APPENDIX C

Draft Monitoring and Adaptive Management Plans

1 INTRODUCTION

In the Deepwater Horizon [DWH] *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (PDARP/PEIS), the DWH Oil Spill Trustees (DWH Trustees) chose a comprehensive and integrated ecosystem approach to restoration in the Gulf of Mexico (DWH Trustees 2016). The spatial, funding, and temporal scales of the DWH Oil Spill and the associated restoration effort are unprecedented. For this reason, the DWH Trustees have recognized the need for robust monitoring and adaptive management (MAM) for the restoration projects and included this process as one of the programmatic goals in the PDARP/PEIS. The goal to "Provide for Monitoring, Adaptive Management, and Administrative Oversight to Support Restoration Implementation" is discussed in the PDARP/PEIS to ensure that the restoration projects provide long-term benefits to the resources and services injured by the spill (DWH Trustees 2016:Section 5.3.1).

This document, which comprises the MAM plans (Appendix C1–C22), is an appendix to the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) And Recreational Use* (Louisiana Trustee Implementation Group 2018), hereafter referred to as the RP/EA.

2 FRAMEWORK

As described in Chapter 5, Appendix E of the PDARP/PEIS (DWH Trustees 2016), the Trustee Council (composed of designated natural resource trustee officials, or their alternates, for each of the DWH Trustee agencies) has committed to a MAM framework to support restoration activities by infusing best available science into project planning and design, identifying and reducing key uncertainties, tracking and evaluating progress toward restoration goals, determining the need for corrective actions, and supporting compliance monitoring. In December 2017, the DWH Trustees released the first version of the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0.* (MAM Manual) (DWH Trustees 2017). The MAM Manual, along with the *Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon (DWH) Oil Spill* (SOPs) (Trustees Council 2016) build upon the PDARP/PEIS MAM framework by providing details and guidance to the DWH Trustees for the planning, administration, and implementation of restoration through the states' trustee implementation groups (TIGs). Specifically, the MAM Manual provides guidance on Steps 2 through 8 of the MAM framework (Figure 1).

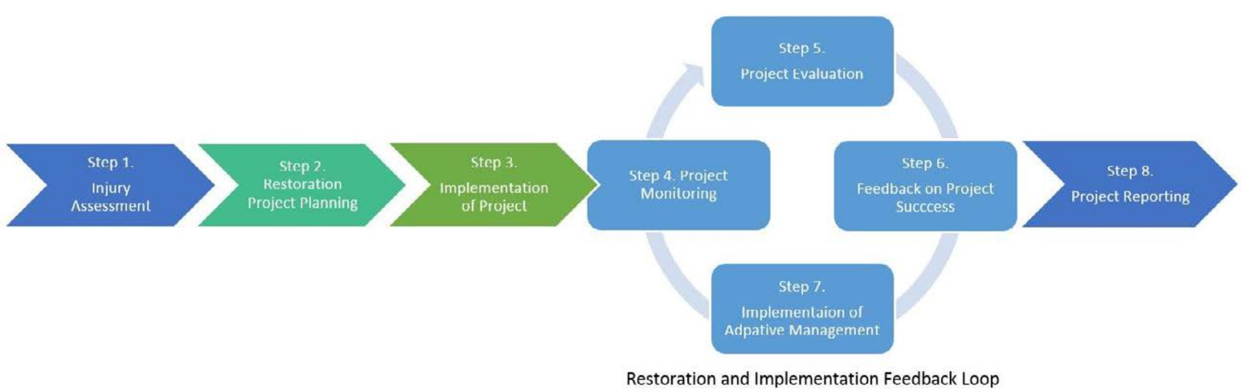

Figure 1. MAM framework as presented in the PDARP/PEIS.

The DWH MAM framework provides a flexible, science-based approach to effectively and efficiently implement restoration over several decades that provides long-term benefits to the resources and services injured by the DWH Oil Spill. At a proposed project level, MAM plans identify the monitoring needed to evaluate progress toward meeting site-specific objectives and to support corrective action and adaptive management of the restoration project where applicable. A variety of project-level monitoring activities may be included as part of a MAM plan, including pre-implementation monitoring, as-built monitoring, performance monitoring, or post-implementation monitoring, the bulk of monitoring which may fall under performance monitoring (DWH Trustees 2017:Section 2.2). Performance monitoring is meant to document whether projects have met their established performance criteria, as well to assist with determining the need for corrective actions if the project is not meeting the criteria (adaptive management). Adaptive management at the project level can include employing corrective actions, performance criteria, or other decision points where data would be evaluated to direct a future management action within the scope of the project (DWH Trustees 2017:Section 2.4).

2.1 Project-Level Monitoring and Adaptive Management Plans

Project-level MAM plans may include descriptive information regarding monitoring goals, objectives, parameter details (e.g., methodology and timing/frequency), potential corrective actions, and monitoring schedules. The MAM plans for selected projects are intended to be living documents and would be updated as needed to reflect changing conditions and/or to incorporate new information. For example, a MAM plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to individual project MAM plans as well as updates and additional details concerning the status of monitoring activities would be made publicly available through the Restoration Portal, currently located at: http://www.restoration.noaa.gov/dwh/storymap/.

As discussed in the MAM Manual (DWH Trustees 2017), MAM plans may follow the template developed by the Cross-TIG MAM work group. This template includes the following information, as is followed in the EA/RP, and as discussed in Section 3:

1. Introduction: This section includes the project description, location, restoration type goals and restoration objectives, the conceptual setting (the interactions and linkages in the ecosystem at the project site), and the potential sources of uncertainty.
2. Project Monitoring: This section outlines the monitoring parameters for performance monitoring and/or adaptive management; the methods for measuring the parameters; the timing, location, frequency, duration, and spatial scale of the monitoring efforts; and the sample size required for monitoring.
3. Adaptive Management: This section discusses the projected need and extent of adaptive management, based on the restoration type, approach, scale, unknowns, and timeframe of the project.
4. Evaluation: This section includes information on how the project's performance will be assessed against its restoration objectives and established performance criteria.
5. Project-Level Decisions: Performance Criteria and Potential Correction Actions: This section outlines the performance criteria for the project, which will be used to determine what constitutes success, or the need for corrective actions.
6. Monitoring Schedule: This section includes a schedule for project implementation and project monitoring.

7. Data Management: This section includes information on the type of data that will be collected; how it will be collected; timing, frequency, and location of collection; the quantity of data that are expected; and the data standards that are to be followed.
8. Reporting: This section outlines the reporting structure for the monitoring activities, including the information that will be reported on, and the frequency of reporting.
9. Roles and Responsibilities: This section outlines the key roles and responsibilities for the project, including information on what entity or entities will implement the project, are sponsoring the project, and are monitoring the project.
10. References: This section includes all documents referenced in the MAM plan.
11. MAM Plan Revision History: This section will keep a record of the changes and iterations of the plans because MAM plans are intended to be living documents.

3 APPENDIX C ORGANIZATION

All projects identified in the RP/EA require a MAM plan that is consistent with the requirements and guidelines set forth in the Final PDARP/PEIS, the Trustee Council SOPs, and the MAM Manual. A monitoring plan for each project was developed and is included in the following subsections of this appendix (Appendix C1–C22). Two restoration types are included in the RP/EA: nutrient reduction and recreational use (Louisiana Trustee Implementation Group 2018). The following MAM plans are presented by restoration type; the nutrient reduction projects are presented first, followed by the restoration use projects.

One restoration objective of the RP/EA is to reduce the nutrient loads to water bodies that were impaired by the DWH Oil Spill. The second restoration objective in the RP/EA is to restore a portion of the lost recreational use in Louisiana caused by the DWH Oil Spill by enhancing recreational opportunities in Louisiana. This would be accomplished by improving the public's accessibility and enjoyment of natural resources. The MAMs include project objectives with associated performance criteria to track progress toward restoration goals, methodologies and parameters for data collection, identification of uncertainties, and potential corrective actions.

4 REFERENCES

Deepwater Horizon Oil Spill Trustees (DWH Trustees). 2016. Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS).* Available: http://www.gulfspill restoration.noaa.gov/restoration-planning/gulf-plan. Accessed January 25, 2018.

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Trustee Council. 2016. *Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the* Deepwater Horizon *(DWF) Oil Spill.* November 15, 2016. Available at: http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/DWH-SOPs.pdf. Accessed January 25, 2018.

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APPENDIX C1

Draft Monitoring and Adaptive Management Plan

Theme 1: Nutrient Reduction on Dairy Farms

1 INTRODUCTION

Excessive nutrient enrichment, or eutrophication, of Gulf Coast estuaries and their watersheds is a chronic threat that can lead to hypoxia (low oxygen levels), harmful algal blooms, habitat loss, and fish kills (Deepwater Horizon [DWH] Trustees 2016:Section 5.5.4). The primary goal for the nutrient reduction projects is water quality improvement through nutrient and sediment reduction. The health of the Gulf of Mexico depends on the health of its estuaries, and the health of those coastal waters is influenced by land uses in the watersheds of its tributaries. Nutrient reduction projects would help to restore and enhance the ecological and hydrological integrity of the area's water resources, including improved water quality and ensuring natural water quantity levels in the area's coastal rivers and streams and coastal bays and estuaries. To this end, the objective of these projects is to reduce rural nonpoint source pollution through the implementation of conservation practices (CPs) on agricultural lands.

Implementing U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)–developed CPs has been proven to successfully address natural resource concerns related to agricultural lands. Many of these practices can be used to achieve a number of the restoration types identified in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS)* (PDARP/PEIS) (DWH Trustees 2016). CPs are technical methods designed to help conserve soil, water, air, energy, and related plant and animal resources. Appendix D in the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018; hereafter the RP/EA), provides a list of CPs that would be available for implementation under the proposed Theme 1 projects. Two CPs, Waste Separation Facility and Diversion, are discussed below to provide examples of the types of effects that may result from the application of different types of CPs.

A waste separation facility is a filtration or screening device, settling tank, settling basin, or settling channel used to partition solids and/or nutrients from a waste stream. The purpose of these facilities is to partition solids, liquids, and/or their associated nutrients to improve or protect air quality and water quality, improve manure handling methods, or serve as a pre- or post-treatment for other processes. Facilities generally include waste collection points, waste transfer pipelines, and waste treatment and storage facilities. Waste separators can be either mechanical or non-mechanical and are selected based on site-specific characteristics to meet specific management objectives. For proper functioning of mechanical separation equipment, environmental conditions may require roofing and or building enclosures. For separation facilities exposed to precipitation events, emergency overflow appurtenances are designed to pass the peak runoff from the drainage area of the facility for a 25-year 24-hour storm frequency plus the normal waste stream discharge. Design of settling basins is dependent on multiple factors including amount of storage needed, equipment access needed for cleanout, appropriate ventilation if facility is enclosed or in a confined area, and if the bottom is concrete or lined with a geosynthetic or geomembrane liner or is just compacted soil.

