Major to minor, permanent, beneficial impacts in Barataria Basin bed elevations and land building from the influx of sediments (~525 million tons over 50 years) with impacts decreasing with distance from the diversion structure (maximum increase of 5.9 feet in the immediate outfall area by 2070). • Major to minor, permanent, adverse impacts on water levels in the basin from the input of fresh water, with impacts decreasing with distance from the diversion structure (maximum increase of 2.0 feet in the immediate outfall area). • All other impacts would be similar to the Applicant's Preferred Alternative.	Construction: • As compared to the No Action Alternative, the terrace alternatives would have substantially similar impacts as the corresponding alternatives without terraces, plus additional minor, short-term, adverse construction impacts on local hydrology and bed elevations in the immediate outfall area. Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding alternatives without terraces, plus, additional minor impacts on diversion-induced deposition patterns resulting in less sediment accretion and land building in the vicinity of the terraces, and greater sediment accretion and land building to the northwest and west of the terraces.
Surface Water and Sediment Quality (Section 4.5)	• No construction related impacts would occur. • Land subsidence and sea-level rise would continue, resulting in permanent elevated salinity, total suspended sediments (TSS), and sulfate throughout the basin. • Minor permanent increases in average minimum water temperatures in the basin. • Basin subsegments impaired by fecal coliforms would remain impaired.	Construction: • Temporary, minor or moderate adverse construction impacts on water quality would result from the resuspension of fine sediments into the water column from in-water activities or runoff of sediment from adjacent work zones, resulting in increased turbidity and suspended sediments. • Construction activities associated with the use of heavy equipment would create the potential for inadvertent releases of contaminants (fuel, oil, and other construction materials) to surface water in both the Mississippi River and the Barataria Basin. These impacts would be temporary and minor and mitigated by the implementation of SPCC Plan and Stormwater Pollution Prevention Plan (SWPPP).	Construction: • Impacts would be similar to the Applicant's Preferred Alternative. Operational: • Minor to moderately elevated (slightly less elevated than Applicant's Preferred Alternative) TN and TP concentrations throughout the basin. • Negligible to moderate decrease (slightly less decreased than Applicant's Preferred Alternative) in average sulfate concentrations in the basin.	Construction: • Impacts would be similar to the Applicant's Preferred Alternative. Operational: • Minor to moderately elevated (slightly more elevated than Applicant's Preferred Alternative) TN and TP concentrations throughout the basin. • Permanent, minor to moderate increase (slightly more elevated than Applicant's Preferred Alternative) in TSS concentrations throughout the basin; negligible to	Construction: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs). Operational: • Each terrace alternative generally would have the same impacts as listed for

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
	• Sediment quality in the Mississippi River and the basin would remain similar to current conditions.	Operational: • Permanent, minor to moderate decreases in salinity in the basin; minor increases in salinity in the birdfoot delta. • Permanent, minor decrease in basin water temperatures corresponding to diversion opening (flowing greater than the 5,000 cfs base flow). • Permanent, minor to moderately elevated total nitrogen (TN) and total phosphorus (TP) concentrations throughout the basin. • Impacts on DO would vary throughout the basin, but overall minor to moderate, permanent impacts. • Permanent, minor to moderate increase in TSS concentrations throughout the basin; negligible to minor increases in TSS in the birdfoot delta; seasonal shift in TSS trends in the northern basin. • Permanent minor to moderate decrease in average sulfate concentrations in the basin. • Permanent, major adverse impacts caused by elevated fecal coliform concentrations in the basin possibly causing an oyster propagation use impairment. • Movement of sediment from Mississippi River to basin is not expected to result in measurable impacts on sediment quality in the basin.	• Permanent, minor to moderate increase (slightly less elevated than Applicant's Preferred Alternative) in TSS concentrations throughout the basin; negligible to minor increases in TSS in the birdfoot delta; seasonal shift in TSS trends in the northern basin. • All other impacts would be similar to the Applicant's Preferred Alternative.	minor increases in TSS in the birdfoot delta; seasonal shift in TSS trends in the northern basin. • Negligible to moderate decrease (slightly more decreased than Applicant's Preferred Alternative) in average sulfate concentrations in the basin. • All other impacts would be similar to the Applicant's Preferred Alternative.	each corresponding capacity flow alternative without terraces (50,000, 75,000, and 150,000 cfs) with some noted differences in fecal coliform and other parameters.
Wetlands (Section 4.6)	• Major, permanent, adverse impacts due to the continued loss or conversion of wetlands in the Barataria Basin and birdfoot delta. • By year 2070, total wetland acres would be 72,800 in the Barataria Basin and 6,410 acres in the birdfoot delta. • Invasive plant species would continue to persist and the net impact on invasive plants would be minor, permanent, and adverse.	Construction: • Minor to moderate, adverse impacts due to dredging and filling wetlands to construct the Project features. • Moderate, permanent, beneficial impacts in beneficial use areas due to creation and enhancement of wetlands. • Minor, temporary, adverse, localized impacts on wetlands adjacent to construction footprint due to sedimentation and contaminants from runoff during construction. • Minor, permanent, localized beneficial impacts in the Project construction footprint due to invasive species mortality during excavation activities and minor to moderate, long-term, adverse impacts in the event that construction results in the spread of invasive species. Operational: • Major, permanent, beneficial impacts on wetlands in the delta formation area and new marsh/marsh creation projects in the diversion outfall area that would be sustained or created by the diversion of sediment and fresh water. By year 2070, total wetland acres would be 85,500 and wetland losses would be 17.4 percent less than the No Action Alternative. • Moderate, permanent, adverse impacts on wetlands in the birdfoot delta. By year 2070, total wetland acres would be reduced to 3,510 acres. • Negligible impacts on wetlands outside of the delta formation area. • Moderate, short-term, adverse impacts due to erosion and loss of some emergent wetlands near the immediate outfall area, which would be offset when total wetland impacts are considered over the 50-year analysis period. • Minor to moderate, permanent, adverse impacts by increasing the spread of invasive species in the Barataria Basin. • Negligible to minor, permanent, beneficial impacts by decreasing the spread of invasive species in the birdfoot delta.	• Major, permanent, beneficial impacts on wetlands in the delta formation area and new marsh/marsh creation projects in the diversion outfall area that would be sustained or created by the diversion of sediment and fresh water. By year 2070, total wetland acres would be 82,000 and wetland losses would be 12.7 percent less than the No Action Alternative. • Moderate, permanent, adverse impacts on wetlands in the birdfoot delta. By year 2070, total wetland acres would be reduced to 3,680. • All other impacts would be similar to the Applicant's Preferred Alternative.	• Major, permanent, beneficial impacts on wetlands in the delta formation area and new marsh/marsh creation projects in the diversion outfall area that would be sustained or created by the diversion of sediment and fresh water. By year 2070, total wetland acres would be 98,600 and wetland losses would be 35.4 percent less than the No Action Alternative. • Moderate, permanent, adverse impacts on wetlands in the birdfoot delta. By year 2070, total wetland acres would be reduced to 3,710. • All other impacts would be similar to the Applicant's Preferred Alternative.	Construction • As compared to the No Action Alternative, terrace alternatives would have substantially similar construction impacts as that of corresponding capacity flow alternatives without terraces, except that terrace construction would cause additional minor, short-term, adverse impacts on existing wetlands due to potential vegetation mortality from material placement. Operational • As compared to the No Action Alternative, terrace alternatives would have substantially similar impacts as those listed for the corresponding capacity flow alternatives without terraces, except that they would cause a negligible increase in wetland loss in the birdfoot delta.
Air Quality (Section 4.7)	• Continued loss of wetlands in the Barataria Basin via conversion to open water would release methane and CO_2 trapped in plant biomass and marsh sediments, contributing to increased.	Construction: • Minor, direct, temporary, adverse impacts on air quality would occur during construction due to emissions from combustion-powered equipment. • Minor to moderate, direct temporary, adverse impacts on air quality due to emissions from fugitive dust, including during operation of the on-site concrete manufacturing plant.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
	atmospheric greenhouse gases (GHGs).	Operational: • Negligible impacts on air quality due to operations. • Minor, indirect, permanent, beneficial impacts on carbon sequestration and atmospheric GHG concentrations due to wetland creation and restoration within the Barataria Basin.			corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Noise (Section 4.8)	• No impacts on noise levels from construction, operation, or maintenance of the Project would occur.	Construction: • Temporary, direct, minor to moderate, adverse noise impacts during construction of the Project, due to operation of combustion-powered construction equipment and pile driving. Operational: • Negligible airborne noise impacts due to operations and maintenance during active maintenance activities, diversion gate operation, and water flow through the diversion. • Impacts on marine and aquatic species due to noise from maintenance dredging would be intermittent and limited to maintenance dredging activities (see Section 4.10 Aquatic Resources, Section 4.11 Marine Mammals, and Section 4.12 Threatened and Endangered Species for specific noise impacts on species).	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Terrestrial Wildlife and Habitat (Section 4.9)	• Major, permanent, adverse impacts on terrestrial wildlife due to the continued loss or conversion of wetlands. • Minor to moderate, short-term to permanent, adverse impacts on upland vegetation due decreased presence of wetlands and storm surge protection. • Major, permanent, adverse impacts on modeled species (green-winged teal, mottled duck, and alligator) from a model-projected decrease in habitat suitability; negligible to minor permanent, adverse impact on gadwall.	Construction: • Minor to moderate, temporary to permanent, adverse impacts on upland vegetation due to clearing associated with Project construction. • Negligible to moderate, temporary to permanent adverse impacts on wildlife from habitat clearing and construction disturbance. Operational: • Negligible to minor, permanent, direct and indirect, adverse impacts on terrestrial species from operational noise and lighting, and potential impacts on migration/movement. • Minor to major, permanent, beneficial impacts on wildlife using wetland habitat from the creation of wetland in the basin by year 2070. • Moderate, permanent, adverse impacts on wildlife in the birdfoot delta through the loss of wetlands by year 2070. • Minor to moderate, permanent beneficial impacts on green-winged teal, mottled duck, and alligators; negligible impacts on gadwall. • Moderate to major, permanent, adverse impacts on species that predominantly use higher salinity marsh such as diamondback terrapin. • Negligible to minor, permanent, adverse impacts on upland vegetation and minor, permanent, adverse impacts on wildlife and wildlife habitat from the potential spread of invasive plants and animals.	• Moderate, permanent, direct and indirect, beneficial impacts on green-winged teal, mottled duck, and alligators from increased habitat suitability near the immediate outfall area; negligible impacts on the gadwall due to overall low habitat suitability in the Project area. • All other impacts would be similar to the Applicant's Preferred Alternative.	• Moderate to major, permanent, direct and indirect, beneficial impacts on green-winged teal, mottled duck, and alligators from increased habitat suitability near the immediate outfall area; negligible impacts on the gadwall due to overall low habitat suitability in the Project area. • All other impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Aquatic Resources (Section 4.10)	• Moderate, permanent, indirect, adverse impacts on SAV. • Major, permanent, direct and indirect adverse impacts on benthic resources and essential fish habitat (EFH) and managed species. • Habitat suitability for key species decreases overtime with changing salinity and marsh loss. • Continued trend of invasive species expansion or maintenance.	Construction: • Minor, temporary to permanent, direct and indirect, adverse impacts on SAV. • Minor to moderate, short-term to permanent, direct and indirect impacts on benthic resources. • Negligible to minor, temporary to permanent, direct and indirect, adverse impacts on EFH and managed species. • Minor to moderate, adverse, temporary to permanent impacts on aquatic invasive plants and animals. Operational: • SAV: Major, temporary, indirect, adverse impact through the initial and immediate change in salinity in the Barataria Basin, followed by major, permanent, indirect, beneficial impacts. Permanent, adverse, indirect, and negligible impacts in the birdfoot delta from increasing salinity. • Benthic resources: Minor to moderate, permanent, direct and indirect impacts in the Barataria Basin (beneficial or adverse, depending on species).	• Impacts would be similar to the Applicant's Preferred Alternative. • Key species: Generally consistent with Applicant's Preferred Alternative but with slight decreases in benefits due to smaller increases in marsh, slight decreases in adverse impacts from the smaller area of disrupted larval transport, and incremental changes in either beneficial or adverse impacts associated with the decreased area of salinity modification (depending on species preferences).	• Impacts would be similar to the Applicant's Preferred Alternative. • Key species: Generally consistent with Applicant's Preferred Alternative but with slight increases due to larger increases in marsh, slight increases in adverse impacts from the larger area of disrupted larval transport, and incremental changes in either beneficial or adverse impacts associated with the expanded area of salinity modification (depending on species preferences).	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

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Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
	• Key Species ○ Brown shrimp – Major, adverse, indirect, permanent impacts. ○ White shrimp – Major, adverse, indirect, permanent impacts. ○ Blue crab – Moderate, adverse, indirect, permanent impacts. ○ Bay anchovy – Negligible, indirect, permanent impacts. ○ Gulf menhaden – Negligible, indirect, permanent impacts. ○ Red drum – Minor, adverse, indirect, permanent impacts. ○ Spotted seatrout – Minor, adverse, indirect, permanent impacts. ○ Atlantic croaker – Minor, adverse, indirect, permanent impacts. ○ Southern flounder – Negligible, indirect, permanent impacts. ○ Largemouth bass – Major, adverse, indirect, permanent impacts. ○ Eastern oyster – Major, adverse, indirect, permanent impacts.	Moderate, permanent, and adverse impact in the birdfoot delta from marsh loss. • EFH: Major, permanent, direct and indirect, beneficial changes. Moderate, permanent, adverse impacts in the birdfoot delta from loss of marsh habitat. • Managed species: Negligible impacts on coastal migratory pelagics and highly migratory species due to predominant use of nearshore and offshore waters. Minor, adverse, indirect, and permanent impacts on reef fish from changes in prey species (gray snapper) or salinity and nursery habitat (lane snapper). • Habitats impacts range from major beneficial to major adverse. • Key species: ○ Brown shrimp – Major, adverse, direct and indirect, permanent impact to species with major decrease in abundance earlier in analysis period than No Action; impact continues through the analysis period. ○ White shrimp – Negligible to minor, beneficial, direct and indirect, permanent impact to species with potentially greater abundance than under No Action. ○ Blue crab – Negligible to minor, beneficial, direct and indirect, permanent impact to species with potentially greater abundance than under No Action. ○ Bay anchovy – Minor, beneficial, direct and indirect, permanent impact to species with slightly greater abundance than under No Action. ○ Gulf menhaden – Moderate, beneficial, direct and indirect, permanent impact to species with greater abundance than under No Action. ○ Red drum – Moderate, beneficial, indirect permanent impact to species with greater abundance than under No Action. ○ Spotted seatrout – Minor, adverse, direct and indirect permanent impact to species with a slightly lower abundance than under No Action. ○ Atlantic croaker – Negligible, direct and indirect, permanent impact with no measurable basin-wide change in abundance over time as compared to No Action. ○ Southern flounder – Negligible to minor, adverse, direct and indirect, permanent impact to species with potentially lower abundance than under No Action. ○ Largemouth bass – Moderate, beneficial, direct and indirect, permanent impact to species with greater abundance than under No Action. ○ Eastern oyster – Major, adverse, direct and indirect, permanent impact to species with major decrease in abundance earlier in analysis period than No Action and continues over time. ○ Freshwater fishes – Moderate, beneficial, direct and indirect, permanent impact to freshwater fish introduced into basin with greater abundance than under No Action. ○ Minor to moderate, permanent, indirect, adverse impacts on aquatic invasive plants and animals.			
Marine Mammals (Section 4.11)	• Gradually increasing minor, permanent, adverse impacts on Barataria Bay Estuarine System (BBES) dolphins.	Construction: • Negligible to minor, temporary, indirect, and adverse impacts on bottlenose dolphins from construction noise and dredging. Operational: • Major adverse impacts on BBES dolphins and dolphin habitat (due mostly to salinity) that would continue throughout the lifetime of the Project. Immediate decreases in salinity levels within the BBES Stock area, which would persist throughout the analysis period, would cause permanent, major adverse impacts on BBES dolphin health, survival, and reproduction. Dolphins north of the Barrier Islands would be especially adversely impacted, while Barrier Island-associated dolphins would be less-adversely impacted; however, all	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