A diversion is a channel generally constructed across the slope with a supporting ridge on the lower side. The purpose of a diversion is to break up concentrations of water on long slopes, on undulating land surfaces, and on land that is generally considered too flat or irregular for terracing. Diversions are used to divert water away from farmsteads, agricultural waste systems, or other improvements; collect or direct water for storage; protect terrace systems; intercept surface and shallow subsurface water flow; reduce runoff damages; divert water away from active gullies or critically eroding areas; and supplement water management on conservation cropping and stripcropping systems. Diversions are stable sloped channels that are vegetated to protect the diversion from erosion. If the soils or climatic conditions preclude the use of vegetation for erosion protection, non-vegetative linings such as concrete, gravel, rock riprap, cellular block, or other approved manufactured lining systems are often used. USDA proposes two Theme 1 projects to accomplish nutrient reduction on dairy farms in the Lake Pontchartrain Basin:

- Nutrient Reduction on Dairy Farms in St. Helena and Tangipahoa Parishes
- Nutrient Reduction on Dairy Farms in Washington Parish

Although agricultural lands are not the sole or leading contributors of nutrients in the Lake Pontchartrain Basin, discharges from these lands do contribute a significant portion of nutrients (U.S. Geological Survey [USGS] 2002). This creates opportunities to address this resource concern at dairy farms within the Lake Pontchartrain Basin located within St. Helena, Tangipahoa, and Washington Parishes. To determine which parishes to focus on, a group of Hydrologic Unit Code (HUC) 12 watersheds were evaluated based on the findings published in the *FINAL 2016 Louisiana Water Quality Inventory: Integrated Report (305(b)/303(d)).* The HUC 12 watersheds are located within the Lake Pontchartrain Basin in St. Helena, Tangipahoa, and Washington Parishes, and were identified as not meeting their designated uses for Primary Contact Recreation, Secondary Contact Recreation, and Fish and Wildlife Propagation (Louisiana Department of Environmental Quality 2016). Currently dairy farms in these parishes are managing the waste component of their respective operations through waste treatment systems that were constructed in the early 1990s. The effluent waste application systems of these dairies are obsolete or marginal at best. Given the success of the USDA Farm Bill programs such as the Environmental Quality Incentives Program (EQIP) and their strong acceptance by private landowners, there is a significant opportunity to implement CPs on dairy farms that would reduce the levels of nutrients, fecal coliform bacteria, and sediments entering the Gulf of Mexico from the Lake Pontchartrain Basin.

The primary goal of these projects is to enhance overall ecosystem health by benefitting the estuaries that are integral habitat for many of the Gulf of Mexico's ecologically and economically important species. Nutrients and fecal coliform bacteria originating from dairy operations can enter water bodies through runoff and have a considerable deleterious effect on water quality. Nutrient management planning and implementation of best management practices (BMPs) and/or CPs on dairy farms can improve water quality for the receiving water body and the downstream water bodies.

The implementation of BMPs/CPs on dairy farms would require voluntary cooperation and support from landowners, who can improve nutrient application and management methods to decrease the amount of nutrients going into the watershed and ultimately discharging into coastal Gulf of Mexico waters. Voluntary conservation programs provide technical assistance to landowners and implement CPs that help reduce nutrient loads along the Gulf Coast. Under Theme 1, USDA would work with landowners to develop site-specific conservation plans for each dairy operation, outlining a combination of CPs. The conservation plans would address water quality, CPs applied to address water quality, and project timeline for implementation.

Conservation on dairy operations normally begins with a complete operational and natural resource assessment, conducted with the operator's plans and objectives in mind, while also striving to address all present and future resource concerns associated with the operation. Ultimately, all conservation concerns and objectives are addressed by developing and implementing a comprehensive waste management system. All enrolled dairy land tracts would be included in the development of a comprehensive nutrient management plan (CNMP), which would be used to define all conservation practice design parameters.

The proposed nutrient reduction on dairy farms projects would target efforts for measurable impact by clustering projects at the HUC 12 watershed scale, which directly impacts coastal wetlands (Figures 1a and 1b). The identified HUC 12s are located within multiple parishes, and projects under Theme 1 are identified by the parishes in which the priority HUCs are located. The Nutrient Reduction on Dairy Farms in St. Helena and Tangipahoa Parishes project includes the Crittenden Creek-Tickfaw River and Beaver Creek Watersheds. The Nutrient Reduction on Dairy Farms in Washington Parish project includes the Gorman Creek–Tchefuncta River, Clifton, LA–Bogue Chitto, Muster Ground Creek–Pushepatapa Creek, Snell Branch–Silver Creek, Little Silver Creek–Silver Springs Creek, Crains Creek–Pushepatapa Creek, Lawrence Creek, and Mayfield Creek–Pearl River Watersheds. Activities associated with projects under Theme 1 would occur on private lands on a voluntary basis.

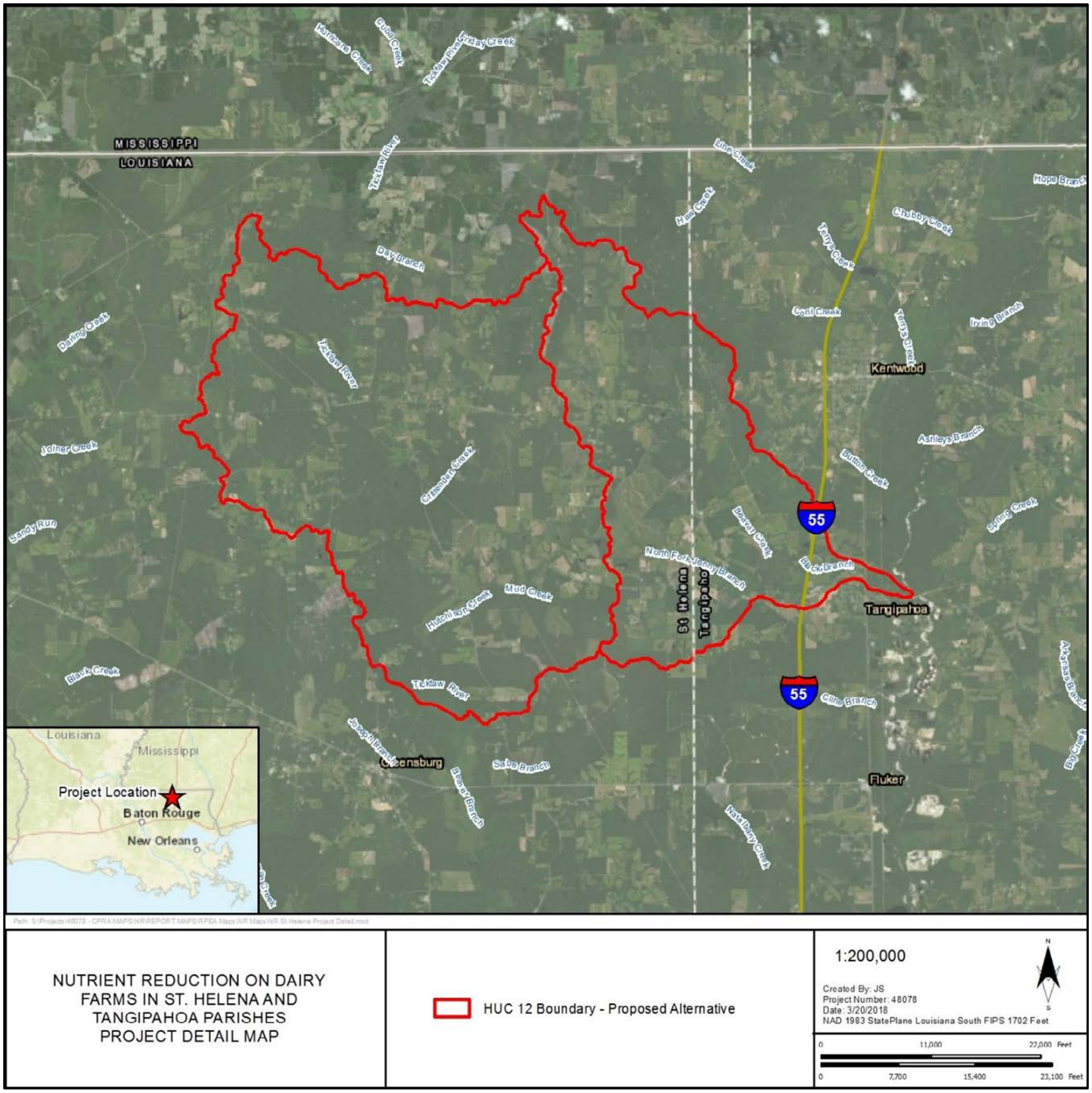

Figure 1a. Boundary for the Nutrient Reduction on Dairy Farms in St. Helena and Tangipahoa Parishes project, Theme 1.

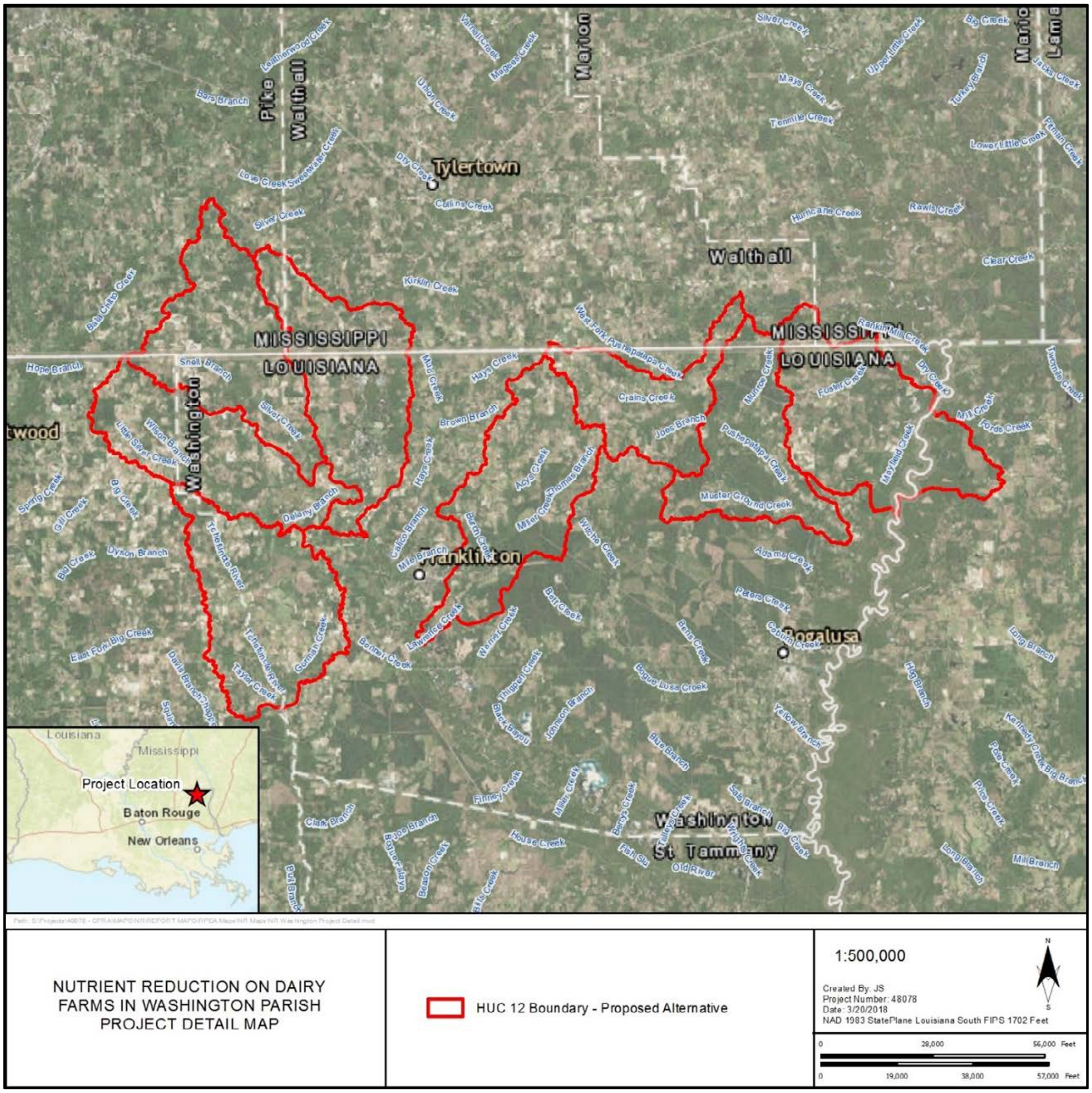

Figure 1b. Boundary for the Nutrient Reduction on Dairy Farms in Washington Parish project, Theme 1.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Trustees in the PDARP/PEIS is to "restore water quality" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals, and further identified specific goals for each restoration type. The Theme 1 projects fit within the restoration type of nutrient reduction (nonpoint source), which addresses the overall programmatic goal of restoring water quality. The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.4.1):

- Reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms or that suffer habitat losses associated with water quality degradation.
- Where appropriate, co-locate nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches.
- Enhance ecosystem services of existing and restored Gulf Coast habitats.

The proposed projects fall within the first restoration type goal because they propose to reduce nutrient loadings to the Gulf Coast. Theme 1 projects would meet the restoration goals outlined in the PDARP/PEIS through planning and implementation of CPs and BMPs at dairy farms in the Lake Pontchartrain Basin.

As described in Section 3.2.2 of the RP/EA (LA TIG 2018), the proposed projects would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the projects have a strong nexus to the injuries described in the PDARP/PEIS. The DWH Oil Spill resulted in impacts to ecological connectivity throughout nearshore habitats. To restore these ecological linkages, the DWH Trustees have suggested that an integrated restoration approach that includes restoration of various ecosystem attributes needs to occur. One of these attributes is water quality. When combined with nearshore habitat restoration approaches, water quality restoration projects can provide large-scale benefits that address chronic threats to the Gulf ecosystem. Reducing nutrient loading is part of the restoration approach that would mitigate the chronic and pervasive ecosystem threats incurred by eutrophic Gulf Coast waters. As the Theme 1 projects propose, implementation of CPs on privately owned lands would reduce nutrient enrichment, levels of fecal coliform bacteria, and sedimentation to help restore water quality in Gulf of Mexico coastal watersheds. The watershed-scale approach of the proposed projects under Theme 1 would restore water quality impacted by the DWH Oil Spill by reducing the levels of nutrients and sediments entering the Gulf of Mexico.

The overall goal of these projects is to reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms, or that suffer habitat losses associated with water quality degradation. The specific objective of the Theme 1 projects is as follows:

- To reduce nutrient, sediment, and/or pathogen (e.g., bacteria) concentrations and loadings to the Gulf of Mexico through the development and implementation of conservation plans and practices at dairy farms in the Lake Pontchartrain Basin.

The goals and objectives of the Theme 1 projects should be refined upon completion of the CNMP. Information included in the CNMP, such as the exact types of BMPs/CPs proposed, locations, and quantitative anticipated nutrient reduction values, are required in order to establish more project-specific goals and objectives.

1.1 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project, and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the projects can be found in the RP/EA in Sections 4.1 and 4.5, respectively (LA TIG 2018).

Aspects of the ecological system that may be affected by implementation of Theme 1 projects will depend on the type of BMPs/CPs implemented on the dairy farms throughout the Lake Pontchartrain Basin. For example, if an earth embankment, channel, or other type of diversion is created to collect or direct surface water flow, it is anticipated that the BMP/CP would affect the geology and soils, and hydrology of the project area (i.e., alter the hydrologic flow of the surface water and potentially create localized erosion due to the movement of soils to create the diversion). Likewise, if the diversion is created in an area of porous soils (e.g., sandy soils instead of clay soils) then the BMP/CP would likely be affected by the physical environment (the diversion may not operate as intended). As the proposed Theme 1 project locations and specific BMPs/CPs have not yet been identified, this monitoring and adaptive management (MAM) plan will need to be updated to include a more robust analysis of the conceptual setting.

In addition, subsequent environmental review will need to occur to determine whether a planned project-specific action is below the maximum impacts described in the RP/EA. An example of the Environmental Evaluation Worksheet used to document this review is included in Appendix D of the RP/EA (LA TIG 2018). If the project-specific action is below the maximum impacts described in the RP/EA, the analysis of the effects will be documented on the Environmental Evaluation Worksheet and the action will proceed. The Environmental Evaluation Worksheet will be routed through the LA TIG to the administrative record, where it will be publicly available. If the evaluation of the planned project-specific action indicates the effects are likely to exceed the maximum impacts described in the RP/EA, the LA TIG will undertake additional project-specific environmental review consistent with National Environmental Policy Act requirements and other requirements for protection of the environment. The LA TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of these projects.

1.1.1 Drivers

As outlined in the *Monitoring and Adaptive Management Procedures and Guidelines Manual* (MAM Manual), drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.5.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating these projects, the following outside drivers and stressors were considered:

- Changes in land use
- Land-use practices (e.g., free range dairy farming verses traditional farming methods)
- Alterations to freshwater flow

Changes in land use and land use practices could greatly affect the proposed projects under Theme 1. If, for example, a landowner of one of the dairy farms included in the CNMP decides to stop farming, and instead sells the property for commercial use, then the proposed restoration project will no longer be relevant at that site. Alterations to freshwater flow would also have the potential to influence the outcomes of the proposed Theme 1 projects. For example, structures (buildings, fences, etc.) constructed on a dairy farm after implementation of a BMP/CP may disrupt the hydrological flow of surface water on the property. This disruption could cause water to no longer flow into the BMP/CP, therefore altering the effectiveness of the restoration project. This list should not be considered exhaustive; additional drivers may be identified as the projects are implemented and/or monitored, and would need to be included in this MAM plan. If any drivers are negatively impacting the projects, adaptive management may be necessary to ensure the projects' goals and objectives are being achieved. The adaptive management strategy for the projects is outlined in Section 3 of this plan.

1.1.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating these nutrient reduction projects, the following uncertainties were considered:

- Willingness of landowners to participate in the development and implementation of a CNMP
- Linkages between water quality improvements and ecosystem benefits
- Degree to which local improvements in water quality contribute to water quality improvements downstream
- Combination and placement of projects within a watershed to maximize benefits in receiving estuary
- Pollutant transport and freshwater flow through Gulf coastal watersheds
- Relationship between watershed pollutant loadings and occurrence of Gulf coastal ecosystem threats and human use impacts
- Other nutrient, point source contributions in the watershed

This list should not be considered exhaustive; additional uncertainties may be identified as the projects are implemented and/or monitored. During the planning phase of the projects, it was assumed that USDA would be able to attract dairy farm operators to participate in the development and implementation of CPs through a CNMP. However, anticipated participation for the proposed projects was not gauged before Theme 1 was assessed by the LA TIG. Therefore, the ability of USDA to engage the landowners to participate in the Theme 1 projects is an unknown. Likewise, the degree to which local improvements in water quality at the dairy farms contribute to water quality improvements downstream is not fully known at this time. Impacts to the community and environment are considered in the RP/EA that was completed for the Theme 1 projects (LA TIG 2018:Section 4.5.2). BMPs to mitigate the potential environmental and socioeconomic impacts of the Nutrient Reduction (Nonpoint Source) restoration type are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the projects are implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. Additional discussion and specific details regarding how uncertainties may affect the Theme 1 projects should be added to this MAM plan after completing the CNMP. If negative impacts from the projects occur, or if the projects are unable to attract recreational users, adaptive management may be necessary to ensure the projects' goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the projects. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the projects' ability to fully achieve their objectives. The adaptive management strategy for these projects is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the projects achieve the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that were considered were geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH Trustees restoration projects. The sections below outline the monitoring parameters and the methods for measuring these parameters for the Theme 1 nutrient reduction projects. Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds" Restoration Approaches (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to nutrient reduction projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

One core performance monitoring parameter has been identified for the Theme 1 projects is the number of water quality improvement practices (BMPs and/or CPs) implemented. The number of BMPs/CPs is considered a "core performance" monitoring type because it can be used consistently across projects that fall under the Nutrient Reduction (Nonpoint Source) restoration type. In addition, several project-specific objectives have been identified for the Theme 1 projects. The monitoring parameters associated with the project-specific objectives outlined in Table 1 would be collected in addition to the core performance parameter.

Table 1. Project-Specific Objectives and Performance Monitoring Parameters for Theme 1 Projects

Project-Specific Objective	Objective-Specific Performance Monitoring Parameters
Reduce nutrient concentrations and loadings leaving dairy farms in the Lake Pontchartrain Basin	Total nitrogen and total phosphorus
Reduce sediment concentrations and loadings leaving dairy farms in the Lake Pontchartrain Basin	Total suspended solids and turbidity
Reduce pathogen concentrations and/or exposures leaving dairy farms in the Lake Pontchartrain Basin	*Escherichia coli*, enterococci, and fecal coliform

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the "reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds" restoration approach to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring. As the exact locations and types of BMPs/CPs have yet to be determined, this MAM plan will need to be updated once the CNMP is complete. Specific details on the monitoring schedule, methodology (i.e., number of samples, location of samples, etc.), and reporting will need to be included in subsequent versions of this plan. Review and approval of the updated plan by the LA TIG would be necessary prior to implementation of the practices outlined herein.