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Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
		groups would be more adversely impacted than compared to conditions under the No Action Alternative. • Based on the projected decreases in survival rates due to prolonged low-salinity exposure, there would be a substantial reduction in population numbers.			
Threatened and Endangered Species (Section 4.12)	• No impact on the West Indian manatee, hawksbill and leatherback sea turtle, pallid sturgeon, and giant manta ray. • Minor adverse impact on the loggerhead and green sea turtles, and saltmarsh topminnow. • Negligible impact on the black rail and bald eagle. • Minor to moderate adverse impact on Kemp's ridley sea turtle, piping plover (and critical habitat), and red knot (and proposed critical habitat).	Construction: • No effect (no impact) on loggerhead sea turtle critical habitat, five species of sea turtles on nesting beaches, and designated (piping plover) or proposed (red knot) critical habitat. • Likely to adversely affect (minor adverse impact on) pallid sturgeon due to construction noise. • Not likely to adversely affect (negligible to minor impact on) West Indian manatee, piping plover, red knot, five species of sea turtles in marine environments, black rail, and giant manta ray. • Minor, temporary, adverse, and direct/indirect impacts on saltmarsh topminnow. • Negligible impact on bald eagles from loss of potential nesting trees and indirect disturbances from construction activities. Operational: • No effect (no impact) on four species of sea turtles on nesting beaches, or loggerhead or designated (piping plover) or proposed (red knot) critical habitat (compared to the No Action Alternative). • Not likely to adversely affect (negligible to minor adverse impact on) West Indian manatee; hawksbill and leatherback sea turtles in marine environments; the loggerhead sea turtle on nesting beaches; piping plover; red knot; black rail, and giant manta ray. • Likely to adversely affect (minor to moderate adverse impact on) the Kemp's ridley, loggerhead, and green sea turtles and pallid sturgeon. • Minor to moderate, permanent, direct and indirect, beneficial impacts on the saltmarsh topminnow. • Negligible to moderate, permanent, indirect, and adverse impacts on bald eagle from potential contaminant uptake.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Socioeconomics (Section 4.13)	• Economy, Employment, Businesses, and Industrial Activity: General trend continues: moderate to major, permanent, adverse impacts on economic activities. • Population: Major, permanent, adverse impacts on population outmigration. • Housing and Property Values: Negligible (inside flood protection) to major (outside flood protection), permanent, adverse impacts on property values. • Tax Revenue: Minor to moderate permanent, adverse impacts on sales and use revenues in the Project area. Impacts on property taxes are expected to be negligible for areas inside of flood protection, while for areas outside of flood protection, where	Construction: • Economy, Employment, Businesses, and Industrial Activity: Moderate to major, temporary, beneficial impacts from job creation and increased economic activity in the Project area. Short-term, minor to moderate, adverse impacts on some businesses located in the direct vicinity of construction activities associated with increased traffic, noise, and dust during construction. Minor, permanent, adverse impacts on agricultural outputs and employment in areas in and near the proposed Project footprint. • Population: Negligible impacts on population in the Project area. • Housing and Property Values: Minor, short-term, adverse impacts on properties within the construction footprint as well as properties within approximately 0.5-mile around the footprint. Minor to moderate, temporary, adverse direct construction impacts would occur on lands within the construction footprint, as well as adjacent lands, including nearby residences and businesses. • Tax Revenue: Minor to moderate, short-term, beneficial impacts on sales and use and income taxes across the State of Louisiana and local jurisdictions associated with construction spending, particularly in Plaquemines Parish. Minor, permanent, adverse impacts on property taxes receipts in Plaquemines Parish associated with reduced housing and property values. • Public Services and Utilities: Minor short-term benefits to public services associated with increased sales tax receipts, primarily in Plaquemines Parish.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Economy, Employment, Businesses, and Industrial Activity: Each terrace alternative would have similar construction impacts as listed for each corresponding flow capacity alternative without terraces (50,000, 75,000, and 150,000 cfs). Inclusion of spending on marsh terraces under any of the capacity alternatives would slightly increase the regional economic benefits of these alternatives as compared to the flow capacity alternatives. • All Other Socioeconomic Activities: Each terrace alternative would have the same impacts as listed for each corresponding

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
	populations are generally smaller, moderate to major, permanent, adverse impacts are expected. • Public Services and Utilities: Moderate to major, permanent, adverse impacts. Current trends of closures and decreases in public services in expected to continue. • Community Cohesion: Moderate permanent, adverse impacts on community cohesion. • Protection of Children**:** Minor, permanent, adverse impacts on the welfare of children.	Minor short-term adverse impacts on public services associated with reduced property taxes. Negligible impacts on utilities. • Community Cohesion: Negligible impacts on community cohesion. • Protection of Children: Negligible impacts on protection of children. Operational: • Economy, Employment, Businesses, and Industrial Activity, Negligible to minor, permanent, beneficial impacts on businesses and industrial activity in the west bank New Orleans area north of the diversion. Minor permanent, adverse impacts on the regional economy, employment, businesses, and industrial activity as a result of increased tidal flooding and storm surge in areas outside flood protection in the Barataria Basin, particularly in the 2030s to 2050s in areas near (within 10 miles north or 20 miles south) the immediate outfall area. Depending on the degree of flood impact, CPRA plans to acquire Project servitudes on affected properties within communities to compensate property owners for the impact of diversion-induced flooding on the value of their properties. • Population: Minor to moderate, permanent, adverse impacts on communities near the immediate outfall area (within 10 miles north or 20 miles south) outside of flood protection due to increased tidal flooding and associated outmigration. Depending on the degree of flood impact, CPRA plans to acquire Project servitudes on affected properties within communities to compensate property owners for the impacts of diversion-induced flooding on the value of their properties. Long-term, negligible to minor, beneficial impacts due to additional storm surge protection for the west bank New Orleans area north of the diversion. • Housing and Property Values: In the west bank New Orleans area north of the diversion, the Project would be expected to have minor, permanent, beneficial impacts on housing and property values as the land gained as a result of the proposed Project would decrease the risks of storm hazards. Minor to moderate, permanent, adverse impacts on housing and property values would occur in communities near the immediate outfall area (within 10 miles north or 20 miles south) outside of flood protection. Negligible to minor impacts for areas inside flood protection and for areas further (more than 20 miles) south of the diversion. • Tax Revenue: Minor to moderate, permanent, beneficial impacts on property tax revenues in the west bank New Orleans area north of the diversion. Minor, permanent, adverse impacts in areas outside of flood protection near the immediate outfall area (within 10 miles north or 20 miles south); negligible impacts expected in areas further from the immediate outfall area. Negligible impacts for areas inside flood protection. • Public Services and Utilities: Minor, permanent, beneficial impacts on public service facilities and delivery in the west bank New Orleans area due to decreased storm hazard risks and increased tax revenue. Public services and utilities infrastructure located outside of federal flood protection near (within 10 miles north or 20 miles south) the immediate outfall area would experience direct adverse impacts. Decreased tax revenues in Plaquemines and Jefferson Parishes would reduce funding for public services. Overall minor, permanent, adverse impacts on delivery of public services in Plaquemines and Jefferson Parishes. • Community Cohesion: Minor to moderate, permanent, adverse impacts on community cohesion in communities near the immediate outfall area (within 10 miles north or 20 miles south) outside of flood protection related to outmigration. • Protection of Children: Minor, permanent, adverse impacts on children in communities near the immediate outfall area (within 10 miles north or 20 miles			capacity flow alternative without terraces (50,000, 75,000, and 150,000 cfs) and would be similar to the Applicant's Preferred Alternative.

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
		south) outside of flood protection. Minor, permanent, beneficial impacts on children in the in the west bank New Orleans area north of the diversion.			
Commercial Fisheries (Section 4.14)	• Adverse impacts on the commercial shrimp fishery due to decrease in shrimp abundance from reduced marsh habitat and increased salinity over time. • Adverse impacts on the commercial oyster industry due to salinity shift over time, particularly after 2050. • Adverse impacts on commercial crab fishery due to decrease in blue crab abundance from reduced marsh habitat over time. • Adverse impacts on commercial fisheries for spotted seatrout, Atlantic croaker, and largemouth bass (proxy for freshwater species) as abundance declines in the long term due to reduced marsh habitat and increased salinity and water depth. • No or negligible impacts anticipated for southern flounder, Gulf menhaden, and bay anchovy commercial fisheries due to negligible impacts on species abundance over time.	Construction: • Minor, adverse, temporary impacts on commercial fishing during construction due to delays in accessing areas used for fishing as compared to No Action Alternative. Operational: • Moderate to major, permanent, adverse impacts on shrimp fisheries associated with adverse impacts on brown shrimp abundance over time. Impacts would further encourage fishers to exit from the industry. • Major, permanent, adverse impacts on eastern oyster fisheries due to adverse impacts on eastern oyster abundance. • Negligible to minor, permanent, beneficial impacts on blue crab fishery would be anticipated due to changes in species abundance. • A range of impacts on finfish fisheries would be expected. Decreases in species abundance in the Project area would cause direct reductions in commercial catch, discourage entrants into the fishery, and encourage exits, while the converse would be true where increases in abundance and catch would be anticipated. Specifically, as compared to the No Action Alternative: ○ Moderate, permanent, beneficial impacts on Gulf menhaden; ○ Minor, permanent, beneficial impacts on bay anchovy; ○ Negligible, impacts on Atlantic croaker; ○ Negligible to minor, permanent, adverse impacts on southern flounder; ○ Minor, permanent, adverse impacts on spotted seatrout; and ○ Moderate, permanent, beneficial impacts on freshwater finfish fisheries.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Environmental Justice (Section 4.15)	• Major, permanent, adverse impacts on low-income and minority populations. Environmental changes may impact low-income and minority populations more intensely than general population due to social and economic vulnerabilities, ties to traditional lands and lifeways, and dependence on commercial and subsistence fisheries that would be expected to decline over time.	Construction: • Minor to moderate, temporary, adverse impacts on low-income and minority populations within 0.5-mile of the construction footprint. Construction impacts on minority and low-income populations, including the population of Ironton, could be disproportionately high and adverse depending on the unique vulnerabilities within that community. Operational: • May have disproportionately high and adverse, long-term impacts on some low-income and minority populations in communities located near the immediate outfall area (within 10 miles north and 20 miles south) and outside of federal levee protection including populations within Myrtle Grove, Woodpark, Suzie Bayou, Hermitage, Grand Bayou, and Happy Jack due to increased tidal flooding and storm hazards, to the extent that such populations are uniquely vulnerable to tidal flooding and storm hazard impacts. In addition, negligible to minor increase in risk of levee overtopping in communities gulfward of the immediate outfall area during certain 1 percent (100 year) storms could result in disproportionately high and adverse impacts on low-income and minority populations in Ironton to the extent that overtopping leads to flooding in that community. To a lesser extent, tidal flooding could increase in the Lafitte area, which includes multiple communities with varying levels of existing non-federal flood protection. May have disproportionately high and adverse impacts on low-income and minority populations engaged in commercial and subsistence fishing and dependent on adversely impacted fisheries in the Barataria Basin; disproportionate impacts may vary according to levels of engagement and dependence. • For low-income or minority populations located in areas inside the federal levee system, or farther than 10 miles north and 20 miles south of the	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
		immediate outfall area, impacts from increased tidal flooding and storm surge caused by operation of the Project are expected to be negligible. Impacts on low-income and minority populations in these areas would not be disproportionate. For low-income or minority populations located in areas north of the diversion, some beneficial impacts related to additional protection from storm hazards due to reduced storm surge and wave heights as a result of land building may occur relative to the No Action Alternative.			
Recreation and Tourism (Section 4.16)	• No impacts on recreation and tourism from construction of the proposed Project would occur. Ongoing trends would continue. • Negligible (early decades) to major (later decades) declines in recreation site accessibility. • Minor, permanent decreases in the abundance and recreational fishing of spotted seatrout and red drum. • Moderate, permanent, decreases in site accessibility for recreational boating. • Adverse impacts on hunting and wildlife watching. • Major, permanent adverse impacts on visitation to privately-managed recreation areas. • Recreational expenditures in the region and the associated economic impacts would decrease over time.	Construction: • Temporary, minor, localized, adverse impacts from construction due to traffic, increased dust, and noise impacts which may contribute to delays in accessing sites. Water-based construction traffic in the Mississippi River and Barataria Basin may also have minor impacts on recreational site access for recreational users. Operational: • Long-term to permanent, minor to moderate, adverse impacts on site accessibility, recreational boating, and boat-based recreational fishing due to tidal flooding, sedimentation, and expansion of invasive plant species. • Minor, permanent, adverse impacts on recreational fishing for spotted seatrout. • Moderate, permanent, beneficial impacts on recreational fishing for red drum. • Minor to moderate, permanent, beneficial impacts on hunting and wildlife watching due to increases in wetland habitat. • Minor, permanent, adverse or beneficial impacts on the regional economy associated with recreational expenditures in the region.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Public Lands (Section 4.17)	• Major, permanent, and adverse impacts on public lands due to decreases in wetland habitat availability for fish and wildlife and adverse impacts on visitation accessibility.	Construction: • Temporary, minor, adverse impacts from construction due to temporary and localized traffic congestion from the mobilization of crews and equipment, which may contribute to delays in accessing public lands. Operational: • Negligible to minor, adverse, permanent impacts on public lands in the Barataria Basin due to negligible to minor, adverse impacts on wetland habitat at these sites. • Minor to moderate, adverse, permanent impacts on the Pass A Loutre Wildlife Management Area (WMA) and Delta National Wildlife Refuge (NWR) in the birdfoot delta due to projected decreases in wetland habitat. • Long-term, minor to moderate, adverse direct and indirect impacts on site accessibility due to increased tidal flooding at public lands and private recreation sites (or roads leading to those sites).	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Land Use and Land Cover (Section 4.18)	• No impacts on land use from construction of the proposed Project would occur. • Any future impacts would be required to comply with applicable permits and laws. • Major, permanent, adverse impacts due to continued land loss in the Barataria Basin and birdfoot delta.	Construction: • Moderate, temporary and short-term, adverse impacts due to vegetation clearing, ground disturbance, and fill placement. Operational: • Moderate, permanent impacts on existing land use. • Major, permanent beneficial impacts in the Barataria Basin due to lands that are sustained or created (13,400 acres by year 2070). • Moderate, permanent, adverse or beneficial (depending on the user) impacts on wetland land loss in the birdfoot delta (an additional 3,000 acres lost by 2070).	• Major, permanent beneficial impacts in the Barataria Basin due to lands that are sustained or created (9,660 acres by year 2070). • Moderate, permanent, adverse or beneficial (depending on the user) impacts on wetland land loss in the birdfoot delta (an additional 2,820 acres lost by 2070).	• Major, permanent beneficial impacts in the Barataria Basin due to lands that are sustained or created (29,200 acres by year 2070). • Moderate, permanent, adverse or beneficial (depending on the user) impacts on wetland land loss in the birdfoot delta (an additional 2,820 acres lost by 2070).	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

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Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
			• All other impacts would be similar to the Applicant's Preferred Alternative.	• All other impacts would be similar to the Applicant's Preferred Alternative.	
Aesthetic and Visual Resources (Section 4.19)	• No impacts on aesthetic and visual resources from construction of the proposed Project would occur. • Any future impacts would be required to comply with applicable permits and laws. • Minor to major, adverse to beneficial, permanent impacts on aesthetic and visual resources depending on type and scope of potential future development.	Construction: • Temporary, minor, adverse impacts on visual resources during construction of the Project. Operational: • Permanent, moderate, adverse impacts on visual resources from operation of the Project due to presence of aboveground structures. • During operations, permanent, minor, beneficial changes in the existing viewshed within the Barataria Basin due to wetland creation and restoration.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Public Health & Safety, Including Flood and Storm Hazard Risk Reduction (Section 4.20)	• Minor to major, permanent, adverse impacts from increase in frequency and severity of non-storm and storm related flooding inside and outside federal levee systems.	Construction: • Minimized risk of inadvertent releases of contaminants which could cause temporary, adverse impacts that range from no impact to moderate, depending on nature of release. • Minimized risk of storm events which could cause construction equipment and material related impacts which could have short-term, adverse impacts that range from minor to moderate impact. Operational: • Minor to major, adverse, long-term impacts on public health and safety due to increased tidal flooding in the Barataria Basin communities near the immediate outfall area not protected by federal levees. • Minor to moderate, beneficial, permanent impacts on public health and safety associated with storm hazards in communities outside of federal levee systems north of the immediate outfall area. • Minor to moderate, adverse, permanent impacts on public health and safety risks associated with storm hazards in communities outside of federal levee systems south of the immediate outfall area. • Negligible to minor, beneficial, permanent impacts on decreasing levee overtopping north of the immediate outfall area and permanent, negligible to minor, adverse impacts on increasing levee overtopping immediate outfall area.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Similar impacts as Applicant's Preferred Alternative, with greater major intensity of impact on public health and safety than the Applicant's Preferred Alternative during the first 20 years of the analysis period, particularly in communities outside the federal levee system closer to the immediate outfall area.	Construction • Construction of terraces would alter approximately 88 additional acres of 100-year floodplains than the corresponding capacity flow alternative without terraces (50,000, 75,000, and 150,000 cfs) Alternative, but no impacts on public health and safety. Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Navigation (Section 4.21)	• Cargo tonnages and marine vessels transiting the Lower Mississippi River, GIWW, Barataria Bay Waterway, and Bayou Lafourche would continue to show little or no growth. • Existing dredging trends would continue.	Construction: • Minor, temporary, adverse impacts on traffic capacity in the Lower Mississippi River and the Barataria Basin federal navigation channels due to 10 monthly barge deliveries of construction materials via both the Mississippi River and Barataria Basin channels during the construction period. • Minor, temporary, adverse impacts on safety and efficiency of shallow-draft vessels transiting past the proposed Project site in the Mississippi River during construction due to waterway obstructions associated with the proposed cofferdam for the 3.5-year construction timeframe of the river intake system. Operational: • Moderate, intermittent but permanent, adverse impacts on marine traffic efficiency and safety for shallow-draft vessels in the Mississippi River during operations due to cross-currents extending into the channel from the proposed intake structure. Some congestion may be unavoidable and could cause transit delays. • Minor, permanent, adverse impacts on maintenance dredging between the proposed intake structure (RM 60.7 AHP) and Venice (RM 13 AHP) in the	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

Table 2.9-1
Comparative Summary of Potential MBSD Impacts Under Each Alternative (as Compared to the No Action Alternative unless Otherwise Stated)

Resource	No Action Alternative	75,000 cfs Alternative (Applicant's Preferred)	50,000 cfs Alternative	150,000 cfs Alternative	Terrace Alternatives
		Mississippi River due to changes in typical shoaling patterns and locations and minor increases in dredging quantities if new point bar growth intrudes into the navigation channel. • Moderate, permanent, adverse impacts on maintenance dredging in the Mississippi River from Venice to the Gulf, including Head of Passes and in Southwest Pass, and in other passes carrying flow to the Gulf (for example, South Pass, Tiger Pass). • Minor, permanent, indirect impacts on marine traffic in the Barataria Basin navigation channels due to increased dredging frequencies (dredging activities may cause delays for marine traffic). • Moderate, permanent, adverse impacts on maintenance dredging in the Barataria Bay Waterway due to increased sedimentation. • Minor, permanent, adverse impacts on maintenance dredging in Bayou Lafourche due to increased sedimentation.			
Land-Based Transportation (Section 4.22)	• Future increases in LA 23 traffic volumes of 2.2 percent annually. • NOGC train traffic expected to remain at current levels. • Future industrial and commercial development in vicinity of the Project site may induce increases in roadway and railroad traffic volumes, which may result in congestion and delays for motorists.	Construction: • Temporary, moderate, adverse impacts on roadway traffic delays and congestion from construction-generated traffic and reduced roadway capacity for southbound traffic on LA 23. • Temporary, minor, adverse impacts on increased NOGC train traffic from rail deliveries of construction materials. Operational: • Permanent, minor, adverse impacts on LA 23 traffic access due to closure of two median cross-over locations. • Permanent, minor, beneficial impacts on LA 23 traffic safety due to limited wildlife access on proposed LA 23 bridge.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Hazardous, Toxic, and Radioactive Waste (Section 4.23)	• Only limited impacts on hazardous, toxic, and radioactive waste (HTRW) are expected to occur during the 5-year analysis period (the period that would otherwise be required for construction of the proposed Project); therefore, there would likely be only negligible HTRW impacts during that timeframe. Existing HTRW within the basin and the birdfoot delta could be impacted as a result of future development or ongoing processes, potentially resulting in minor to major, permanent adverse impacts over time, depending on the type of future developments or events.	Construction: • Temporary, minor to moderate, adverse impacts due to potential unexpected discovery of and exposure to existing contaminated sites. Operational: • Short- to long-term, minor to major adverse impacts resulting from the transport and use of potentially harmful chemicals and fuels needed for general equipment maintenance and operation and increased water flow and sedimentation.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).
Cultural Resources (Section 4.24)	• Existing and future trends, including subsidence and erosion, within the Operational Impacts Area of Potential Effects (APE) would continue.	Construction: • USACE determined that the undertaking will have an adverse effect on one (1) historic property (archaeological site, 16PL107) within the Construction Impacts APE. Operational: • USACE determined the undertaking will have an adverse effect on 5 historic properties (archaeological sites) within the Operational Impacts APE.	• Impacts would be similar to the Applicant's Preferred Alternative.	• Impacts would be similar to the Applicant's Preferred Alternative.	Construction and Operational: • As compared to the No Action Alternative, the three terrace alternatives would have substantially similar impacts as the corresponding capacity flow alternatives without terraces (50,000, 75,000, and 150,000 cfs).

Attachment 9: Compliance with Other Laws and Regulations

Compliance with Other Laws and Regulations

1 Consultations under the Endangered Species Act

The process to comply with the Endangered Species Act (ESA) is detailed in the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS) (Section 6.9.1.) and in the "*Deepwater Horizon* Trustee Council Standard Operating Procedures – Appendix F Environmental Compliance Manual" (*Deepwater Horizon* [DWH] Trustees, 2016c). For the alternatives proposed under the Final Phase II Restoration Plan #3.2: Mid-Barataria Sediment Diversion (Final RP #3.2 or Final RP) and associated Final Mid-Barataria Sediment Diversion Environmental Impact Statement (Final MBSD EIS or Final EIS), the Louisiana Trustee Implementation Group (Louisiana TIG) complied with the ESA by engaging in Section 7 consultation with both U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for species under each of their respective jurisdictions. The Louisiana TIG provided a Biological Assessment to NMFS on March 17, 2021, and to USFWS on April 15, 2021, along with the requests to initiate formal consultation and develop Biological Opinions for species that the Mid Barataria Sediment Diversion (the MBSD, Alternative 1, or the Project) *may affect and is likely to adversely affect* (the pallid sturgeon and the Kemp's ridley, green, and loggerhead sea turtles). On December 13, 2021, the USFWS and NMFS individually issued Biological Opinions that concluded that the Project would have *no effect* or *is not likely to adversely affect* the remaining species noted above (Section 5.1.7) or any critical habitat in the Project area. The Biological Opinions further determined that the Project would not jeopardize the continued existence of pallid sturgeon (USFWS) and green, Kemp's ridley, and loggerhead sea turtles (NMFS). The Biological Opinions include Incidental Take Statements (setting forth allowable incidental take for adversely affected species), reasonable and prudent measures (to minimize impacts of takings on specific species), and Conservation Recommendations (voluntary conservation measures to assist species' recovery) for the pallid sturgeon and the green, Kemp's ridley, and loggerhead sea turtles. Consultation under the ESA is complete. The Louisiana Coastal Protection and Restoration Authority (CPRA) will implement all reasonable and prudent measures and all Conservation Recommendations from both the USFWS and the NMFS Biological Opinions as part of its Project implementation.

All formal and informal consultations required by USFWS or NMFS under the ESA have been initiated and completed. The relevant consultation documents are included in Appendix O of the Final MBSD EIS.

1.1 Magnuson–Stevens Fishery Conservation and Management Act

The U.S. Army Corps of Engineers (USACE) and NMFS, on behalf of the Louisiana TIG, contacted NMFS regarding Essential Fish Habitat (EFH) consultation in December 2019 to notify NMFS that the Project may impact EFH. The USACE and NMFS, on behalf of the Louisiana TIG, provided an EFH assessment and requested EFH consultation with NOAA in February 2021. NMFS issued a response to the EFH consultation in June 2021, in which NMFS concurred with the USACE's findings regarding EFH and provided conservation recommendations. CPRA will implement all conservation recommendations as part of its Project implementation. This documentation, including the conservation recommendations, are provided in Appendix N of the Final MBSD EIS. If, after further consultation with CPRA and USACE, NMFS modifies these recommendations in the future, the modified recommendations shall automatically supersede the recommendations attached in Appendix N of the Final MBSD EIS.

1.2 The Marine Mammal Protection Act

Marine Mammal Protection Act (MMPA) compliance for the Project has been addressed in accordance with Section 20201 of Title II of Public Law No. 115–123 (the "Bipartisan Budget Act of 2018"), which specifically addresses the Project. As directed by the Bipartisan Budget Act of 2018 (Public Law 115-123), NMFS issued an MMPA waiver for the MBSD, Mid-Breton Sound Sediment Diversion, and Calcasieu Ship Channel Salinity Control Measures Projects (NMFS, 2018a) on March 15, 2018 (NMFS, 2018b). Section 20201 of Title II of Public Law No. 115–123 also requires that the State of Louisiana, in consultation with NMFS: "(1) to the extent practicable and consistent with the purposes of the projects, minimize impacts on marine mammal species and population stocks; and (2) monitor and evaluate the impacts of the projects on such species and population stocks." Measures developed in recognition of the impacts on marine mammals can be found in Appendices A, B, and C of the Final RP #3.2.

1.3 Compliance under the National Historic Preservation Act

All projects tiered from the Final PDARP/PEIS, including the alternatives selected for implementation, were reviewed under Section 106 of the National Historic Preservation Act (NHPA) prior to any project activities that would restrict consideration of measures to avoid, minimize, or mitigate any adverse impacts on historic properties located within a project area. The Project will be implemented in accordance with all applicable federal and state laws and regulations, including those laws and regulations concerning the protection of cultural and historic resources.

The USACE led the Section 106 of the NHPA of 1966 compliance effort for the Project and the Louisiana TIG signed the Programmatic Agreement as concurring parties (ROD Attachment 10). The USACE sent a letter of introduction and invitation to informally begin the NHPA consultation process on October 21, 2016. The USACE also invited the following Tribal Nations to consult in the development of the Programmatic Agreement: Alabama Coushatta, Caddo Nation of Oklahoma, Chitimacha, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw, Mississippi Band of Choctaw, Muscogee Nation, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana. The Alabama Coushatta, the Caddo Nation of Oklahoma, and the Choctaw Nation of Oklahoma are participating. In 2017, the USACE initiated formal consultation between the Advisory Council on Historic Preservation, Louisiana State Historic Preservation Office (SHPO), and participating Tribal Nations.

The USACE consulted with the SHPO and Federally-recognized Tribal Nations to identify concerns and determine survey requirements for Section 106 compliance. All consulting parties agreed to a Construction Impacts Area of Potential Effect (APE) of approximately 3,095 acres that encompasses the footprint of all Project features and an Operational Impacts APE of approximately 70,630 acres within the Barataria Basin.

A Phase I cultural resources survey was conducted from August to November 2019 in both the Construction Impacts and Operational Impacts APEs. Phase II National Register of Historic Places (NRHP) eligibility testing was conducted at one site (16PL107) in the Construction Impacts APE from January to March 2022. The cultural resources surveys found:

1) The majority of the 31 previously recorded archaeological sites within the Operational Impacts APE are submerged due to forces including subsidence and erosion, and the identifiable portions do not contain qualities of significance or integrity and therefore, these sites are considered not NRHP-eligible; and

2) Four (4) previously-recorded archaeological sites within the Operational Impacts APE retain integrity and have been determined to be historic properties eligible for listing in the NRHP (Sites 16JE2, 16JE3, 16JE11, 16JE147); and

3) Two (2) new archaeological sites were identified in the Operational Impacts APE, but only one (Site 16JE237) retains integrity and is being treated as NRHP eligible; and

4) Numerous archaeological and architectural features within 16PL107 Locus 1 in the Construction Impacts APE within the Project construction limits contribute to Site 16PL107's significance. The portion of 16PL107 in the Project construction limits of the Construction Impacts APE has been determined eligible for listing in the NRHP; and

5) One (1) previously identified archaeological site within the Construction Impacts APE (Site 16PL269) was determined not eligible for listing in the NRHP.

The USACE determined that the Project would have an adverse effect on NRHP-eligible and NRHP-potentially eligible resources. The Section 106 Consultation concluded with execution of a Programmatic Agreement (ROD Attachment 10). The Programmatic Agreement is provided in Appendix K of the Final MBSD EIS and attached as Appendix A to the Final Mitigation and Stewardship Plan.

1.4 Compliance with the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

All pertinent Best Management Practices (BMPs)/Conservation Measures outlined in the Biological Assessment, found in Appendix O of the Final MBSD EIS, will be followed.

The BMPs listed in Final EIS Chapter 4, Section 4.27 Mitigation Summary, Appendix R1, and USFWS Fish and Wildlife Coordination Action Report (FWCAR) recommendations will be followed to avoid impacts on any protected birds.

In order to comply with the Bald and Golden Eagle Protection Act (BGEPA), USFWS developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: https://www.fws.gov/media/national-bald-eagle-management-guidelines. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Onsite personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to U.S. Fish and Wildlife Service, Deepwater Horizon Gulf Restoration Office. If a bald eagle nest occurs or is discovered within or adjacent to the 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: https://www.fws.gov/library/collections/bald-and-golden-eagle-management. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary.