2.2.1 Parameter 1: Number of CPs/BMPs Implemented

The recommended methodology for monitoring this parameter is to count the number of improvements implemented at each dairy farm that participates in the CNMP. Gathering information on the amount of CPs and BMPs implemented should occur throughout the implementation period of the CNMP, and not during planning, because environmental and economic factors may change, resulting in implementation of fewer, or perhaps more, CPs and BMPs. Monitoring of this parameter should occur on-site through direct observation of the implemented CPs and BMPs. One observation is sufficient to record this parameter; follow-up visits to the participating dairy farms for data collection would not be necessary.

2.2.2 Parameter 2: Total Nitrogen and Total Phosphorus

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the sum of all forms of phosphorus and nitrogen, including organic and inorganic forms. Guidance for specific water sampling methodology to measure total nitrogen (TN) can be found in the American Society for Testing and Materials (ASTM) D5176 Volumes 11.01 and 11.02 (ASTM 2013a, 2013b) and the USGS *National Field Manual for the Collection of Water-Quality Data* (USGS variously dated). For guidance on potential methodologies to measure total phosphorous (TP), see the U.S. Environmental Protection Agency (EPA) Methodologies 300.0, 365.2, 365.3, and 300.1 (EPA 1971a, 1978, 1993a, 1997). Also, for additional guidance see the Standard Methodologies 4110C and 4110B (National Environmental Methods Index 2011a, 2011b), and the *USGS Methodology for Evaluation of Alkaline Persulfate Digestion as an Alternative to Kjeldal Digestion for Determination of Total and Dissolved Nitrogen and Phosphorus in Water* (USGS 2003).

Additional information should also be collected when sampling for TN and total phosphorus (TP), such as loads (i.e., water level and flow, which is an invaluable measurement for calculating nutrient loading), depth of the sample, and collection method. Further, ammonium nitrogen (NH4-N), nitrite plus nitrate nitrogen (NO2-N + NO3-N), and total Kjeldahl nitrogen (TKN) could be analyzed from the samples.

Data collection and calibration procedures of detection instruments would be determined by the respective instrument's quality assurance and quality control (QA/QC) procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.3 Parameter 3: Total Suspended Solids and Turbidity

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the total suspended solids (TSS) and turbidity. TSS is defined as the dry weight of sediment from the known volume of a sub-sample of the original water sample, and is measured as milligrams per liter (mg/L) or parts-per-million (ppm) (DWH Trustees 2017:Section E.9.27). Turbidity is defined as a measure of intensity of light scatter by a sample, or the cloudiness/haziness of a sample, and is measured in nephelometric turbidity units (NTUs) (DWH Trustees 2017:Section E.9.27).

For methods on collection of TSS, see EPA 160.2 (EPA 1971b), and for methods on assessing water turbidity see EPA 180.1 (EPA 1993b) and Wagner et al. (2006). Data collection and calibration procedures of detection instruments would be determined by the respective instrument's QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.4 Parameter 4: **Escherichia coli***, Enterococci, and Fecal Coliform*

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the indicators (*Escherichia coli*, enterococci, and fecal coliform) of recent fecal matter contamination. The presence of these indicator pathogens in water samples signifies that pathogens dangerous to human health may be present in the water body. *Escherichia coli* is measured in water samples as either the most probable number (MPN)/100 liters (L) or colony-forming units (CFU)/100 milliliters (mL). Guidance on methods of detection of *Escherichia coli* in water samples can be found in EPA 1604, and SM 9223 B (EPA 2002, 2004). Enterococci are measured the same way as *E. coli* (MPN/100 L or CFU/100 mL). Guidance on the appropriate methods used to assess enterococci in water samples can be found in IDEXX Enterolert (Baird et al. 2017; EPA 2004). Fecal coliform, which is a subset of total coliform bacteria, are indicators that pathogenic bacteria, viruses, or protozoans dangerous to human beings may be present in a water body. Fecal coliform is measured as CFU per 100 mL. Guidance on sampling methodology and analytical techniques for determining fecal coliform can be found in the *Standard Methods for the Examination of Water and Wastewater* (Baird et al. 2017).

Data collection and calibration procedures of detection instruments would be determined by the respective instrument's QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques, or have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011). The projects proposed under Theme 1 of the restoration type—nutrient reduction—would use previously established types of CPs and BMPs. USDA has demonstrated success in developing and implementing the same types of CPs that would be included in the CNMP within similar watersheds across the Gulf Coast. Given their extensive experience and expertise in CPs, the success and legacy of the USDA Farm Bill programs, and their established level of trust and cooperation with private landowners, there is a significant opportunity to implement CPs on private lands. Implementation of CPs would reduce the levels of nutrients and sediments entering watersheds that could provide benefits to marine resources and coastal watersheds.

Examples of past successful water quality restoration projects include regional watershed management plans, state Clean Water Act (CWA) 319 programs, and USDA conservation programs (i.e., EQIP, Conservation Reserve Program, Wetlands Reserve Program, Wildlife Habitat Incentives Program). Additionally, the USDA conservation programs and EPA have funded the successful implementation of agriculture CPs throughout the nation, resulting in significant reductions in nutrient loadings to water bodies nationwide. Recently, the USDA's Conservation Effects Assessment Program (CEAP) evaluated the ecological impact of the agricultural CPs implemented in the Texas Gulf Basin (NRCS 2015). These practices combine structural practices for controlling water erosion with structural or tillage and residue management practices to reduce nutrient runoff throughout the Texas Gulf Basin. The combined use of these CPs has reduced sediment, nitrogen, and phosphorus loads delivered from cropland to rivers and streams by 60%, 41%, and 55%, respectively. Additionally, under Section 319 of the CWA, EPA provides grants to states who work with partners and stakeholders to control nonpoint source pollution. This program has documented numerous examples of the use of conservation systems to restore water quality.

Although adaptive management is a critical component of the restoration planning process, adaptive management on the specific conservation practices being proposed under Theme 1 is not needed because of the nature of the sampling approaches (standard and reliable), the objectives of the projects, the scale of the sites in which the data would be collected (watershed scale), and the understanding of the conservation practices that would be applied. However, if monitoring determines that the projects are not meeting their goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 5 of this document.

4 EVALUATION

The projects proposed under Theme 1 would be considered successful if they meet the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are quantitative and based on the projects' goals and objectives:

- Increase in the number of nutrient reduction CPs and BMPs on dairy farms in the Lake Pontchartrain Basin
- Targeted reduction (percent nutrient reduction over time) of instream TN and TP at dairy farms in the Lake Pontchartrain Basin
- Targeted reduction (percent nutrient reduction over time) of instream TSS and turbidity at dairy farms in the Lake Pontchartrain Basin
- Targeted reduction (percent nutrient reduction over time) of instream *Escherichia coli*, enterococci, and fecal coliform at dairy farms in the Lake Pontchartrain Basin

To properly establish if the BMPs/CPs are achieving nutrient reduction, pre-construction evaluations would need to occur. Pre-construction water quality monitoring would provide baseline information on the project-specific nutrient loads entering the ecosystem from the dairy farms. Using the baseline data, the USDA will be able to gauge whether targeted reduction of TN, TP, TSS, *Escherichia coli*, enterococci, and fecal coliform is occurring as a result of project implementation. Because the details of the proposed monitoring regimes are unknown, the following methods for analyzing, evaluating, and interpreting the monitoring data collected for Theme 1 could include the following:

- <u>Data summarization and characterization</u>: This analysis would include calculation of the basic statistics of the monitoring data (e.g., linear regression of TN within the proposed sampling location(s). This information would form the basis for a more comprehensive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- <u>Status determination</u>: This evaluation would help determine if the projects are meeting their performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate that there is an increase in TSS and turbidity entering the nearest waterway, there may be an issue with the CPs and BMPs, or increased agricultural use on the site. This evaluation methodology would involve both expert interpretation and statistical analysis.
- <u>Trends evaluation</u>: This evaluation methodology can be used to address whether there is a change in nutrient loading and water quality over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Specific analysis methods would be applied to all of the monitoring parameters once the CNMP is finalized with project specifics. At that time, this MAM plan would also be updated to include project-specific information.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring objective for projects included under Theme 1 (Table 2). Additional corrective actions may be identified once the CNMP is complete and specific project details are known, and/or during post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Objective

Monitoring Objective	Final Performance Criteria	Potential Corrective Actions
Increase the number of nutrient reduction CPs and BMP on dairy farms in the Lake Pontchartrain Basin	Increased number of installed CPs and BMPs on dairy farms across the Lake Pontchartrain Basin	Adding additional CPs and BMPs to participating dairy operations, as necessary, to increase reduce nutrient loading to the Gulf Coast.
Reduce nutrient concentrations and loadings leaving dairy farms in the Lake Pontchartrain Basin	Identifiable reduction in TN and TP from dairy farm operations in the Lake Pontchartrain Basin	Improving project infrastructure (e.g., installing additional waste water treatment CPs and BMPs). Conducting routine maintenance activities (e.g., cleaning and maintaining waste separators and associated filters).
Reduce sediment concentrations and loadings leaving dairy farms in the Lake Pontchartrain Basin	Identifiable reduction in TSS and turbidity from dairy farm operations in the Lake Pontchartrain Basin	Improving project infrastructure (e.g., installing additional waste water treatment CPs and BMPs). Conducting routine maintenance activities (e.g., cleaning and maintaining diversion channels to increase the effectiveness of TSS reduction).
Reduce pathogen concentrations and/or exposures leaving dairy farms in the Lake Pontchartrain Basin	Identifiable reduction in *Escherichia coli*, enterococci, and fecal coliform from dairy farm operations in the Lake Pontchartrain Basin	Conducting routine maintenance activities (e.g., cleaning and maintaining waste separators and associated filters).