1.5 Compliance with Fish and Wildlife Coordination Act

The BMPs listed in Final EIS Chapter 4, Section 4.27 Mitigation Summary, Appendix R1, and USFWS FWCAR recommendations would be followed to avoid impacts on any protected birds. Abbreviated recommendations of the final FWCAR include the following and are explained in more detail in the full report.

- The USFWS recommends the construction of crevasse projects that may include terracing to offset the indirect loss of 926 acres on the Delta National Wildlife Refuge and 37 acres on the Pass Au Loutre Wildlife Management Area.
- The impacts to Essential Fish Habitat (EFH) should be discussed with the NMFS to determine if the project complies with the MSFCMA (Magnuson-Stevens Act; P.L. 104-297, as amended) and its implementing regulations.
- In order to better coordinate and consider the overall health of the Barataria Basin, the USFWS recommends that a basin-wide operations and monitoring data repository be developed.
- The USFWS recommends sampling of fish and shellfish and, if warranted, local nesting bald eagles, (e.g., fecal and blood samples) for contaminants commensurate with the most recent U.S. Environmental Protection Agency Priority Pollutant list. If high levels of contaminants are found, the USFWS and other resource agencies should be consulted.
- The USFWS recommends that consideration be given to operating the diversion in a manner that would prevent or minimize adverse impacts to wetlands due to prolonged inundation and focus on the overall enhancement of the entire project area to the greatest extent possible.
- The USFWS recommends, in coordination with other resource agencies, development of a detailed (Monitoring and Adaptive Management) MAM Plan to inform operational decisions in order to minimize adverse impacts where possible.
- The USFWS recommends adaptively managing the diversion outfall area to minimize stage increases and to maximize distribution and capture of suspended sediments within the immediate outfall area.
- A report documenting the current and future management, including the status of implementation, operation, maintenance, adaptive management measures, and proposed changes to management should be prepared every three years by the managing agency and provided to the resource agencies.
- Further detailed planning of project features and any adaptive management and monitoring plans should be developed in coordination with the natural resource agencies with considerations given to their recommendations.
- The USACE and the Louisiana TIG completed formal consultation with the USFWS, and the Service issued a Biological Opinion on December 13, 2021. That biological opinion specifically addressed impacts to the endangered pallid sturgeon and concurrence for the West Indian manatee, eastern black rail, red knot, piping plover and its critical habitat, Kemp's ridley sea turtle, and the loggerhead sea turtle. The USACE, the Louisiana TIG, CPRA, and any contractors or personnel involved with the Project should adhere to the reasonable and prudent measures and terms and conditions detailed in that Biological Opinion in order to be covered under the Incidental Take Permit associated with that biological opinion.
- During in-water work in areas that potentially support manatees, all project personnel should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees and be advised of civil and criminal penalties if these BMPs are not adhered to.
- If implementation of the action has the potential to directly or indirectly affect the eastern black rail, red knot, piping plover or its critical habitat, Kemp's Ridley sea turtle, or loggerhead sea turtle or sea turtle nesting habitat, beyond what was previously considered in the USFWS's December 13, 2021, Biological Opinion, then consultation with this office should be reinitiated.

- To avoid adverse impacts to Migratory Bird Treaty Act and BGEPA nesting, the FWCAR recommends careful planning and timing of construction along with on-site inspections for wading bird nesting colonies and bald eagle's nests.
- The USFWS recommends that the CPRA and the USACE contact the Service and the Louisiana Department of Wildlife and Fisheries for additional consultation if: 1) the scope or location of the 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 designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made or finalized.

1.6 Compliance with the Clean Water Act and Rivers and Harbors Act

The MBSD Project requires authorization under the (Clean Water Act) CWA and Rivers and Harbors Act (RHA). Consistent with CWA Section 404, the USACE has completed the Section 404(b)(1) evaluation of the Project as provided in its Record of Decision (ROD) and issued the Section 404 permit for the Project on December 19, 2022. A CWA Section 401 Water Quality Certification associated with the Section 404 permit application for the Project has been issued by the Louisiana Department of Environmental Quality and is provided in Appendix S of the Final MBSD EIS. In regard to compliance with CWA Section 402, CPRA will be responsible for obtaining any National Pollutant Discharge Elimination System (NPDES) permits. In regard to RHA compliance, the USACE has authorized the Project under Section 10 and approved the Section 408 (33 U.S.C. 408) Request for Permission as provided in its December 19, 2022, Summary of Findings and ROD.

1.6.1 Jurisdictional Wetlands and Waters of the U.S

Construction of the Project would include excavation within the 204.2 acres of jurisdictional wetlands and 307.2 acres of open water. CPRA proposes to use excess excavated material in several ways, including marsh creation areas adjacent to the Project outfall feature. CPRA proposes to repurpose 2.0 million cubic yards of excavated material to create 375 acres of emergent marsh and nourish 92 acres of existing marsh during Project construction.

Details regarding these marsh creation areas are provided in the Final MBSD EIS (Chapter 2, Section 2.8.1.1 Project Design Features). This marsh creation through beneficial use of excavated material, according to Wetland Value Assessment modeling, would at minimum provide equivalent Average Annual Habitat Units (AAHUs) to the identified AAHUs anticipated to be lost due to direct impacts from Project construction. These marsh creation features will be constructed concurrently with overall construction of the Project. The Final MBSD EIS Table 4.27-3 offers a comparison of the jurisdictional wetland impacts compared to the projected benefits in AAHUs for these beneficial use wetland creation areas.

CPRA is not relying on diversion marsh creation performance to replace the permanent loss of wetlands that will result from Project construction. However, the Final MBSD EIS Table 4.27-3 provides wetland benefits in AAHUs over the Project’s 50-year analysis period in addition to the beneficial use marsh creation areas to summarize the total projected benefits in AAHUs of the Project. CPRA’s MAM Plan includes monitoring and triggers for management actions to ensure adequate creation and/or maintenance of marsh.

1.7 Permit Special Conditions

Department of Army (DA) permits contain standard general conditions applicable to all Section 404/10 permits (see 33 CFR Part 325, Appendix A). Other special conditions may be included in a DA permit, depending on the type of permit (such as Section 404, Section 10) or permission (Section 408) and the circumstances particular to the work. Both the USACE, Mississippi Valley Division, New Orleans District (CEMVN) 404/10 ROD and the CEMVN 408 ROD include general and special conditions applicable to the Project. (https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/).

1.8 FAST-41

In addition to the compliance requirements described above, the Project has been added to the inventory of "covered projects" pursuant to the requirements set forth in Title 41 of the Fixing America's Surface Transportation Act (FAST-41) (42 U.S.C. 4370m). FAST-41 created a new governance structure, set of procedures, and funding authorities to improve the timeliness, predictability, and transparency of the federal environmental review and authorization process for covered infrastructure projects. It works to streamline the permitting process within the structure of existing federal environmental reviews and authorizations. FAST-41 calls for the designation of a lead federal agency and promotes early consultation and enhanced interagency coordination by requiring the development of a project-specific plan and permitting timetable for the completion of environmental reviews and authorizations. As a "covered project," the Project was placed on the Permitting Dashboard, and each federal agency with a role in the review and authorization of the Project agreed to a Coordinated Project Plan aimed at eliminating unnecessary sequencing of and duplication in the environmental review process and improving coordination and timely and efficient processes for environmental review and authorizations.

1.9 Compliance with State and Local Laws and Regulations

The Louisiana TIG will ensure compliance with all applicable state and local laws relevant to the State of Louisiana. Potentially applicable state laws and regulations include:

- Archeological Finds on State Lands (LA. Rev. Stat. 41:1605);
- Hurricane Protection, Flood Control, and Coastal Restoration (La. Rev. Stat. 49:214.1-214.7);
- Louisiana State and Local Coastal Resources Management Act (La. Rev. Stat. 49:214.21-214.42);
- Louisiana Oil Spill Prevention and Response Act (La. Rev. Stat. 30:2451 et seq.);
- Management of State Lands (La. Rev. Stat. 41:1701.1 et seq.);
- Louisiana Coastal Resources Program (La. Admin. Code 43:700 et seq.);
- Louisiana Surface Water Quality Standards (La. Admin. Code 33.IX, Chapter 11);
- Management of Archeological and Historic Sites (La. Rev. Stat. 41:1605); and
- Oyster Lease Acquisition and Compensation Program (La. Admin. Code 43:I, 850-859, Subchapter B).

Attachment 10: NHPA Section 106 Programmatic Agreement

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
Choctaw Nation of Oklahoma,
Louisiana State Historic Preservation Officer,
The Advisory Council on Historic Preservation
and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

WHEREAS, the State of Louisiana, acting by and through the Coastal Protection and Restoration Authority (CPRA), proposes to construct the Mid-Barataria Sediment Diversion (MBSD), a large-scale sediment diversion in the Barataria Basin for the purpose of reconnecting and re-establishing sustainable deltaic processes between the Mississippi River and the Barataria Basin through the delivery of sediment, freshwater, and nutrients to support the long-term viability of existing and planned coastal restoration efforts and to help restore habitat and ecosystem services injured in the northern Gulf of Mexico as a result of the *Deepwater Horizon* (DWH) oil spill; and

WHEREAS, on June 22, 2016, the CPRA submitted a permit application for a Department of Army permit for MBSD to the New Orleans District of the U.S. Army Corps of Engineers (CEMVN) under the provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Appropriation Act of 1899, as amended (33 U.S.C. 403) (hereafter “Section 10/404”), and a request for permission under Section 14 of the Rivers and Harbors Appropriation Act of 1899 (33 U.S.C. 408) (hereafter “Section 408”); and

WHEREAS, CEMVN has determined that the proposed MBSD project has the potential for significant impacts and requires an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) to inform CEMVN’s permit decision (CEMVN, 2021, Draft Environmental Impact Statement for the Mid-Barataria Sediment Diversion Project. Plaquemines and Jefferson Parishes, Louisiana). The CEMVN Regulatory permit processing number is MVN-2012-2806-EOO; and

WHEREAS, the United States Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the United States Department of the Interior (DOI), and the United States Department of Agriculture (USDA) are cooperating agencies and CEMVN is lead federal agency for the EIS and these agencies have executed a Memorandum of Understanding (MOU) dated September 11, 2017, to specify duties and obligations among Federal Agencies; and

WHEREAS, the executed MOU among Federal Agencies states that CEMVN is coordinating with the Louisiana State Historic Preservation Office (LA SHPO) and Tribal Nations; and

WHEREAS, EPA, NOAA, DOI, and USDA are Federal Agencies who may fund the construction of the MBSD project as natural resource trustees under the Oil Pollution Act of 1990 (33 U.S.C. 2701) and are the federal agency members of the Louisiana Trustee Implementation Group for the *Deepwater Horizon* oil spill; and

WHEREAS, demonstration of National Historic Preservation Act of 1966 (NHPA), as amended (formerly 16 U.S.C. 470), Section 106 compliance is a necessary predecessor to a permit decision; and

WHEREAS, CEMVN, EPA, NOAA, DOI, and USDA have determined that the MBSD project is an “Undertaking” pursuant to the NHPA and will have an adverse effect on properties included or eligible for inclusion in the National Register of Historic Places (National Register or NRHP); and

WHEREAS, CEMVN, EPA, NOAA, DOI, and USDA have designated CEMVN as the lead federal agency for Section 106 of the NHPA for the MBSD project pursuant to 36 CFR 800.2(a)(2); and

WHEREAS, CEMVN as lead federal agency has invited EPA, NOAA, DOI, and USDA to concur in this Agreement pursuant to 36CFR 800.6(c)(3); and

WHEREAS, CEMVN has elected to fulfill the collective responsibilities of these agencies under Section 106 of the NHPA for the Undertaking through the execution and implementation of this Programmatic Agreement (Agreement) as provided in 36 CFR 800.14(b); and

WHEREAS, CEMVN notified the Advisory Council on Historic Preservation (ACHP) of the potential for this Undertaking to adversely affect historic properties pursuant to the ACHP's implementing regulations (36 CFR Part 800); and

WHEREAS, the ACHP accepted the invitation to participate in consultation to develop this Agreement and to seek ways to avoid, minimize, or mitigate adverse effects on historic properties; and

WHEREAS, CEMVN acknowledges Tribes as sovereign nations which have a unique Government-to-Government relationship with the federal government and its agencies; CEMVN further acknowledges its Trust Responsibility to those Tribes; and

WHEREAS, CEMVN made a reasonable and good faith effort to identify any Tribes that may attach religious and cultural significance to historic properties that will be affected by the Undertaking; and

WHEREAS, the CEMVN has invited the 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 the Tunica-Biloxi Tribe of Louisiana to consult in the development of this Agreement. The Seminole Nation of Oklahoma has deferred to the Chitimacha Tribe, and the Muscogee (Creek) Nation has chosen not to participate in further coordination; and

WHEREAS, the Chitimacha Tribe of Louisiana, and the Choctaw Nation of Oklahoma have participated in the development of this Agreement and CEMVN has invited each of them to sign this Agreement as an Invited Signatory; and

WHEREAS, the Mississippi Band of Choctaw has participated in the development of this Agreement and CEMVN has invited them to concur in this Agreement; and

WHEREAS, CEMVN has and will continue to consult with any interested Tribe who may have not yet requested to consult; and

WHEREAS, the CEMVN has taken appropriate measures to identify other parties that may be interested specifically in the development of this Agreement, by notification to the Presidents of Plaquemines and Jefferson Parishes, as well as to historical associations within these parishes, and has invited such parties to participate in the development and implementation of this Agreement; and

WHEREAS, CPRA is the Applicant and Proponent for MBSD project and has participated in the development of this Agreement and has been invited to sign this Agreement as an Invited Signatory; and

WHEREAS, the terms Signatory and Signatories will include reference to Invited Signatories throughout the remainder of this Agreement; and

WHEREAS, if an Invited Signatory chooses not to sign this Programmatic Agreement, then that party is instead regarded as a Consulting Party; and

WHEREAS, CEMVN in collaboration with CPRA as permit Applicant, with SHPO, with federally recognized Tribes, and with the ACHP have defined two Areas of Potential Effect (APE) for the MBSD Project as depicted in Appendix B; and

WHEREAS, after agreement upon two APEs for the MBSD, Phase I investigations comprehensively, and Phase II investigations in a portion of the Construction APE, have occurred in order to identify historic properties within the APEs; and

WHEREAS, CEMVN consulted with LA SHPO and Tribes on June 30, 2020 and on June 6, 2022 and determined that there are five (5) historic properties (16PL107, 16JE2, 16JE3, 16JE11, 16JE147) for which effects must be taken into account, in the MBSD APEs; and

WHEREAS, for the purpose of considering effects to historic properties, Site 16JE237 has an undetermined eligibility but will be treated as an historic property, and so a total of six (6) historic properties exist within the MBSD APEs; and

WHEREAS, CEMVN consulted with the ACHP, SHPO, Tribal Historic Preservation Officers (THPO) and federally recognized Indian Tribes as defined under 36 CFR 800.16(m) (Tribes), and other appropriate Consulting Parties in developing this Agreement to take into consideration the effects of the MBSD project upon historic properties pursuant to 36 CFR 800.14(b); and

WHEREAS, the CEMVN has considered the nature of MBSD construction and operation and likely effects on historic properties and has taken steps to involve the individuals, organizations and entities likely to be interested and has involved the public through the NEPA process, which affords interested persons, organizations and government agencies an opportunity to review and comment on proposed major federal actions that are evaluated in a NEPA document; and

WHEREAS, the CEMVN has taken steps to notify the wider public. The public scoping process included three meetings held in Jefferson and Plaquemines Parishes, on 20, 25, and 27 July 2017. Notices of the public scoping meetings were sent through email distribution lists, posted on CEMVN's Mid-Barataria Sediment Diversion EIS website: (http://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS), and mailed to public libraries, government agencies, and interested groups and individuals. Scoping meeting dates and locations were advertised in the following local newspapers on the following dates in 2017:

i. Plaquemines Gazette, July 4 and 11;
ii. The Times Picayune, July 5 and 14; and
iii. The Advocate, July 5 and 17.

The newspaper scoping meeting ads stated that Vietnamese translation would be available at the meetings, and that translation services in other languages were available upon request; and

WHEREAS, a draft version of this Programmatic Agreement was published with the Draft EIS. A Notice of Availability (NOA) for the MBSD Draft EIS was published in the Federal

Register. The formal Draft EIS comment period along with public meeting dates was announced through a Public Notice that was published to the CEMVN's Project website, emailed to interested parties, and advertised in local media. During the 90-day comment period regarding the Draft EIS, interested persons and organizations were invited to review and comment on the Draft EIS, including Sections 3.24 and 4.24 regarding cultural and historical resources and anticipated impacts from the MBSD on those resources, as well as to review and comment on the draft Programmatic Agreement and Alternative Mitigation Plan. CEMVN considered these comments in finalizing this Programmatic Agreement and responses to these comments are included in Appendix B to the Final EIS. Additional details regarding public outreach related to the EIS are included in Chapter 7 of the Final EIS; and

NOW, THEREFORE, the CEMVN, LA SHPO, and ACHP agree that the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties.

STIPULATIONS

CEMVN shall ensure compliance with the following measures:

I. Correspondence

A. Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions. See Appendix A for a list of contacts and email addresses. Contact information in Appendix A may be updated as needed without an amendment to this Agreement. It is the responsibility of each Consulting Party to immediately inform the CEMVN of any change in name, address, email address, or phone number of any point-of-contact. The CEMVN will forward this information to all Signatories by email. Failure of any Consulting Party to notify the CEMVN of any change to a point-of-contact's information shall not be grounds for asserting that notice of a proposed action was not received.

B. All standard response timeframes established by 36 CFR Part 800 will apply to this Agreement, unless an alternative response timeframe is agreed to by the CEMVN, LA SHPO, Tribes, and CPRA. The CEMVN may request expedited review by the LA SHPO and Tribes on a case by case basis. Such expedited review period shall not be less than 10 working days.

II. Tribal Consultation

A. The CEMVN has made a reasonable and good faith effort to identify Tribes that might attach religious and cultural significance to historic properties that might be affected by the Undertaking or that might be affiliated with the APE for the MBSD project.

B. The CEMVN has and will continue to consult with federally recognized Tribes in a manner that acknowledges the Government-to-Government relationship with federally recognized Tribes, including those who participated in the consultation to develop this Agreement and also those that request in writing to be a Consulting Party in the consultation to be carried out under the terms of this Agreement (collectively referred to as "Consulting Tribes").

C. The CEMVN will provide the Consulting Tribes with an executed copy of this Agreement and has or will provide all Consulting Tribes with copies of all plans, determinations, and findings provided to the LA SHPO.

III. Public Involvement

A. The CEMVN, in consultation with the LA SHPO, will continue to provide members of the public who express interest in the effects of the MBSD project upon historic properties with a description of the Undertaking and the provisions of this Agreement.

B. To the extent permitted under applicable federal laws and regulations (e.g., Section 304 of the NHPA, Section 9 of the Archaeological Resources Protection Act [ARPA]), the CEMVN will release to the public documents developed pursuant to this Agreement, including effects determinations. Specific cultural resources data will not be released to the general public or be released as part of NEPA documents.

IV. Other Consulting Parties

A. The CEMVN, in consultation with the LA SHPO, will continue efforts during the duration of this Agreement to identify other parties with a demonstrated interest in the Undertaking and its effects on historic properties and invite them to be Consulting Parties in the consultation to be carried out under the terms of this Agreement.

B. The CEMVN will maintain a record of stakeholders who are invited to be or accepted as Consulting Parties in the consultation process for the MBSD project and carried out under the terms of this Agreement maintain it as part of the project file.

C. If any dispute arises regarding a written request by a stakeholder to be recognized as a Consulting Party, the CEMVN will contact the ACHP and provide all appropriate documentation. The ACHP will participate in the resolution of the issue.

V. Identification, Evaluation, and Assessment of Effects Determinations

A. The CEMVN, in consultation with the LA SHPO, Consulting Tribes, and CPRA, defined the geographic areas within which the Undertaking will directly or indirectly cause alterations in the character or use of historic properties, referred to as an "Area of Potential Effect" (APE). All Consulting Parties agreed to define two distinct, but related, APEs: a Construction APE and an Operations APE. The figure documenting these APEs is attached as Appendix B. Each APE represents the geographic reach for potential direct, indirect, and cumulative effects upon historic properties. Reasonable and good faith identification and evaluation efforts were limited to the identified MBSD APEs.

B. The MBSD APEs were defined to include areas that will be directly or indirectly impacted by construction or operation of the MBSD as follows:

1. A Construction APE containing a conveyance channel, guide levees, a dredged Outfall Transition Feature (OTF), a railroad accommodation, a LA Hwy 23 bridge, and a Siphon, as well as any other activities associated with construction (i.e., access roads and staging areas), as shown in Appendix B;

2. An Operations APE consisting of the outfall and the delta formation area in the Barataria Basin as shown in Appendix B;

C. The MBSD's potential effects are recognized to be different for each of the defined APEs; therefore, cultural resources identification survey strategies were specifically designed for each APE as were the NRHP evaluation strategies. The results of identification and evaluation are as follows:

1. A cultural resources survey of the Operations APE was completed following a Scope of Work agreed to by all parties. The results of this survey were provided to all parties for review and concurrence. CEMVN concluded that:

   i. Twenty-eight (28) sites within the Operations APE are ineligible for the National Register.

   ii. Four (4) historic properties within the Operations APE are eligible for the National Register (16JE2, 16JE3, 16JE11, 16JE147).

   iii. One (1) property, not assessed for the National Register (16JE237), will be treated as NRHP-eligible.

   iv. In light of the anticipated effects of operation of the MBSD, CEMVN concluded that the APE contains historic properties that will be adversely affected by the MBSD.

2. Multiple previous cultural resources surveys of the Construction APE were completed by others. CPRA conducted a cultural resources survey within the Construction APE for this project. The results of the CPRA survey were provided to all parties for review and concurrence. CEMVN concluded that:

   i. Five (5) sites within the Construction APE are ineligible for the National Register.

   ii. No historic properties within the Construction APE had been determined eligible for the National Register.

   iii. Four (4) archaeological sites within the Construction APE had not been previously assessed for the National Register (16PL107, 16PL165, 16PL269, 16PL280).

      1. CEMVN has determined that properties 16PL165 and 16PL280 (St. Rosalie Plantation Cemetery #2) are outside of the construction footprint and avoidance measures will be put in place to ensure they are not inadvertently affected.

      2. 16PL269 has been determined ineligible for NRHP, and will not be further treated.

      3. St. Rosalie Plantation (16PL107 Locus One) was investigated, following a Scope of Work agreed to by all parties, and was determined to be NRHP-eligible.

   iv. CEMVN will proceed in implementation of Stipulation VI. C for the portion of 16PL107 that was investigated, which is 16PL107 Locus One, hereafter referred to only as 16PL107.

VI. Resolution of Adverse Effects

A. Adverse Effects have been identified for the Operations APE for five NRHP-eligible archaeological sites.

1. CEMVN and the Consulting Parties have agreed to an alternative mitigation plan (see Appendix C) that includes three basic products:

   i. Peer-reviewed scholarly publication of an ethnohistoric overview regarding Tribes in the Barataria Basin and larger Mississippi River Delta region;

   ii. Compilation of information intended to be available only to Tribes that may more specifically elucidate their Tribal history and become useful in future consultations; and

iii. Public-facing components that may include a website or other accessible materials providing greater information to the public-at-large.

2. The alternative mitigation shall not exceed a cost of $350,000.

3. Alternative mitigation is not required if CEMVN denies CPRA a Permit for the Mid-Barataria Sediment Diversion.

B. If CEMVN issues the permit, CPRA will be responsible for implementation of the alternative mitigation plan.

1. Implementation will begin within 6 months following permit issuance.

2. Outline and draft versions of each product will be provided to all Consulting Parties for 60-day review and comment period.

3. Completion of all component parts of the alternative mitigation plan is estimated to occur within three (3) years.

4. When working with Tribes, CPRA or its Designee will ensure that work is coordinated via designated points of contact and will be sensitive to cultural and language differences per the respective requirements of each Tribal Government.

5. CEMVN will be available to help ensure proper protocols are followed in the collection of primary data.

C. Based on the outcome of the NRHP-determination for St. Rosalie Plantation (16PL107) outlined in Stipulation V.C., Signatories and Consulting Parties will proceed in negotiating a mitigation strategy that is tailored to the significance of the historic property, and may include, but is not necessarily limited to, one or more of the following:

1. Public Interpretation;

2. Historical, Architectural or Archaeological Monographs;

3. Ethnographic studies; and

4. Data recovery for archaeological properties.

5. Off-site mitigation may be considered if it is determined to better serve the public interest due to imminent construction activity. Off-site mitigation possibly includes the acquisition of property with similar historic significance, or preservation easements on property, as appropriate and legal.

D. Consultation to develop the Treatment Plan for 16PL107 will follow 36 CFR 800 and the resulting plan will become an Appendix to the Programmatic Agreement (Appendix D).

VII. Curation

A. Recovered archaeological collections from a required archaeological survey, evaluation, and/or mitigation plan remain the property of the landowner (either private, state, federal, etc.). CEMVN, in coordination with the LA SHPO and appropriate Tribe(s), may, as determined through consultation, encourage private landowners to transfer any recovered artifacts and related documentation to an appropriate archive or public or Tribal entity. CEMVN, in coordination with LA SHPO and Tribe(s), will work with all Tribal, State, and local agents to support steps that ensure the long-term curation of recovered artifacts and related documents through the transfer of the materials to a suitable repository as agreed to by CEMVN, LA SHPO, and appropriate Tribes(s) and following applicable State or Tribal guidelines.

VIII. Unanticipated Discoveries and Effects

A. CEMVN is responsible for complying with 36 CFR 800.13(a)1 in the event of inadvertent discoveries of historic properties during implementation of the Project. Discoveries of previously unidentified historic properties or unanticipated adverse effects to known historic properties are not anticipated, however if there is an inadvertent discovery or unanticipated effect, CEMVN will ensure that the following stipulations are met. If the discovery is or contains human remains, then Stipulation IX shall apply. CPRA will ensure that these provisions will be included in all construction, operations, and maintenance plans as well as ensuring that project managers brief field personnel.

B. Discovery During Construction Activities:

1. If an unanticipated discovery occurs during construction of the MBSD project, then the construction contractor will comply with CPRA's environmental protection construction specifications and immediately halt all construction activity at the location of discovery and a fifty (50) foot buffer zone will be defined in all directions and appropriate measures to protect the find from further disturbance will be identified and implemented. If the discovery is or contains human remains, then Stipulation IX shall apply. If the discovery does not contain human remains, then CPRA shall notify all Signatories of the discovery within 24 hours. CPRA and CEMVN shall assess available information as soon as reasonably feasible. Within 48 hours after this assessment, CEMVN will provide Signatories and Tribes all available information and

the assessments to consult on the interpretations and recommendations made. Within 7 days after invitation, Signatories and Tribes shall reply with any comment to the CEMVN recommendations.

2. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines the site is either isolated, does not retain integrity sufficient for listing on the NRHP, or will not be further disturbed by construction activities, construction may resume within the fifty (50) foot radius buffer zone.

3. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines that the discovery is eligible or of undetermined eligibility and cannot be avoided, CEMVN in coordination with CPRA will as soon as reasonably feasible determine actions that it can take to resolve adverse effects, and provide this recommendation to Signatories and Tribes within 48 hours of reaching this conclusion. The recommendation shall describe the CEMVN's assessment of National Register eligibility of the property and proposed actions to resolve the adverse effects. The SHPO, Tribes, and Consulting Parties shall respond within 7 days of the recommendation. CEMVN shall take into account their comments regarding National Register eligibility and proposed actions, and then work with CPRA to ensure that appropriate actions are carried out. CEMVN shall provide the LA SHPO, Tribes and Consulting Parties a report of the actions when they are completed.

4. Upon completion of the actions, CPRA will direct the contractor to resume work in the fifty (50) foot buffer area.

C. Discovery During Operation Activities:

1. If an unanticipated discovery occurs, CPRA shall notify all Signatories of the discovery within 24 hours of being aware of it. If the discovery is or contains human remains, then Stipulation IX shall apply. As soon as reasonably feasible, CPRA shall supply a SOI-qualified archaeologist to evaluate the discovery and make a written recommendation to CEMVN on the nature and eligibility of the discovery.

2. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines the site is either isolated, does not retain integrity sufficient for listing on the NRHP, or will not be further disturbed then consultation is complete.

3. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines that the discovery is eligible or of undetermined eligibility and impacts to the discovery are on-going, then CEMVN and CPRA will first assess whether further impacts to the discovery can be avoided. The feasible alternatives will be presented to

Consulting Parties. Consulting Parties will have 10 days to reply to the CEMVN and CPRA avoidance measures. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines that further impacts to the discovery can be avoided, CPRA will implement measures to avoid the on-going impacts to the discovery. CEMVN will notify the Signatories and Tribes within 48 hours of agreement to avoidance measures, to summarize the discovery and steps for avoidance.

4. If CEMVN, in consultation with the SHPO, Tribes, and other Consulting Parties, as appropriate, determines that the discovery is eligible or of undetermined eligibility and cannot be avoided, then CEMVN in coordination with CPRA will as soon as reasonably feasible determine actions that it can take to resolve adverse effects, and provide this recommendation to Signatories and Tribes within 48 hours of reaching this conclusion. The recommendation shall describe the CEMVN's assessment of National Register eligibility of the property and proposed actions to resolve the adverse effects. The SHPO, Tribes, and Consulting Parties shall respond within 10 days of the recommendation. CEMVN shall take into account their comments regarding National Register eligibility and proposed actions, and then work with CPRA to ensure that appropriate actions are carried out. CEMVN shall provide the LA SHPO, Tribes and Consulting Parties a report of the actions when they are completed.

IX. Discovery of Human Remains

A. If abandoned cemeteries, unmarked graves, or human remains are discovered during construction or operation of the MBSD, CPRA will comply with the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671 et seq.). CPRA will notify local law enforcement and the Louisiana Division of Archaeology (LDOA), within the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, by telephone to assess the nature and age of the human skeletal remains within twenty-four (24) hours of the discovery of unmarked human remains and will accompany local law enforcement personnel during all field investigations. If the appropriate local law enforcement official determines that the remains are not a crime scene, and the remains are more than 50 years old, LDOA has jurisdiction over the remains. In no instance will human remains be removed from the discovery site until jurisdiction is established. In cases where the LDOA assumes jurisdiction and the remains are determined to be American Indian, LDOA will consult with Tribes, CEMVN, and CPRA to determine the appropriate course of action.