6 MONITORING SCHEDULE

The schedule for the project monitoring is in Table 3, separated by monitoring activity. The duration of monitoring activities will be determined upon completion of the CNMP and prior to implementation of this MAM plan. This information will be added to and revised in this MAM plan as needed whenever monitoring methods are refined or revised. However, monitoring the effectiveness of BMPs/CPs on agricultural lands in influencing water quality can take many years. It is possible that future iterations of this MAM plan would include long-term monitoring requirements, ranging anywhere between 5 and 7-plus years.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction and Planning	Construction	Post-construction
Number of installed CPs and BMPs on dairy farms across the Lake Pontchartrain Basin			X
Reduction in TN and TP from dairy farm operations in the Lake Pontchartrain Basin	X		X
Reduction in TSS and turbidity from dairy farm operations in the Lake Pontchartrain Basin	X		X
Reduction in *Escherichia coli*, enterococci, and fecal coliform from dairy farm operations in the Lake Pontchartrain Basin	X		X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this monitoring plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4. Because there is no project-specific information at this time, Table 4 would need to be updated once the CNMP is completed and details about the CPs and BMPs, project locations, sampling techniques, etc. are known.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Number of installed CPs and BMPs on dairy farms across the Lake Pontchartrain Basin	CPs and BMP counts and photographs	Direct observation of installed CPs and BMPs at various project sites	To be determined (TBD) in the CNMP	TBD in the CNMP
Reduction in TN and TP from dairy farm operations in the Lake Pontchartrain Basin	Statistical and analytical data for TN and TP	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in TSS and turbidity from dairy farm operations in the Lake Pontchartrain Basin	Statistical and analytical data for TSS and turbidity	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in *Escherichia coli*, enterococci, and fecal coliform from dairy farm operations in the Lake Pontchartrain Basin	Statistical and analytical data for *Escherichia coli*, enterococci, and fecal coliform	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP

All data would be collected either by hand on monitoring or surveys forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

Water samples would be collected using the appropriate and standard monitoring techniques. Standard analytical techniques would be used to document water quality improvements following state and local standard operating procedures (SOPs). A chain-of-custody (COC) form would be used to transmit any samples collected in the field to the analyzing laboratory. In addition, all data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual, Section 3.2 (DWH Trustees 2017).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate QA/QC process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the data submitted to the Trustees using the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that USDA can adequately conduct a final QA/QC check for non-data entry errors (e.g., date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the USDA to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016:Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016:Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, this project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

The first report would be submitted after the completion of pre-construction monitoring of a proposed project under Theme 1. Subsequent reports would be submitted after the completion of post-construction monitoring. The number of reports would be dependent on the CPs and BMPs installed, and other project-specific details (such as location) that are not known at this time. This MAM plan would be updated once the CNMP is completed and project-specific information is understood.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (Trustees Council 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing party, USDA is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the TIG, and submitting MAM data and project information to the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, USDA, is responsible for all maintenance activities and costs related to the CPs/BMPs, including any repairs needed over the life of the CNMP.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C2

Draft Monitoring and Adaptive Management Plan

Theme 2: Nutrient Reduction on Cropland and Grazing Lands

1 INTRODUCTION

Excessive nutrient enrichment, or eutrophication, of Gulf Coast estuaries and their watersheds is a chronic threat that can lead to hypoxia (low oxygen levels), harmful algal blooms, habitat loss, and fish kills (Deepwater Horizon [DWH] Oil Spill Trustees [DWH Trustees] 2016:Section 5.5.4). The primary goal for the nutrient reduction projects is water quality improvement through nutrient and sediment reduction. The health of the Gulf of Mexico depends on the health of its estuaries, and the health of those coastal waters is influenced by land uses in the watersheds of its tributaries. Nutrient reduction projects would help to restore and enhance the ecological and hydrological integrity of the area's water resources, including improved water quality and ensuring natural water quantity levels to the area's coastal rivers and streams and coastal bays and estuaries. To this end, the objective of these projects is to reduce rural nonpoint source pollution through the implementation of conservation practices (CPs) on agricultural lands.

Implementing U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)–developed CPs has been proven to successfully address natural resource concerns related to agricultural lands. Many of these practices can be used to achieve a number of the restoration types identified in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS)* (Final PDARP/PEIS) (DWH Trustees 2016). CPs are technical methods designed to help conserve soil, water, air, energy, and related plant and animal resources. Appendix D in the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018; hereafter the RP/EA), provides a list of CPs that would be available for implementation under the proposed Theme 2 projects. Two USDA CPs, 1) Residue and Tillage Management, Reduced Till and 2) Grassed Waterway, are highlighted in the RP/EA, in order to provide examples of the types of effects that may result from the application of different types of CPs.

Residue management is managing the amount, orientation, and distribution of crop and other plant residue on the soil surface throughout the year. It includes all soil-disturbing activities like tillage, nutrient applications, and harvesting of residue. Residue management systems can be designated to accomplish multiple purposes including: reduce sheet and rill erosion, maintain or increase soil organic matter, increase moisture available for plant use, reduce energy use, reduce soil particulate emissions and carbon dioxide (CO_2) losses, and provide food and escape cover for wildlife. Residue tillage regimes manage residue for sustainable agricultural production, which has been proven to improve soil condition over traditional tillage methods. Reduced till systems manage the amount, orientation, and distribution of crop and other residue on the soil surface while limiting the soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting.

A grassed waterway is a shaped or graded channel that is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. The purpose of a grassed waterway is to convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding, to reduce gully erosion, and/or to protect and improve water quality. Design features of grassed waterways include capacity, stability, width, side-slope depth, drainage, outlets, and vegetative establishment.

USDA proposes the following three Theme 2 projects to accomplish nutrient reduction on cropland and grazing land:

- Nutrient Reduction on Cropland and Grazing Land in Bayou Folse
- Nutrient Reduction on Cropland and Grazing Land in Concordia, Catahoula, and Tensas Parishes
- Nutrient Reduction on Cropland and Grazing Land in Iberia, St. Mary, and Vermilion Parishes.

Runoff containing fertilizers and livestock waste from agricultural lands in the Atchafalaya, Mermentau, Vermilion-Teche, Mississippi, Red, Ouachita, Barataria, and Terrebonne River Basins is a significant contributor to nitrogen and phosphorus levels within these watersheds. The deposition of excessive nutrients in these watersheds stimulates an overgrowth of algae that sinks and decomposes in the water downstream. The resulting low oxygen levels are insufficient to support most aquatic life and habitats in near-bottom waters, posing a serious threat to the Gulf of Mexico's fisheries, and because of the particular hydrology of these basins, these nutrient loads have a direct flow path to the Gulf of Mexico. The annual hypoxic zone that forms in nearshore waters off the Louisiana coast is a chronic problem with significant implications for the health of Gulf of Mexico resources, and the long-term health of those resources requires addressing the problem. This creates opportunities to address this resource concern in cropland and grazing land within these watersheds located within Concordia, Catahoula, Tensas, Lafourche, Terrebonne, Iberia, St. Mary, and Vermilion Parishes.

Given the success of USDA conservation programs such as EQIP and their strong acceptance by landowners, there is a significant opportunity to implement CPs on cropland and grazing land that would reduce the levels of nutrients entering the Gulf of Mexico. The primary goal of Theme 2 projects is to enhance overall ecosystem health by benefitting the estuaries that are integral habitat for many of the Gulf of Mexico's ecologically and economically important species. Many estuarine-dependent species spend part of their life history offshore, and therefore, there is a strong linkage between the health of inshore and offshore waters. Nutrients originating from cropland and grazing land can enter water bodies through runoff and have a considerable deleterious effect on water quality. Nutrient management planning and implementation of best management practices (BMPs) and/or CPs on cropland and grazing land can improve water quality for not only the receiving water body, but downstream as well.

Conservation on agricultural lands normally begins with a complete operational and natural resource assessment, conducted with the landowner's plans and objectives in mind, while striving to address existing water quality concerns associated with the operation. Ultimately, conservation concerns and objectives are addressed by developing a CNMP, which would be used to define all CP design parameters. Nutrient reduction on cropland and grazing land projects would target efforts to achieve a measurable impact by clustering projects in HUC 12 watersheds that directly impact coastal wetlands (Figures 1a–1c). The identified HUC 12s are located within multiple parishes under Theme 2 (Table 1). Activities associated with projects under Theme 2 would occur on private lands on a voluntary basis.

Table 1. HUC 12 Watershed by Project

Nutrient Reduction on Cropland and Grazing Lands in Bayou Folse	
Bayou Cutoff	Lake Fields
Halpin Canal	Bayou Terrebonne
Bayou L'Eau Bleu	St. Louis Cana-Bayou Pointe Au Chien
Forty Arpent Canal	
Nutrient Reduction on Cropland and Grazing Lands in Concordia, Catahoula, and Tensas Parishes	
Ford Creek	Wyches Bayou-Bayou Cocodrie
Crackets Bayou	Pool Lake Bayou
Little Choctaw Bayou-Big Choctaw Bayou	Cross Bayou
Excelsior Lake-Bayou Cocodrie	Callahan Branch-Ouachita River
Boggy Bayou-Fool River	Cocodrie Lake
Routh Bayou-Big Choctaw Bayou	Hawthorne Creek-Bushley Creek
Haha Bayou	Black Bayou

Black Bayou-Tensas River	Vidalia Canal-Bayou Cocodrie
Lake St. John-Black Bayou Lake	Greens Bayou
Hibbs Bayou	Lake Concordia-Bayou Cocodrie
Little Tensas Bayou-Little Tensas River	Dean Bayou-Tensas River
Dismal Swamp-Bayou Cocodrie	Glade Bayou-Black River
Big Choctaw Bayou-Tensas Lake	Boggy Bayou
Van Buren Bayou	Lake Louis-Bayou Louis
Clarks Bayou-Bayou Macon	Brushy Bayou
Durham Prong	Long Branch
Birds Creek-Sandy Lake	Lake St. Joseph-Clark Bayou
Lake Bruin	Whites Bayou-Bayou Cocodrie
Elm Slough-Little River	Tiger Bayou
Brushley Bayou-Ouachita River	Big Cash Bayou-Tensas River
Black River Lake-Black River	
Nutrient Reduction on Cropland and Grazing Lands in Iberia, St. Mary, and Vermilion Parishes	
Yokely Bayou-Frontal Intercoastal Waterway	Blackfish Pirogue Trail-Frontal White Lake
Schooner Bayou Canal-Frontal White Lake	Bayou Grand Marais
Sledge Canal-Frontal Intercoastal Waterway	Warren Canal-Frontal Intercoastal Waterway
Bayou Cypermort-Frontal Intercoastal Waterway	Oyster Bayou-Frontal Gulf of Mexico
Loreauville Canal-Bayou Teche	Bayou Tigre-Delcambre Canal
Freshwater Bayou-Frontal Gulf of Mexico	Big Way Bayou-Frontal Atchafalaya Bay
Bayou Lucien-Frontal Gulf of Mexico	Bayou Carlin-Frontal Cote Blanche Bay
Deblane Coulee-Bayou Petite Anse	Youngs South Coulee-Vermilion River
Delahoussaye Canal	Yellow Bayou-Bayou Teche
Pecan Island-Frontal Gulf of Mexico	Tete Bayou
Bayou Teche-Lower Atchafalaya River	East Constance Bayou- Frontal Gulf of Mexico
Isle Marrone Canal-Frontal Intercoastal Waterway	Vermilion River-Frontal Intercoastal Waterway
Bayou Cypermort-Frontal Vermilion Bay	Lake Fausee Point
Pipeline Canal-Frontal Gulf of Mexico	Grosse Isle Point-Frontal Gulf of Mexico
Bayou Carlin-Frontal Intercoastal Waterway	Warren Canal-Schooner Bayou Canal
Little Bayou-Vermilion River	Bayou Pare Perdu-Lake Peigneur
Bayou Choupique-Frontal Intercoastal Waterway	Belle Isle Bayou-Freshwater Bayou Canal
Seventh Ward Canal-Frontal Intercoastal Waterway	Boston Canal-Frontal Intercoastal Waterway
Wax Lake	Shell Reefs-Frontal Gulf of Mexico
Coulee Kenny	Lower Atchafalaya River-Frontal Atchafalaya Bay
Latanier Bayou-Frontal Intercoastal Waterway	Bayou Blanc-Frontal West Cote Blanche Bay
Weeks Bayou-Frontal Intercoastal Waterway	Hog Bayou-Frontal Wax Lake
Vermilion River-Frontal Vermilion Bay	Billy Bayou-Frontal Intercoastal Waterway
Floating Turf Bayou-Frontal White Lake	Florence Canal-Frontal White Lake

The implementation of BMPs/CPs on cropland and grazing land would require voluntary cooperation and support from landowners, who can improve nutrient application and management methods to decrease the amount of nutrients going into the watershed and ultimately discharging into coastal Gulf of Mexico waters. Voluntary conservation programs provide technical assistance to landowners and implement CPs that help reduce nutrient loads along the Gulf Coast. Under Theme 2, USDA would work with landowners to develop site-specific conservation plans for each dairy operation outlining a combination of CPs. The conservation plans would address water quality, CPs applied to address water quality, and project timeline for implementation.

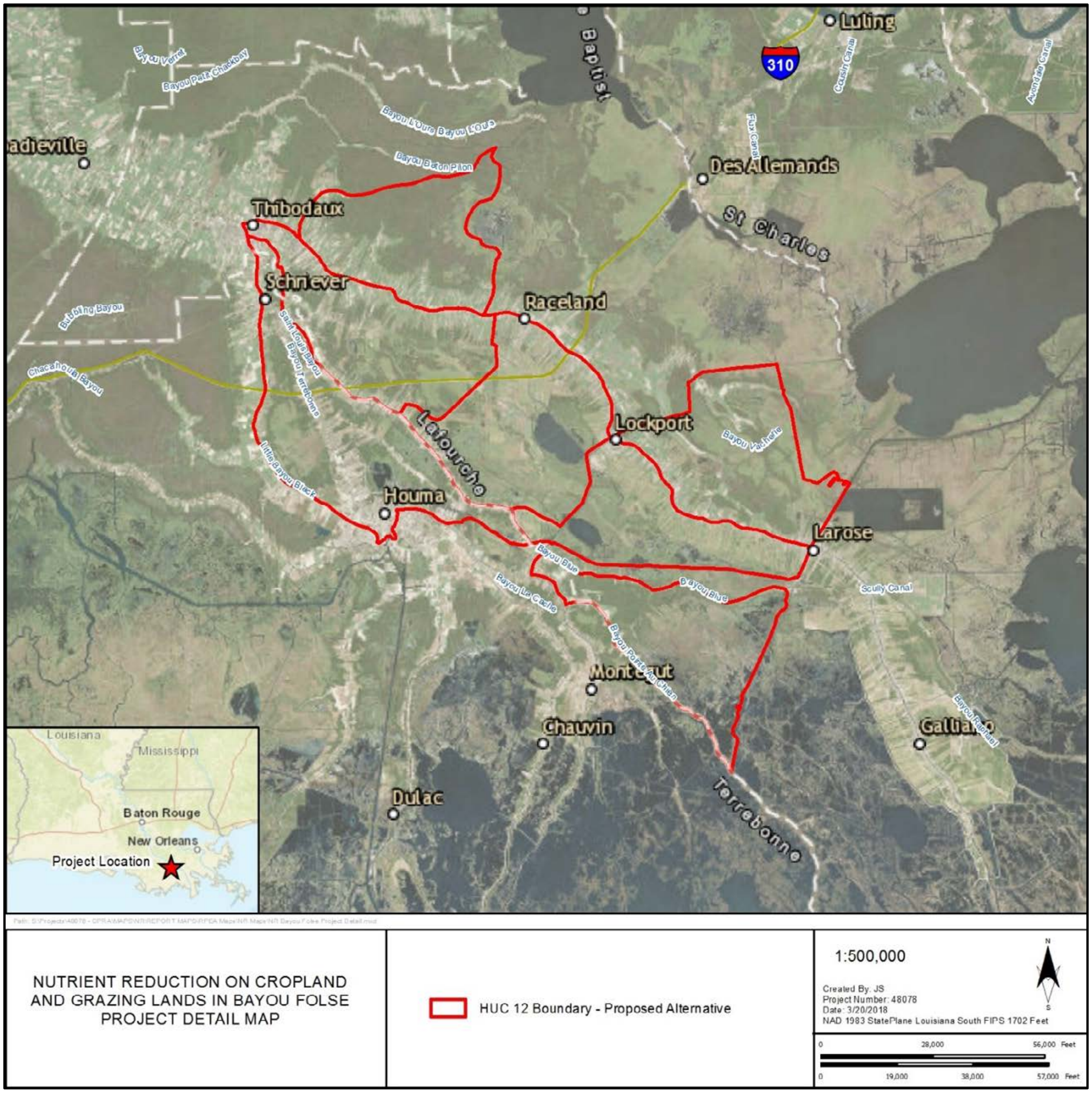

Figure 1a. Boundary for the Nutrient Reduction on Cropland and Grazing Land in Bayou Folse project, Theme 2.

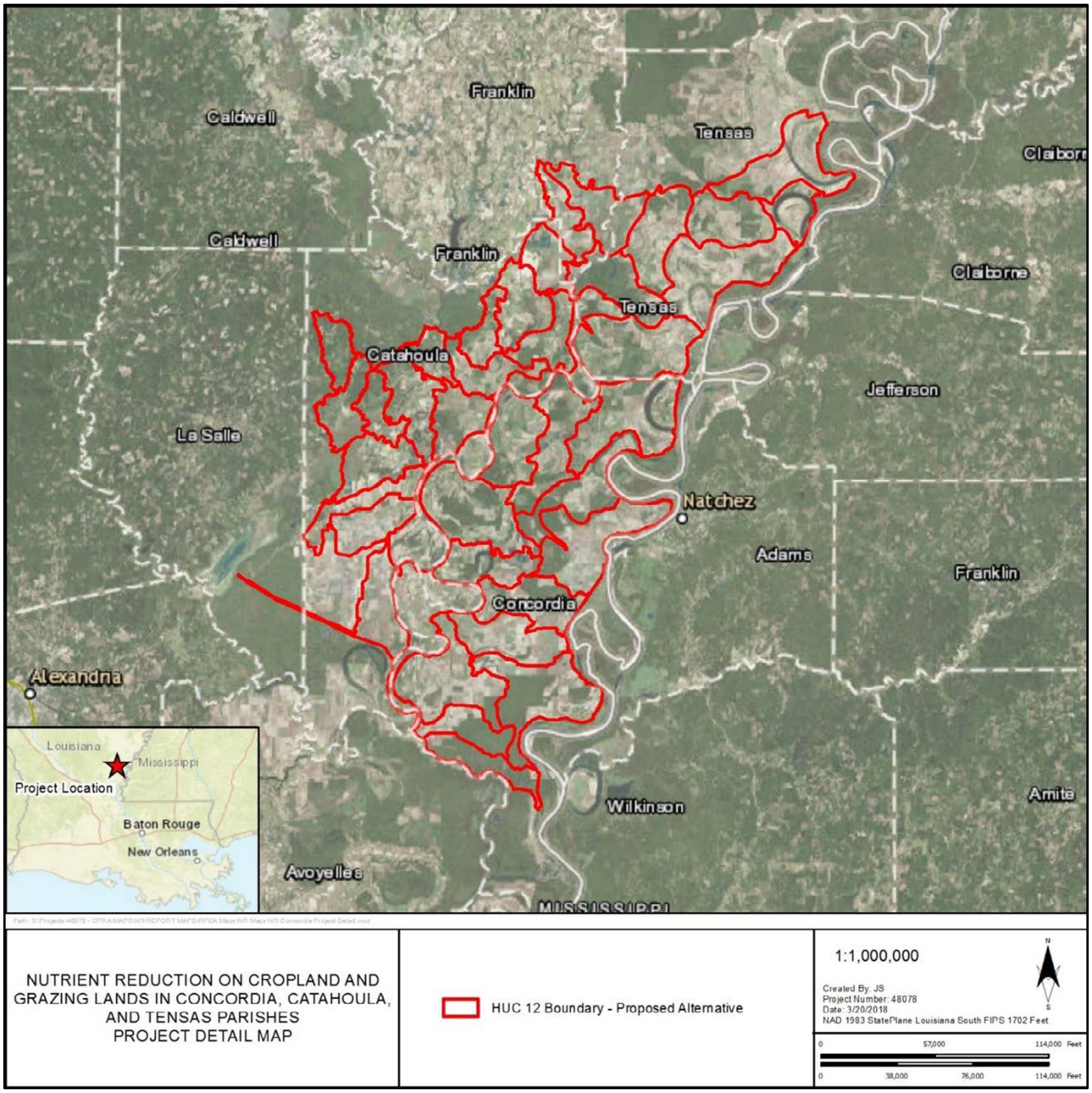

Figure 1b. Boundary for the Nutrient Reduction on Cropland and Grazing Land in Concordia, Catahoula, and Tensas Parishes project, Theme 2.