X. Monitoring Plan

A. CPRA will comply with its Monitoring and Adaptive Management (MAM) Plan, relative to NHPA Section 106 requirements (Section 3.7.4.1), including the use of Secretary of the Interior Qualified Archaeologists to conduct an annual one-day reconnaissance of the Operations APE by boat. The first reconnaissance visit will occur within three months before the first operation of the MBSD and will document current conditions prior to operation for later, post-operation comparison. After operations begin, the reconnaissance survey will be performed annually for a period of 15 years. This reconnaissance team will take photographs and document visible changes to the landscape within the Operations APE, including in proximity to the NRHP properties (16JE2, 16JE3, 16JE11, 16JE147, 16JE237), with the particular attention to any evidence of previously undiscovered cultural resources and the appearance of human remains at known archaeological sites. If an apparent cultural resource is/are located by the reconnaissance team, CPRA will notify all Consulting Parties pursuant to Stipulation VIII. If apparent human remains are found the provisions of Stipulation IX will be followed. A report documenting the results of the annual survey will be provided to all Consulting Parties with 30 days after completion of the survey. CPRA shall share annual survey results as specified at Section 7.6 Compliance Reporting of its MAM Plan, only after CEMVN has been allowed to review proposed language and redact any specific location data for the historic properties or new findings or other sensitive data under applicable law and regulations.

XI. Dispute Resolution

A. Should any Signatory or Consulting Party to this Programmatic Agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, that party will notify the CEMVN, who will seek to resolve such objection through consultation with the relevant parties, including LA SHPO, Consulting Tribes and CPRA, as appropriate.

B. If CEMVN determines that the objection cannot be resolved through consultation, the CEMVN shall forward all documentation relevant to the dispute to the ACHP, including any proposed resolution identified during consultation, copying all Signatories and Consulting Parties. The ACHP may provide its advice on the resolution of the objection within 10 business days of receiving adequate documentation. The other Signatories and Consulting Parties may also provide their advice on the resolution of the objection within that time frame.

C. Prior to reaching a final decision on the dispute, CEMVN will prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, Signatories, and Consulting Parties, and will provide them with a copy of this written response. CEMVN will then proceed according to its final decision.

D. Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute, and the CEMVN's responsibilities to ensure fulfillment of all actions that are not subject of the dispute will remain unchanged.

XII. Administration of this Agreement

A. All Signatories to this Agreement shall meet according to an agreed timeframe to evaluate the effectiveness of this Agreement, beginning one (1) year after operation of the MBSD has begun. The CEMVN shall coordinate such meetings following the execution of this Agreement, and shall invite the Signatories and Consulting Parties to participate. At each meeting, held in manner and location as mutually agreed upon by the Signatories and Consulting Parties, the effectiveness of the Stipulations of this Agreement shall be discussed. The discussion of cumulative effects as addressed in Stipulation VIII shall be available for consideration at each agreed meeting, if no special conditions have required an additional meeting per Stipulation XV.

XIII. Effect of this Agreement

A. This Agreement will be signed in counterparts. The terms of the Agreement will not become effective until such time as a Department of the Army permit is executed for the MBSD.

B. CEMVN shall make compliance with this Agreement a special condition of any permit(s) it issues for the Undertaking.

C. CPRA agrees that in the event CEMVN grants its permit for the MBSD, it will comply with its obligations as set forth in the stipulations of this Agreement.

XIV. Duration of this Agreement

A. This Agreement will remain in effect for fifty (50) years from the date that operation of the MBSD begins, unless extended for a five-year period by written agreement negotiated by all Signatories.

XV. Changes to Permitted Actions

A. CPRA will construct and operate the diversion in accordance with its Department of Army (DA) Permit and the Monitoring and Adaptive Management (MAM) Plan. If CPRA submits an updated permit application for a modification to the permitted project, it will notify CEMVN in writing of the proposed modification(s), and if new construction is proposed or if new areas may be affected outside the current APEs (Appendix B), it will include a map depicting the new areas potentially affected by the proposed changes. CEMVN will consider such a modification in accordance with the provisions of 33 CFR 325.7. Additionally, CEMVN will evaluate the proposed modification(s) to determine their potential to cause adverse effects to historic properties. CEMVN will notify the Signatories if the determination is for no adverse effect, and invite response. If CEMVN concludes the effects would be adverse or outside of the current APEs (Appendix B), then CEMVN will consult with Signatories and any other Consulting Parties to determine appropriate actions to resolve any adverse effects, including altering the proposed modification to avoid the adverse effects, or utilizing the alternative mitigation strategy to mitigate the adverse effects. If the adverse effects cannot be accounted for under the alternate mitigation strategy, CEMVN and the Consulting Parties will consult to amend this Agreement in accordance with Stipulation XVI.

XVI. Amendment of the Agreement

A. This Agreement may be amended when such an amendment is agreed to in writing by all the Signatories. Notwithstanding any provision of this Agreement, CEMVN, ACHP, LA SHPO, and any Invited Signatory may request that it be amended, whereupon these parties will consult to consider such amendment. The CEMVN will facilitate such consultation within thirty (30) days of receipt of the written request. Any amendment will be in writing and will be signed by the CEMVN, ACHP, LA SHPO, CPRA, and Invited Signatories, and shall be effective on the date of the final signature.

B. Appendices: Appendices may be amended at the request of CEMVN or another Signatory or Invited Signatory in the following manner:

1. CEMVN, on its own behalf or on behalf of another Signatory or Invited Signatory, shall notify the Signatories and Invited Signatories of the intent to modify the current Appendix or Appendices and shall provide a draft of the updated Appendix or Appendices to all Signatory and Invited Signatories.

2. If no Signatory or Invited Signatory objects in writing within thirty (30) days of receipt of the proposed modification, CEMVN shall date and sign the amended Appendix and provide a copy of the amended Appendix to the other Signatories. Such an amendment shall go into effect on the date CEMVN transmits the amendment to the other Signatories. If any Signatory or Invited Signatory objects in writing within thirty (30) days of receipt of the proposed modification, the modification shall not go into effect until agreed to as an amendment under subsection A.

3. Current List of Appendices:

   i. Appendix A: POCs and Contact Information
   ii. Appendix B: Memorandum Summarizing the APEs with Maps
   iii. Appendix C: Alternative Mitigation Plan
   iv. Appendix D: Reserved for St. Rosalie Archaeological Mitigation Plan

C. Any Amendments to this Agreement or the Appendices shall be posted to the CEMVN website for the environmental review of the MBSD project. The MBSD website link is: https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/

XVII. Termination of the Agreement

If any Signatory to this Agreement determines that its terms will not or cannot be carried out, that party will immediately consult with the other Signatories to attempt to develop an amendment per Stipulation XVI, above. If within thirty (30) days (or another time period agreed to by all Signatories) an amendment cannot be reached, any Signatory may terminate the Agreement upon written notification to the other Signatories. Once the Agreement is terminated, CEMVN must either (a) execute another Agreement pursuant to 36 CFR 800.14(b), or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. CEMVN will notify the Programmatic Agreement Signatories and Consulting Parties as to the course of action it will pursue.

XVIII. Addition of Another Federal Agency

In the event that another federal agency not initially a party to or subject to this Agreement receives an application for funding/license/permit for activities associated with the Undertaking as described in this Agreement, and the Undertaking remains unchanged, that agency may fulfill its Section 106 responsibilities by stating in a written letter to CEMVN, LA SHPO, and ACHP that it concurs with and will comply with the terms of this Agreement and that it will condition its authorization (funding/license/permit) on the Applicant's compliance with the terms of this PA. Such agreement shall be evidenced by filing the letter with the ACHP, providing notification to the other Consulting Parties, and implementation of the terms of this Agreement as appropriate.

Execution of this Agreement by the ACHP, CEMVN, and LA SHPO and the implementation of its terms, evidence that the CEMVN as lead federal agency (carrying out the collective responsibilities for EPA, NOAA, DOI, and USDA) has taken into account the effects of the MBSD Project upon historic properties and has afforded the ACHP an opportunity to comment.

SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
Choctaw Nation of Oklahoma,
Louisiana State Historic Preservation Officer,
The Advisory Council on Historic Preservation
and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

U.S. Army Corps of Engineers, New Orleans District (CEMVN)

[redacted]

Stephen F. Murphy
Colonel, Corps of Engineers
District Commander

Date: 15SEP2022

SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
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and
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Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

The Louisiana State Historic Preservation Officer

[redacted]______ Date: 9/30/2022
Kristin P. Sanders,
Louisiana State Historic Preservation Officer

SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
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and
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Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

The Advisory Council on Historic Preservation

[redacted]
Reid Nelson, Executive Director, Acting
ACHP

Date: 10.20.2022

INVITED SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
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and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

Louisiana Coastal Protection and Restoration Authority

[redacted]

Lawrence B. Haase,
Executive Director

Date: 9/28/22

INVITED SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
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River Mile 60.7-R, Plaquemines Parish, Louisiana

Choctaw Nation of Oklahoma

Nothing in this Agreement shall be construed to waive the sovereign rights and immunities of the Choctaw Nation of Oklahoma, its officers, employees, or agents

______________________________ Date: _________________
Gary Batton, Chief

INVITED SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
Choctaw Nation of Oklahoma,
Louisiana State Historic Preservation Officer,
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and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

Chitimacha Tribe of Louisiana

[redacted] Date: 10-20-2022

Melissa Darden, Chairman

CONCURRING PARTY SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
Choctaw Nation of Oklahoma,
Louisiana State Historic Preservation Officer,
The Advisory Council on Historic Preservation
and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

Mississippi Band of Choctaw Indians

______________________________ Date: _________________
Ben Cyrus, Chief

CONCURRING PARTY SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
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and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

U.S. Department of the Interior

[redacted]

Mary Josie Blanchard, Principal Representative

Date: October 3, 2022

CONCURRING PARTY SIGNATORY PAGE

**Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
Choctaw Nation of Oklahoma,
Louisiana State Historic Preservation Officer,
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and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana**

U.S. Environmental Protection Agency

[redacted]

Mary Kay Lynch
Alternate to Principal Representative

Date: October 3, 2022

CONCURRING PARTY SIGNATORY PAGE

Programmatic Agreement
among
United States Army Corps of Engineers,
Chitimacha Tribe of Louisiana,
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The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana

United States Department of Agriculture

[redacted]

Ronald Howard, Director, Acting

Date: October 7, 2022

CONCURRING PARTY SIGNATORY PAGE

**Programmatic Agreement
among
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and
The Louisiana Coastal Protection and Restoration Authority
Regarding the
Mid-Barataria Sediment Diversion
River Mile 60.7-R, Plaquemines Parish, Louisiana**

National Oceanic and Atmospheric Administration

[redacted] Date: September 30, 2022

Christopher D. Doley
Principal Representative, National Oceanic and Atmospheric Administration
Chief, Habitat Restoration Division

Appendix A: Point of Contacts (POC)

CONTACT INFORMATION FOR SIGNATORIES

Signatories shall provide USACE with updated contact information as it becomes available, and revisions to this Appendix A will be made without an amendment to this Agreement.

<table>
<tr><th>Federally-Recognized Tribes</th><th></th></tr>
<tr><td>Chitimacha Tribe of Louisiana

<u>Primary:</u>
Kimberly S. Walden, THPO
Chitimacha Tribe of Louisiana
155 Chitimacha Loop
Charenton, LA 70523
(337) 923-9923
kim@chitimacha.gov

Method of contact for project notification and documentation: email to Primary contact.

Method of contact for other communication: email, phone call</td><td>Chitimacha Tribe of Louisiana

<u>Secondary:</u>
Chairman Melissa Darden
Chitimacha Tribe of Louisiana
155 Chitimacha Loop
Charenton, LA 70523
(337) 924-4973</td></tr>
<tr><td>Choctaw Nation of Oklahoma

<u>Primary:</u>
Ian Thomson
Historic Preservation Department
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702
(580) 642-7981
ithompson@choctawnation.com

Lindsey D. Bilyeu, MS
Program Coordinator
lbilyeu@choctawnation.com
(580) 642-8377

Method of contact for project notification and documentation: email Senior Compliance Review Officer with a copy to THPO.

Method of contact for other communication: email, phone call</td><td>Choctaw Nation of Oklahoma

<u>Secondary:</u>
Gary Batton, Chief
Choctaw Nation of Oklahoma
Attn: Choctaw Nation Historic Preservation Department
P.O. Box 1210
Durant, OK 74702-1210
(800) 522-6170
gbatton@choctawnation.com</td></tr>
</table>