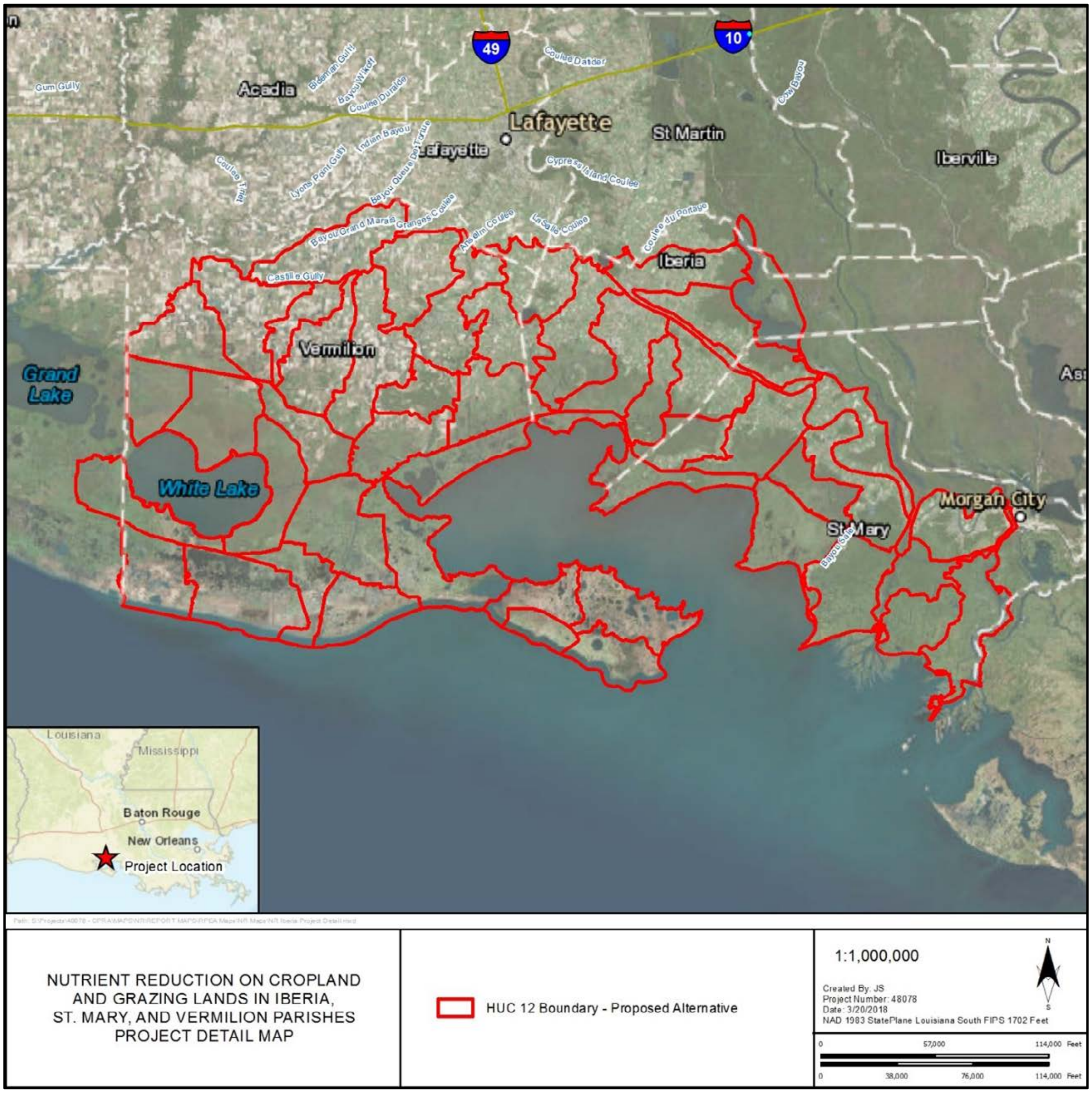

Figure 1c. Boundary for the Nutrient Reduction on Cropland and Grazing Land in Iberia, St. Mary, and Vermilion Parishes project, Theme 2.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Trustees in the Final PDARP/PEIS is to “restore water quality” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals, and further identified specific goals for each restoration type. The Theme 2 projects fit within the restoration type of nutrient reduction (nonpoint source), which addresses the overall programmatic goal of restoring water quality. The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.4.1):

- Reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms or that suffer habitat losses associated with water quality degradation.
- Where appropriate, co-locate nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches.
- Enhance ecosystem services of existing and restored Gulf Coast habitats.

The proposed projects fall within the first restoration type goal because they propose to reduce nutrient loadings to the Gulf Coast. Theme 2 projects would meet the restoration goals outlined in the Final PDARP/PEIS through planning and implementation of CPs and BMPs on cropland and grazing land.

As described in Section 3.2.2 of the RP/EA (LA TIG 2018), the proposed projects would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the projects have a strong nexus to the injuries described in the Final PDARP/PEIS. The DWH Oil Spill resulted in impacts to ecological connectivity throughout nearshore habitats. To restore these ecological linkages, the DWH Trustees have suggested that an integrated restoration approach that includes restoration of various ecosystem attributes needs to occur. One of these attributes is water quality. When combined with nearshore habitat restoration approaches, water quality restoration projects can provide large-scale benefits that address chronic threats to the Gulf ecosystem. Reducing nutrient loading is part of the restoration approach that would mitigate the chronic and pervasive ecosystem threats incurred by eutrophic Gulf Coast waters. As the Theme 2 projects propose, implementation of CPs on privately owned lands would reduce nutrient enrichment, levels of fecal coliform bacteria, and sedimentation to help restore water quality in Gulf of Mexico coastal watersheds. The watershed-scale approach of the proposed projects under Theme 2 would restore water quality impacted by the DWH Oil Spill by reducing the levels of nutrients and sediments entering the Gulf of Mexico.

The overall goal of these projects is to reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms, or that suffer habitat losses associated with water quality degradation. The specific objective of the Theme 2 projects is as follows:

- To reduce nutrient, sediment, and/or pathogen (e.g., bacteria) concentrations and loadings to the Gulf of Mexico through the development and implementation of conservation plans and practices on cropland and grazing land.

The goals and objectives of the Theme 2 projects should be refined upon completion of the CNMP. Information included in the CNMP, such as the exact types of BMPs/CPs proposed, locations, and quantitative anticipated nutrient reduction values, are required in order to establish more project-specific goals and objectives.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project, and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the projects can be found in the RP/EA in Sections 4.1 and 4.5, respectively (LA TIG 2018).

Aspects of the ecological system that may be affected by implementation of Theme 2 projects will depend on the type of BMPs/CPs implemented on the cropland and grazing land. For example, construction of CPs could result in the spread of invasive species near each project, which would result in a minor, long-term impact to the surrounding environment. Another example includes the effects of grassed waterways on terrestrial species. Installation of grassed waterways could potentially cause short-term minor impacts to terrestrial habitats due to potential vegetation clearing. However, there may be long-term beneficial effects, as the grassed waterways may provide additional habitat for certain species, as well as improve downstream aquatic habitats with the improvement of localized water quality. As the proposed Theme 2 project locations and specific BMPs/CPs have not yet been identified, this monitoring and adaptive management (MAM) plan will need to be updated to include a more robust analysis of the conceptual setting.

In addition, subsequent environmental review will need to occur to determine whether a planned site-specific action is below the maximum impacts described in the RP/EA. An example of the Environmental Evaluation Worksheet used to document this review is included in Appendix D of the RP/EA (LA TIG 2018). If the project-specific action is below the maximum impacts described in the RP/EA, the analysis of the effects will be documented on the Environmental Evaluation Worksheet and the action will proceed. The Environmental Evaluation Worksheet will be routed through the LA TIG to the administrative record, where it will be publicly available. If the evaluation of the planned project-specific action indicates the effects are likely to exceed the maximum impacts described in the RP/EA, the LA TIG will undertake additional project-specific environmental review consistent with National Environmental Policy Act requirements and other requirements for protection of the environment. The LA TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of these projects.

1.2.1 Drivers

As outlined in the *Monitoring and Adaptive Management Procedures and Guidelines Manual* (MAM Manual), drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.5.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating these projects, the following outside drivers and stressors were considered:

- Changes in land use
- Land-use practices (e.g., application of fertilizer)
- Alterations to freshwater flow

Changes in land use and land use practices could greatly affect the proposed projects under Theme 2. If, for example, some croplands change their fertilizer regime, or begin fertilizer applications on lands that were previously fertilizer free, then the nutrient loads coming from these properties may increase. An increase in the nutrient loads my result in the proposed and/or implemented BMPs or CPs (e.g., automatic filtration systems) becoming ineffective, and therefore the project may no longer achieve the restoration goal. Likewise, if the surface and/or groundwater flows from some of the croplands or grazing lands were altered, and runoff patterns were to change, then the proposed and/or implemented CPs and BMPs may no longer achieve the restoration goal of reducing nutrient loading to the Gulf of Mexico.

This list should not be considered exhaustive; additional drivers may be identified as the projects are implemented and/or monitored, and would need to be included in this MAM plan. If any drivers are negatively impacting the projects, adaptive management may be necessary to ensure the projects' goals and objectives are being achieved. The adaptive management strategy for the projects is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating these nutrient reduction projects, the following uncertainties were considered:

- Willingness of landowners to participate in the development and implementation of a CNMP
- Linkages between water quality improvements and ecosystem benefits
- Degree to which local improvements in water quality contribute to water quality improvements downstream
- Combination and placement of projects within a watershed to maximize benefits in receiving estuary
- Pollutant transport and freshwater flow through Gulf coastal watersheds
- Relationship between watershed pollutant loadings and occurrence of Gulf coastal ecosystem threats and human use impacts

This list should not be considered exhaustive; additional uncertainties may be identified as the projects are implemented and/or monitored. During the planning phase of the projects, it was assumed that USDA would be able to attract landowners to participate in the development and implementation of CPs through a CNMP. However, anticipated participation for the proposed projects was not gauged before Theme 2 was assessed by the LA TIG. Therefore, the ability of USDA to engage the landowners to participate in the Theme 2 projects is an unknown. Likewise, the degree to which local improvements in water quality at the cropland and grazing land contribute to water quality improvements downstream is not fully known at this time. Impacts to the community and environment are considered in the RP/EA that was completed for the Theme 2 projects (LA TIG 2018:Section 4.5.2). BMPs to mitigate the potential environmental and socioeconomic impacts of the Nutrient Reduction (Nonpoint Source) restoration type are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the projects are implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. Additional discussion and specific details regarding how uncertainties may affect the Theme 2 projects should be added to this MAM plan after completing the CNMP. If negative impacts from the projects occur, or if the projects are unable to attract recreational users, adaptive management may be necessary to ensure the projects' goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the projects. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the projects' ability to fully achieve their objectives. The adaptive management strategy for these projects is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the projects achieve the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that were considered were geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH Trustees restoration projects. The sections below outline the monitoring parameters and the methods for measuring these parameters for the Theme 2 nutrient reduction projects. Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds" Restoration Approaches (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to nutrient reduction projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

One core performance monitoring parameter has been identified for the Theme 2 projects is the number of water quality improvement practices (BMPs and/or CPs) implemented. The number of BMPs/CPs is considered a "core performance" monitoring type because it can be used consistently across projects that fall under the Nutrient Reduction (Nonpoint Source) restoration type. In addition, several project-specific objectives have been identified for the Theme 2 projects. The monitoring parameters associated with the project-specific objectives outlined in Table 2 would be collected in addition to the core performance parameter.