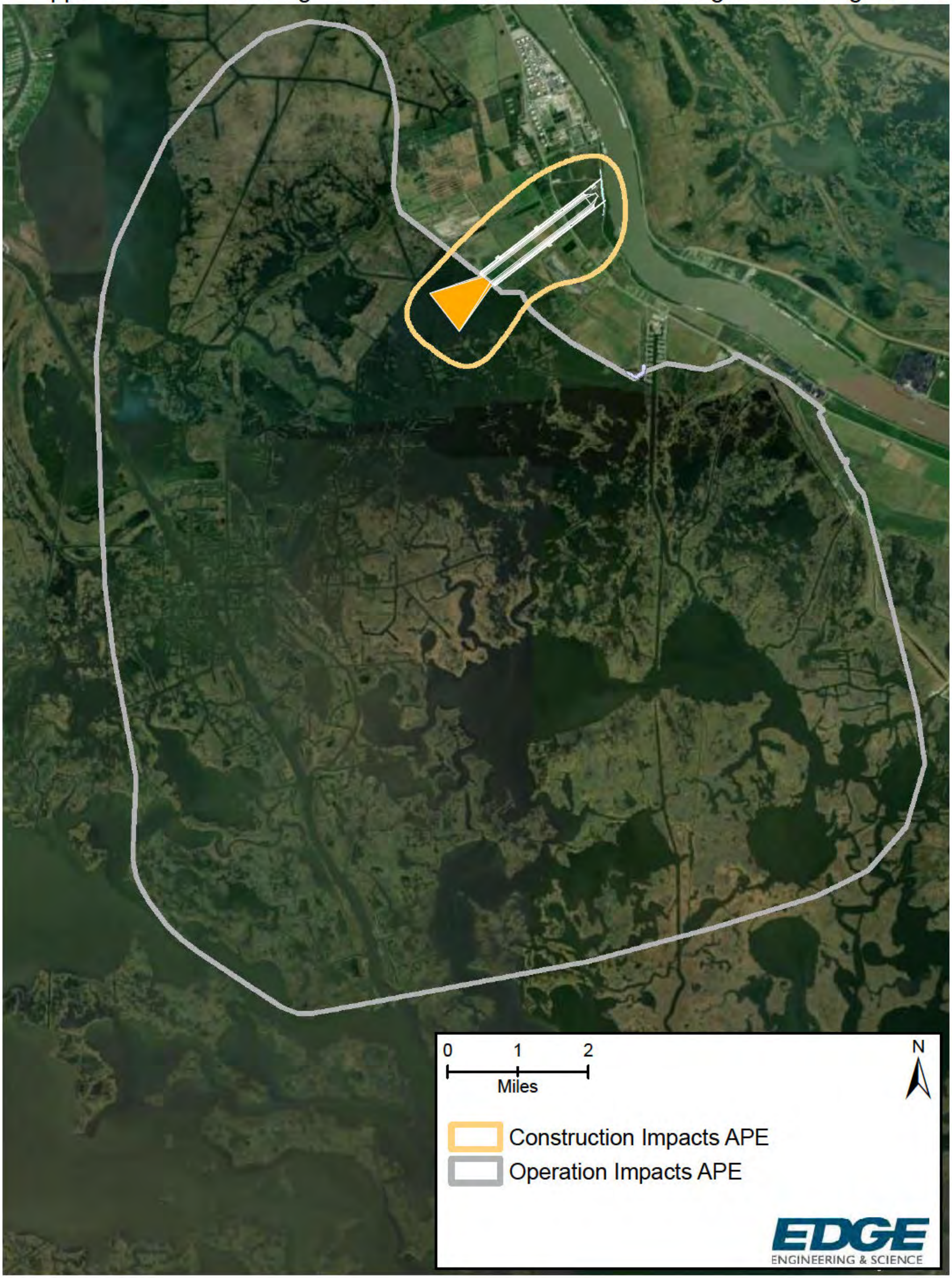
Mississippi Band of Choctaw Indians Primary: Ken Carleton, Tribal Archeologist Mississippi Band of Choctaw Indians 101 Industrial Road Choctaw, MS 39350 (601) 656-5251 ken.carleton@choctaw.org Method of contact for project notification and documentation: email to Primary contact. Method of contact for other communication: email, phone call	**Mississippi Band of Choctaw Indians** Secondary: Ben Cyrus, Chief Mississippi Band of Choctaw Indians 101 Industrial Road Choctaw, MS 39350 (601) 656-5251 info@choctaw.org
SHPOS & Independent Federal Organizations	
Advisory Council on Historic Preservation Primary: John Eddins, Program Analyst Advisory Council on Historic Preservation 401 F Street NW, Suite 308 Washington DC 20001-2637 (202) 517-0211 e106@achp.gov; jeddins@achp.gov Method of contact for project notification and documentation: email to e106@achp.gov and copy to Primary contact email. Method of contact for other communication: email, phone call	**Advisory Council on Historic Preservation** Secondary: Reid Nelson, Executive Director, Acting Office of Federal Agency Programs Advisory Council on Historic Preservation 401 F. Street NW, Suite 308 Washington, DC 20001-2637 (202) 517-0222 achp@achp.gov; rnelson@achp.gov Method of contact for project notification and documentation: email to e106@achp.gov and copy to Primary contact email. Method of contact for other communication: email, phone call
Louisiana State Historic Preservation Officer Primary: Chip McGimsey State Archaeologist Division of Archaeology PO Box 44247 Baton Rouge, LA 70804-4241 (225) 219-4598 cmcgimsey@crt.la.gov Method of contact for project notification and documentation: email at section106@crt.la.gov	**Louisiana State Historic Preservation Officer** Secondary: Rachel Watson Division of Archaeology PO Box 44247 Baton Rouge, LA 70804-4241 (225) 342-8165 rwatson@crt.la.gov Method of contact for project notification and documentation: section106@crt.la.gov Archaeological Site Forms: Submit to LA Division of Archaeology via email to siteforms@crt.la.gov.

Archaeological Site Forms: Submit to LA Division of Archaeology via email to siteforms@crt.la.gov. Reports: Hard copy and PDF on CD Method of contact for other communication: email, phone call	Reports: Hard copy and PDF on CD Method of contact for other communication: email, phone call
U.S. Army Corps of Engineers (USACE) Districts	
New Orleans District (CEMVN) Primary Paul J. Hughbanks, Archaeologist CEMVN-PDS-N 4700 Leake Ave. New Orleans, LA 70118 (504) 862-1100 Paul.J.Hughbanks@usace.army.mil Method of contact for project notification and documentation: email or receipt of hard copy Method of contact for other communication: email, phone call	**New Orleans District (CEMVN)** Secondary: Jason A. Emery, Cultural Resources RTS and District Tribal Liaison CEMVN-PDS-N 4700 Leake Ave. New Orleans, LA 70118 (504) 862-2364 Jason.a.emery@usace.army.mil
Other Federal Agencies	
U.S. Department of the Interior Primary: Ben Frater, Compliance Supervisor Gulf Restoration Office 341 N. Greeno Road Fairhope, AL 36532 (404) 314-8815 benjamin_frater@fws.gov Method of contact for project notification and documentation: email at michelle_eversen@fws.gov and copy to secondary contact. Method of contact for other communication: email, phone call	Secondary: Sarah Clardy, TIG Representative Gulf Restoration Office 341 N. Greeno Road Fairhope, AL (912) 276-4206 Sarah_clardy@fws.gov

U.S. Environmental Protection Agency Region 6 Primary: Robert Houston, Staff Director Communities, Tribes and Environmental Assessment Office of the Regional Administrator U.S. EPA Region 6 1201 Elm Street, Suite 500 Dallas, Texas 75270-2102 (214) 665-8565 houston.robert@epa.gov Method of contact for project notification and documentation: email to Primary and Secondary contacts. Method of contact for other communication: email, phone call	Secondary: Doug Jacobson, EPA TIG Representative U.S. EPA Region 6 (WD-AM) 1201 Elm Street, Suite 500 Dallas, Texas 75270-2102 (214) 665-6692 jacobson.doug@epa.gov Method of contact for project notification and documentation: email to Primary and Secondary contacts. Method of contact for other communication: email, phone call
United States Department of Agriculture Primary: Ronald Howard Director, Acting USDA Gulf Coast Ecosystem Restoration Team 7578 Old Canton Road Madison, MS 39110 c. (601) 812-9449 ron.howard@usda.gov	Secondary: Jon Morton Biologist USDA Gulf Coast Ecosystem Restoration Team 7578 Old Canton Road Madison, MS 39110 Jon.morton@usda.gov c. (601) 331-7327
National Oceanic and Atmospheric Administration Primary: Rachel Sweeney, Program Manager Deepwater Horizon Restoration Program NOAA Restoration Center 263 13th Ave S St Petersburg, FL 33701 (727) 551-5743 rachel.sweeney@noaa.gov Method of contact for all project notification and documentation: email to rachel.sweeney@noaa.gov	Secondary: Christy Fellas, Compliance Coordinator Deepwater Horizon Restoration Program NOAA Restoration Center 263 13th Ave S St Petersburg, FL 33701 (727) 551-5714 christina.fellas@noaa.gov Method of contact for all project notification and documentation: email to christina.fellas@noaa.gov

Permit Applicant	
Louisiana Coastal Protection and Restoration Agency (CPRA)	
Primary: Elizabeth L. Davoli, Coastal Resources Scientist Manager 150 Terrace Ave Baton Rouge, LA 70802 (225) 342-4616 Elizabeth.Davoli@la.gov Method of contact for project notification and documentation: email or receipt of hard copy Method of contact for other communication: email, phone call	Secondary: Brad Barth, Operations Assistant Administrator 150 Terrace Ave Baton Rouge, LA 70802 (225) 342-4553 Bradley.Barth@la.gov Method of contact for project notification and documentation: email or receipt of hard copy

Appendix B: Final and Agreed APE Referenced within this Programmatic Agreement



Appendix C: Alternate Mitigation Plan for the Mid-Barataria Division PA

Native Americans have an enduring presence and deep history in Southeastern Louisiana. At the time of European contact, approximately twenty Native nations lived within the present political boundaries of Louisiana; and of that number, at least six nations occupied the Barataria region. By the eighteenth century, under increasing pressure from Anglo-Europeans east of the Mississippi River, several small nations migrated west to settle in colonial Louisiana where their descendants remain today. During Indian Removal in the antebellum period, some Native Americans driven from their eastern homelands came to settle in small groups or with relatives already established in Louisiana.

Throughout the eighteenth and nineteenth centuries, Southeastern Louisiana remained important to Native Americans in Louisiana. They participated in the eighteenth-century colonial market economy or came to the capital of New Orleans to represent their nations in counsel, negotiations, and treaties. Although conditions for the Tribes would change under the American administration, New Orleans remained a political and commercial center and a viable market for Native Americans into the twentieth century. Over the centuries, the Barataria region remained a place of importance for Native Americans, utilized by hunters and fishermen, and the women who gathered plants like Spanish moss, sassafras, swamp cane, and various herbs for their own use and for barter and sale to the colonists and later Americans.

Project Goals and Objectives:

This project will document Native Americans in Southeastern Louisiana between 1500 and 1900 AD, focusing on the larger Barataria region and associated segments of the Mississippi River where many coastal restoration projects are proposed or under development. As some Tribal communities were based wholly or in part on the north shore, St. Tammany and Tangipahoa parishes are included with Orleans and Jefferson parishes in the study area. Bounding the study area by Bayou Lafourche and the north shore of Lake Pontchartrain provides a spatially and environmentally discrete landscape reflecting the colonial/antebellum world of Southeastern Louisiana. Further research may extend the study area to include Terrebonne Parish.

The objective of this study is to prepare a comprehensive ethnohistoric overview documenting the Native American presence and history within the study area. To provide background and context for the research period, the study will:

1) examine the geologic and environmental history of the region to characterize how changes to the landscape, landforms, hydrology, and environment across the study area affected settlement and use of the study area over time;
2) examine the archaeological record and cultural history of the study area immediately prior to 1500 AD;
3) identify and provide a brief overview of Native nations in the region between ca. 1500 and 1699, the point of sustained European contact, including:

a. ancestral occupation and traditional use area(s);
b. cultural traditions including worldview, lifestyles, technology, and material culture;
c. broader patterns of ideology and trade.

The study will provide detailed ethnohistories of participating Tribes during the study period that examine how they responded to regional, national, and international encounters, events, and trends that affected, and often threatened, their cultural and physical survival. Research topics will be developed in consultation with the participating Tribes. Those topics may include, but will not be limited to:

1. participating Tribes at the point of contact;
2. how Tribal social and political organization at contact structured and influenced interactions with Europeans and other non-tribal communities, and how socio-political organization changed over time;
3. the effects that disease, slave-taking/trading, conflicts/wars, and other events and interactions had on population, settlement patterns, Tribal economies, and inter-relations;
4. changes to social and political relations, including changes in perceptions and status, under French, Spanish, and American administrations;
5. ancestral land and the ways in which ancestral territories were lost or reduced;
6. how Tribes were able to organize, form new alliances, gain recognition, and persist as sovereign nations beginning in the nineteenth century;
7. addressing the Tribe's connection to and relationship with the region today.

Methodology:

Information will be derived from a review of published literature, archival research, and ethnographic interviews conducted with knowledgeable members of consulting Tribes. Research sources many include, but not be limited to:

- archaeological and ethnographic studies;
- colonial records including the LA Superior Council and Cabildo;
- Catholic church records including baptismal, marriage, and burial records;
- U.S. Territorial records;
- traveler accounts, journals, and letters;
- Federal, state, parish, and local records, including War Department records, Indian agency records, land sales, legal proceedings, school records, and military records;
- genealogical records including census, marriage, and death records;
- Tribal archives
- Tribal histories and ethnographies;
- newspaper accounts;
- cartographic collections;

- photographic collections.

Interviews will be conducted with knowledgeable elders/Tribal members from each participating Tribe. Interviews will be digitally recorded in audio .wav and/or .mpg format. Interviews will be fully transcribed and returned to interviewees for review, correction, and/or additions. Depending upon the needs and objectives of the individuals interviewed and/or the participating Tribes, more than one interview may be conducted with some individuals. Group interviews may be also conducted.

Each Tribe will have the opportunity to participate in a week-long visit to the region. The purpose of the trip is to facilitate discussion of significant places within the region, better understand traditional uses of the landscape, and develop information on traditional lifeways and settlement patterns within the study area.

Products:

The proposed study will provide three products:

1) A scholarly publication detailing the results of the study. The report will address all of the topics identified in the proposed scope, and will include a detailed bibliography of references used in the study and/or applicable to the study goals. The presentation of graphical information (i.e., maps) illustrating the locations and patterns of movement of individual Tribes will be developed in consultation with each individual participating Tribe.

2) For each participating Tribe, information and/or a series of documents and/or maps that identify specific areas of Tribal occupation at known temporal intervals within the study period will be prepared in consultation with that Tribe. This information will only be made available to each participating Tribe and will not be publicly disclosed. This information will improve consultation with federal agencies by clarifying for each Tribe which projects and/or human remains discoveries they wish to consult on.

3) A public component: these can include but are not necessarily limited to:
    a) the development of a website that tells the Tribal history(s) in the study area through the extensive use of maps showing general patterns of settlement, floral/faunal use, migrations, etc. (but not identifying specific site locations), and historic photographs, paintings, and engravings paired with text developed from the scholarly publication. The inclusion of a number of artists' illustrations of Tribal life in various contexts/times would be an added way to tell these stories.
    b) Development of curriculum guides and information on Tribal history in Southeastern Louisiana during the study period for use in Louisiana schools.

Attachment 11: Louisiana Trustee Implementation Group Project Funding Agreement

LOUISIANA TRUSTEE IMPLEMENTATION GROUP
PROJECT FUNDING AGREEMENT

THIS PROJECT FUNDING AGREEMENT (this "**Agreement**") is entered into by and among/between the Parties to this Agreement, as that term is defined below.

The "Parties" (individually, "Party") to this Agreement consist of the following**:** The State of Louisiana, through the Coastal Protection and Restoration Authority ("CPRA"), as authorized and directed by the policy of the Coastal Protection and Restoration Board; the National Oceanic and Atmospheric Administration ("NOAA"); the Department of the Interior ("DOI); the Environmental Protection Agency ("EPA"); and the Department of Agriculture ("USDA"). The Parties are working together as members of the Louisiana Trustee Implementation Group ("LA TIG") to implement restoration of natural resources in the aftermath of the Deepwater Horizon oil spill, and they have been considering whether to approve the use of funds from the Natural Resource Damages settlement of the Deepwater Horizon oil spill for construction of the Project pursuant to the Oil Pollution Act, 33 U.S.C. § 2706, and its implementing regulations, 15 C.F.R. Part 990. The federal agencies who are Parties to this Agreement are referred to herein as "Federal Trustees."

WHEREAS, CPRA has identified in Louisiana's Comprehensive Master Plan for a Sustainable Coast (herein sometimes referred to as "Master Plan") the Mid-Barataria Sediment Diversion, Project BA-0153 (herein sometimes referred to as the "Project"), on the Mississippi River at Mile Post 60.7 in Plaquemines Parish, Louisiana; and

WHEREAS, pursuant to La. R.S. 49:214.6.1, CPRA is the implementation and enforcement arm of the CPRA Board and is directed by the policy set by CPRA Board, and pursuant to La. R.S. 49:214.6.2 and La. R.S. 49:214.6.3, CPRA shall administer the programs of the CPRA Board and shall implement projects relative to the protection, conservation, enhancement, and restoration of the coastal area of the State of Louisiana through oversight of integrated coastal projects and programs consistent with the legislative intent as expressed in La. R.S. 49:214.1; and

WHEREAS, State of Louisiana Trustees ("State Trustees") and the Federal Trustees are working together as the LA TIG to implement restoration of natural resources in the aftermath of the Deepwater Horizon oil spill, and on or before the date of this Agreement, they have selected the Project for funding by the LA TIG, and they have determined that a significant portion of the funding for the Project will come from restoration funds being held by the Department of the Interior's Natural Resource Restoration Fund (the "Restoration Fund") for use by the Trustees who are members of the LA TIG ("LA TIG Funds"); and

WHEREAS, on or before the date of this Agreement, the Trustees have determined that LA TIG Funds will be made available to implement the Project in amounts not exceeding $2.26 billion, with the understanding that any and all additional funding required to complete, implement, and operate the Project will be provided by CPRA, on behalf of the State of Louisiana (the "State"); and

WHEREAS, the Federal Trustees' role regarding the Project is limited to: 1) one or more joint funding decisions by the LA TIG described in the preceding recital; 2) a technical advisory role, including providing advice related to the Monitoring and Adaptive Management strategies for the Project; and 3) work by NOAA on behalf of CPRA to conduct certain monitoring activities and to implement the mitigation plan pertaining to marine mammals; and

WHEREAS, the Federal Trustees will have no operational authority, ownership interests, or discretionary role in the operation of the Project. Responsibilities for the design, construction, operations, and management for the Project are held exclusively by the State; including but not limited to the exercise of eminent domain authority, discretion to acquire (or not) various real property(ies) or interests therein, flood-plain activities, decision-making on when to operate the Project, *etc*., these together and with other such unenumerated responsibilities, apparent and inherent; and

WHEREAS, given that the Federal Trustees have no active role in the design, construction, or operation of the Project, the Parties do not believe that any liability is likely to attach to the United States with regard to the Project; and

WHEREAS, joint decisions made by the State Trustees and the Federal Trustees working together as the LA TIG shall not be deemed for purposes of this Agreement to be decisions made "solely" by any Party; and

WHEREAS, a "Claim" under this Agreement means all claims, actions, liabilities, suits, injuries, demands, obligations, losses, settlements, judgments, damages, fines, penalties, costs and expenses, including attorney's fees and other expenses, against any Party or Parties, arising out of or relating to the design, construction, operation, or failure of the Project; provided, however, that a Claim shall not include any claim against a Party that arises solely from the Party's own fault or negligence in performing work for the Project or that of its agents, employees, contractors, successors, assigns and transferees, nor shall a Claim include a claim brought under the Equal Access to Justice Act, 28 U.S.C. §§ 2412 *et seq*.; and

WHEREAS, if liability for a Claim does attach to the Federal Trustees with regard to the Project, such liability may be payable by the Judgment Fund, which is a permanent, indefinite appropriation available to pay final money judgments and awards against the United States (*see* 31 U.S.C. § 1304); and

WHEREAS, a Claim that is not paid from the Judgment Fund is a Project cost covered by this Agreement; and

WHEREAS, the Parties have the right to use LA TIG Funds, including both LA TIG Funds approved for the Project and other LA TIG Funds available under the April 4, 2016, consent decree resolving *United States v. BP, et al*., No. 2:10-cv-04536 (E.D. La.), MDL No. 2179 (E.D. La.), to pay Claims that are not paid by the Judgment Fund; and

WHEREAS, the Project budget approved by the Trustees anticipates that the full expected cost of certain budget items (such as Monitoring and Adaptive Management and Mitigation) will be paid using LA TIG Funds, so that LA TIG Funds for the budgeted cost of those items will be retained by the LA TIG and used to pay expenses for those items as they are incurred, until all expenses for those budget items have been paid. In addition, expenditures of LA TIG Funds for those budget items are not expected to be completed for many years. Therefore, if the actual, final expenses for those budget items are below the budgeted amounts, it is possible that the total amount of LA TIG Funds expended would be less than $2.26 billion. In that event, if CPRA also has provided funding for the Project, it would be appropriate, in order to implement the LA TIG's Record of Decision ("ROD"), to partially reimburse CPRA using unexpended LA TIG Funds for those Project budget items, in order that the LA TIG's final financial contribution to the Project totals $2.26 billion; and

WHEREAS, circumstances also may arise under which it becomes appropriate for CPRA to reimburse LA TIG Funds expended on the Project so that the LA TIG's final financial contribution to the Project does not exceed $2.26 billion. These circumstances may include payments of Project expenses from LA TIG Funds to accommodate cash-flow limitations relating to funds for the Project provided by CPRA and payments of Claims using LA TIG Funds; and

WHEREAS, the Parties understand that there will be periodic reconciliations of expenditures on the Project and reimbursements of accounts to ensure that the total net amount of LA TIG Funds expended on the Project does not exceed the amount of funding authorized by the ROD, as well as to ensure that all funds for the Project authorized by LA TIG resolutions are made available to CPRA for Project expenditures; and

WHEREAS, the Parties additionally understand that after each periodic reconciliation of Project expenditures, implementation of this Agreement may require transfers of funds between CPRA and the Restoration Fund so that funds authorized by LA TIG resolutions for the Project are made available to CPRA for Project expenditures and so that any Project expenditures from LA TIG Funds temporarily authorized by the Trustees in excess of the amount determined by the LA TIG's ROD are reimbursed by CPRA,

NOW THEREFORE, in consideration of the premises stated herein and subject to other terms and conditions, the Parties agree as follows:

1. Acknowledgement of Authorization of LA TIG Funds for the Project. In the ROD, issued by the Trustees on or before the date of this Agreement pursuant to their authority under the Oil Pollution Act, the Trustees have decided to provide up to $2.26 billion in LA TIG Funds, in increments to be determined by the Trustees through LA TIG resolutions, to fund implementation of the Project. In the event that the total cost of implementing the Project exceeds $2.26 billion, the State of Louisiana hereby agrees, by and through CPRA, to provide all funding in excess of $2.26 billion needed to implement the Project.

2. Project Expense Accounting and Reimbursement. On an annual basis, the Trustees agree that there will be an accounting and reconciliation of Project expenditures, which will track the amount of LA TIG Funds expended on the Project and the amount of funds provided by CPRA that were expended on the Project. This accounting and reconciliation process will be structured to allow CPRA to expend funds it provides in the first instance, with later reimbursement from LA

TIG Funds, where LA TIG Funds are not available for particular items at the time of expenditure. This accounting and reconciliation process also will be structured to allow the Trustees to expend LA TIG Funds in excess of the budgeted amounts for certain items (including but not limited to payment of Claims related to certain budget items) or in excess of the total net amount of LA TIG Funds approved by the LA TIG, with later reimbursement from CPRA-provided funds. The accounting and reconciliation procedures under this Agreement will be designed and implemented to achieve the joint objectives of (1) paying for Project costs as needed to timely implement the Project, and (2) using LA TIG Funds for up to $2.26 billion of Project costs and using CPRA-provided funds for all Project costs exceeding $2.26 billion. The Trustees will develop and implement an accounting and reconciliation process to implement this Agreement.

3. No Limitation on Authority of Trustees. Nothing in this Agreement precludes, limits, or otherwise amends the authority of the Trustees to make further decisions or take further actions, with respect to the Project.

4. Mutual Representations. The Parties represent and warrant that they are duly authorized and have the power and authority to execute and deliver this Agreement, and this Agreement constitutes a legally valid and binding obligation on the Parties.

5. Notice of Claims Against Federal Trustee(s). The Federal Trustees must provide CPRA notice of any Claim asserted against any one or more Federal Trustee within thirty (30) business days after obtaining knowledge of such Claim. Such notice will include a copy of the complaint asserting the Claim.

6. Defense of Claims Against Federal Trustee(s). The United States Department of Justice ("DOJ") shall confer and consult with CPRA, in a manner that does not waive any applicable privileges, on any Claim against the Federal Trustees that DOJ is defending. Conferring and consulting shall include discussions of potential legal defenses, overall legal strategy, and settlement positions. DOJ also shall confer and consult with CPRA prior to accepting or declining any settlement offer or otherwise agreeing to a settlement of a Claim. If after conferring and consulting CPRA disagrees with DOJ's intention to accept or decline a settlement offer on a Claim being defended by DOJ's Natural Resources Section, CRPA may request a meeting with the Chief of the Natural Resources Section to further confer and consult regarding that settlement offer. In addition, if CPRA disagrees with a proposed settlement of a Claim being defended by DOJ's Natural Resources Section, CPRA may submit to DOJ a statement of opposition to the proposed settlement, which shall be included with the documents reviewed by DOJ officials with authority to approve the proposed settlement. If CPRA moves to intervene as a defendant in any action or proceeding involving a Claim, DOJ shall not oppose such a motion to intervene.

7. Notices. Any notice, request, demand, or other communication required or permitted to be given under this Agreement shall be deemed to have been duly given if it is in writing and personally delivered, or sent via Certified Mail, Return Receipt Requested, to the following addresses:

As to CPRA:	Lawrence B. Haase Executive Director P.O Box 44027 Baton Rouge, LA 70804-4027
As to NOAA:	Christopher Doley Chief, Office of Habitat Restoration Restoration Center 1315 East-West Highway Silver Spring MD 20910
As to EPA:	Benita Best-Wong Deputy Assistant Administrator Office of Water 1200 Pennsylvania Ave., NW Washington, DC 20460
As to USDA:	Ronald Howard Director, Acting USDA Gulf Coast Ecosystem Restoration Team 7578 Old Canton Road Madison, MS 39110
As to DOI:	Mary Josie Blanchard Director, Gulf of Mexico Restoration Office of the Assistant Secretary Policy Management and Budget U.S. Department of the Interior 1849 C Street N.W., Washington, D.C. 20240

8. Governing Law. The terms of this Agreement shall be governed by and construed in accordance with the laws of the United States and State of Louisiana.

9. Dispute Resolution; Jurisdiction and Venue. Before any Party to this Agreement may bring suit concerning any issue relating to this Agreement, such Party must first seek in good faith to resolve the issue through negotiation or other forms of non-binding alternative dispute resolution mutually acceptable to the Parties. Exclusive jurisdiction for any suit arising out of this Agreement shall be in United States District Court, pursuant to 28 U.S.C. §§ 1331, 1345, and any other applicable basis of jurisdiction. The exclusive venue for any suit arising out of this Agreement shall be in the United States District Court for the Eastern District of Louisiana.

10. No Waiver. No Party shall be deemed to have waived any provision of this Agreement or the exercise of any rights held under this Agreement unless such waiver is made expressly and in writing. Waiver by any Party of a breach or violation of any provision of this Agreement shall not constitute a waiver of any other subsequent breach or violation.

11. Assignment. No Party may assign its rights or delegate its duties under this Agreement without the other Party's prior written consent.

12. Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective legal representatives, administrators, executors, successors and permitted assigns.

13. No Third-Party Beneficiary. Nothing herein is intended to, and nothing herein may be deemed, to create or confer any right, action, or benefit in, to, or on the part of any person or entity not a party to this Agreement as indicated herein or by operation of law.

14. Severability. The terms and provisions of this Agreement are severable. Unless the primary purpose of this Agreement would be frustrated, the invalidity or unenforceability of any term or condition of this Agreement shall not affect the validity or enforceability of any other term or provision of this Agreement. The Parties intend and request that any judicial or administrative authority that may deem any provision invalid, reform the provision, if possible, consistent with the intent and purposes of this Agreement, and if such a provision cannot be reformed, enforce this Agreement as set forth herein in the absence of such provision.

15. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original and all of which together, shall constitute one and the same document.

16. Obligations of Future Appropriations. The Parties intend to fulfill fully their obligations under this Agreement. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the Legislature of the State of Louisiana, where creating such an obligation would be inconsistent with the State of Louisiana's constitutional or statutory limitations, including but not limited to La. R.S. 38:2195, La. R.S. 13:5109(B)(2) and Article II, Section 16(A), and Article XII, Section 10 of the 1974 Constitution of the State of Louisiana. If a Party is unable to, or does not, fulfill its obligations under this Agreement, one or more other Parties may exercise any legal rights they have to protect their interests.

17. Amendments. Notwithstanding any other provision herein, the Parties agree that any change to this Agreement shall require a written amendment, mutually agreed upon and signed by both Parties, including those executed in multiple counterparts. The terms and conditions contained in this Agreement may not be amended, modified, superseded, subsumed, terminated, or otherwise altered except by mutual written consent of all Parties hereto.

18. No Project Approval or Funding Decision. This Agreement is not a decision by any Party to approve the Project, nor is it a decision to fund all or part of the Project. Any such decisions are made in the ROD for the Project issued on or before the date of this Agreement, and in any subsequent LA TIG resolutions adopted by the Trustees.

19. Enforceable Agreement. The Parties agree that this Agreement is enforceable as set forth in Paragraph 9 and that CPRA can be sued in a court of competent jurisdiction as provided by La. R.S. 49:214.6.1(A) and (A)(1). *See* Certificate of Authority, Attachment 1.

20. Agreement Authorized by OPA. This Agreement constitutes an enforceable agreement regarding the management of joint trustee recoveries as authorized by 15 C.F.R. § 990.65(b)(2).

21. Effective Date. This Agreement shall become effective on the date on which it has been signed by all signatories.

22. Entire Agreement. This Agreement contains the entire understanding between the Parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. There is no representation or warranty of any kind made in connection with the transactions contemplated hereby that is not expressly contained in this Agreement.

[The remainder of this page is intentionally left blank]

THUS DONE, PASSED, AND SIGNED on this _______ day of _____________, 20__, before the below-named notary public and competent witnesses.

WITNESSES:	**STATE OF LOUISIANA, COASTAL PROTECTION AND RESTORATION AUTHORITY**
___________________________ (Witness - SIGN)	BY: ___________________________ Lawrence B. Haase Executive Director
___________________________ (Witness - PRINT)	
___________________________ (Witness - SIGN)	
___________________________ (Witness - PRINT)	

____
Notary Public

____
(Print)

The undersigned PARTY enters into this Agreement among the State of Louisiana (through the Coastal Protection and Restoration Authority), the U.S. Department of the Interior, the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.

Date: ______________________

____

Christopher Doley
Chief, Office of Habitat Restoration
Restoration Center
Designated Natural Resource Trustee Official
National Oceanic and Atmospheric Administration

The undersigned PARTY enters into this Agreement among the State of Louisiana (through the Coastal Protection and Restoration Authority), the U.S. Department of the Interior, the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.

Date: ____________________ ____________________________________

BENITA BEST-WONG
Deputy Assistant Administrator
Office of Water
Designated Natural Resource Trustee Official
United States Environmental Protection Agency

The undersigned PARTY enters into this Agreement among the State of Louisiana (through the Coastal Protection and Restoration Authority), the U.S. Department of the Interior, the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.

Date: ______________________ ____

ROBERT BONNIE
Under Secretary for Farm Production and Conservation
U.S. Department of Agriculture

The undersigned PARTY enters into this Agreement among the State of Louisiana (through the Coastal Protection and Restoration Authority), the U.S. Department of the Interior, the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.

Date: ___________________

____
MARY JOSIE BLANCHARD
Director, Gulf of Mexico Restoration
U.S. Department of the Interior

PROJECT FUNDING AGREEMENT

ATTACHMENT 1

<u>CERTIFICATE OF AUTHORITY</u>

I, David A. Peterson, do hereby certify that I serve as the principal legal counsel for the Louisiana Coastal Protection and Restoration Authority; that the Louisiana Coastal Protection and Restoration Authority is a legally constituted public body of the State of Louisiana with full authority and legal capability to perform the terms of the Project Funding Agreement to which this Certificate of Authority is attached; that the State of Louisiana through CPRA can be sued in a court of competent jurisdiction as provide by La. R.S. 49:214.6.1(A) and (A)(1); and that the person who executed the Project Funding Agreement on behalf of the Louisiana Coastal Protection and Restoration Authority acted within his statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this ______________ day of _____________ 2023.

____
DAVID A. PETERSON
General Counsel
Louisiana Coastal Protection and Restoration Authority