Table 2. Project-Specific Objectives and Performance Monitoring Parameters for Theme 2 Projects

Project-Specific Objective	Objective-Specific Performance Monitoring Parameters
Reduce nutrient concentrations and loadings leaving cropland and grazing land	Total nitrogen and total phosphorus
Reduce sediment concentrations and loadings leaving cropland and grazing land	Total suspended solids and turbidity
Reduce pathogen concentrations and/or exposures leaving cropland and grazing land	*Escherichia coli*, enterococci, and fecal coliform

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the "reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds" restoration approach to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring. As the exact locations and types of BMPs/CPs have yet to be determined, this MAM plan will need to be updated once the CNMP is complete. Specific details on the monitoring schedule, methodology (i.e., number of samples, location of samples, etc.), and reporting will need to be included in subsequent versions of this plan. Review and approval of the updated plan by the LA TIG would be necessary prior to implementation of the practices outlined herein.

2.2.1 Parameter 1: Number of CPs/BMPs Implemented

The recommended methodology for monitoring this parameter is to count the number of improvements implemented at each cropland and grazing land in the CNMP. Gathering information on the amount of CPs and BMPs implemented should occur throughout the implementation period of the CNMP, and not during planning, because environmental and economic factors may change, resulting in implementation of fewer, or perhaps more, CPs and BMPs. Monitoring of this parameter should occur on-site through direct observation of the implemented CPs and BMPs. One observation is sufficient to record this parameter; follow-up visits to the participating cropland and grazing land for data collection would not be necessary, unless changes to the CPs and BMPs are made after initial implementation.

2.2.2 Parameter 2: Total Nitrogen and Total Phosphorus

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the sum of all forms of phosphorus and nitrogen, including organic and inorganic forms. Guidance for specific water sampling methodology to measure total nitrogen (TN) can be found in the American Society for Testing and Materials (ASTM) D5176 Volumes 11.01 and 11.02 (ASTM 2013a, 2013b) and the USGS *National Field Manual for the Collection of Water-Quality Data* (USGS variously dated). For guidance on potential methodologies to measure total phosphorous (TP), see the U.S. Environmental Protection Agency (EPA) Methodologies 300.0, 365.2, 365.3, and 300.1 (EPA 1997, 1993a, 1971a, 1978). Also, for additional guidance see the Standard Methodologies 4110C and 4110B (National Environmental Methods Index 2011a, 2011b), and the *USGS Methodology for Evaluation of Alkaline Persulfate Digestion as an Alternative to Kjeldal Digestion for Determination of Total and Dissolved Nitrogen and Phosphorus in Water* (USGS 2003).

Additional information would also be collected when sampling for TN and total phosphorus (TP), such as loads (i.e., water level and flow), depth of the sample, and collection method. Further, ammonium nitrogen (NH4-N), nitrite plus nitrate nitrogen (NO2-N + NO3-N), and total Kjeldahl nitrogen (TKN) could be analyzed from the samples.

Data collection and calibration procedures of detection instruments would be determined by the respective instrument's quality assurance and quality control (QA/QC) procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.3 Parameter 3: Total Suspended Solids and Turbidity

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the total suspended solids (TSS) and turbidity. TSS is defined as the dry weight of sediment from the known volume of a sub-sample of the original water sample, and is measured as milligrams per liter (mg/L) or parts-per-million (ppm) (DWH Trustees 2017:Section E.9.27). Turbidity is defined as a measure of intensity of light scatter by a sample, or the cloudiness/haziness of a sample, and is measured in nephelometric turbidity units (NTUs) (DWH Trustees 2017:Section E.9.27).

For methods on collection of TSS, see EPA 160.2 (EPA 1971b), and for methods on assessing water turbidity see EPA 180.1 (EPA 1993b) and Wagner et al. (2006). Data collection and calibration procedures of detection instruments would be determined by the respective instrument’s QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.4 Parameter 4: Escherichia coli, Enterococci, and Fecal Coliform

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the indicators (*Escherichia coli*, enterococci, and fecal coliform) of recent fecal matter contamination. The presence of these indicator pathogens in water samples signifies that pathogens dangerous to human health may be present in the water body. *Escherichia coli* is measured in water samples as either the most probable number (MPN)/100 liters (L) or colony-forming units (CFU)/100 milliliters (mL). Guidance on methods of detection of *Escherichia coli* in water samples can be found in EPA 1604 and SM 9223 B (EPA 2002, 2004). Enterococci are measured the same way as *Escherichia coli* (MPN/100 L or CFU/100 mL). Guidance on the appropriate methods used to assess enterococci in water samples can be found in IDEXX Enterolert (Baird et al. 2017; EPA 2004). Fecal coliform, which is a subset of total coliform bacteria, are indicators that pathogenic bacteria, viruses, or protozoans dangerous to human beings may be present in a water body. Fecal coliform is measured as CFU per 100 mL. Guidance on sampling methodology and analytical techniques for determining fecal coliform can be found in the *Standard Methods for the Examination of Water and Wastewater* (Baird et al. 2017).

Data collection and calibration procedures of detection instruments would be determined by the respective instrument’s QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, types, and amounts of CPs and BMPs are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques, or have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011). The projects proposed under Theme 2 of the restoration type—nutrient reduction—would use previously established types of CPs and BMPs. USDA has demonstrated success in developing and implementing the same types of CPs that would be included in the CNMP within similar watersheds across the Gulf Coast. Given their extensive experience and expertise in CPs, the success and legacy of the USDA Farm Bill programs, and their established level of trust and cooperation with private landowners, there is a significant opportunity to implement CPs on private lands. Implementation of CPs would reduce the levels of nutrients and sediments entering watersheds that could provide benefits to marine resources and coastal watersheds.

Examples of past successful water quality restoration projects include regional watershed management plans, state Clean Water Act (CWA) 319 programs, and USDA conservation programs (i.e., EQIP, Conservation Reserve Program, Wetlands Reserve Program, Wildlife Habitat Incentives Program). Additionally, the USDA conservation programs and EPA have funded the successful implementation of agriculture CPs throughout the nation, resulting in significant reductions in nutrient loadings to water bodies nationwide. Recently, USDA's Conservation Effects Assessment Program (CEAP) evaluated the ecological impact of the agricultural CPs implemented in the Texas Gulf Basin (NRCS 2015). These practices combine structural practices for controlling water erosion with structural or tillage and residue management practices to reduce nutrient runoff throughout the Texas Gulf Basin. The combined use of these CPs has reduced sediment, nitrogen, and phosphorus loads delivered from cropland to rivers and streams by 60%, 41%, and 55%, respectively. Additionally, under Section 319 of the CWA, EPA provides grants to states who work with partners and stakeholders to control non-point source pollution. This program has documented numerous examples of the use of conservation systems to restore water quality.

Although adaptive management is a critical component of the restoration planning process, adaptive management on the specific conservation practices being proposed under Theme 2 is not needed because of the nature of the sampling approaches (standard and reliable), the objectives of the projects, the scale of the sites in which the data would be collected (watershed scale), and the understanding of the conservation practices that would be applied. However, if monitoring determines that the projects are not meeting their goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 5 of this document.

4 EVALUATION

The projects proposed under Theme 2 would be considered successful if they meet the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are quantitative and based on the projects' goals and objectives:

- Increase in the number of nutrient reduction CPs and BMPs on cropland and grazing land
- Targeted reduction (percent nutrient reduction over time) of instream TN and TP on cropland and grazing land
- Targeted reduction (percent nutrient reduction over time) of instream of TSS and turbidity on cropland and grazing land
- Targeted reduction (percent nutrient reduction over time) of instream *Escherichia coli*, enterococci, and fecal coliform on cropland and grazing land

To properly establish if the BMPs/CPs are achieving nutrient reduction, pre-construction evaluations would need to occur. Pre-construction water quality monitoring would provide baseline information on the project-specific nutrient loads entering the ecosystem from the cropland and grazing land. Using the baseline data, USDA will be able to gauge whether targeted reduction of TN, TP, TSS, *Escherichia coli*, enterococci, and fecal coliform is occurring as a result of project implementation. Because the details of the proposed monitoring regimes are unknown, the following methods for analyzing, evaluating, and interpreting the monitoring data collected for Theme 2 could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., linear regression of TN within the proposed sampling location(s). This information would form the basis for a more comprehensive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the projects are meeting their performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate that there is an increase in TSS and turbidity entering the nearest waterway, there may be an issue with the CPs and BMPs, or increased agricultural use on the site. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in nutrient loading and water quality over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Specific analysis methods would be applied to all of the monitoring parameters once the CNMP is finalized with project specifics. At that time, this MAM plan would also be updated to include project-specific information.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring objective for projects included under Theme 2 (Table 3). Additional corrective actions may be identified once the CNMP is complete and specific project details are known, and/or during post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 3. Performance Criteria and Potential Corrective Actions by Monitoring Objective

Monitoring Objective	Final Performance Criteria	Potential Corrective Actions
Increase the number of nutrient reduction CPs and BMP on cropland and grazing land	Increased number of installed CPs and BMPs on cropland and grazing land	Adding additional CPs and BMPs to participating agricultural operations, as necessary, to increase reduce nutrient loading to the Gulf Coast
Reduce nutrient concentrations and loadings leaving cropland and grazing land	Identifiable reduction in TN and TP from cropland and grazing land	Improving project infrastructure (e.g., installing additional waste water treatment CPs and BMPs) Conducting routine maintenance activities (e.g., cleaning and maintaining waste separators and associated filters)
Reduce sediment concentrations and loadings leaving cropland and grazing land	Identifiable reduction in TSS and turbidity from cropland and grazing land	Improving project infrastructure (e.g., installing additional waste water treatment CPs and BMPs) Conducting routine maintenance activities (e.g., cleaning and maintaining diversion channels to increase the effectiveness of TSS reduction)
Reduce pathogen concentrations and/or exposures leaving cropland and grazing land	Identifiable reduction in *Escherichia coli*, enterococci, and fecal coliform from cropland and grazing land	Conducting routine maintenance activities (e.g., cleaning and maintaining waste separators and associated filters)

6 MONITORING SCHEDULE

The schedule for the project monitoring is in Table 4, separated by monitoring activity. The duration of monitoring activities will be determined upon completion of the CNMP and prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised. However, monitoring the effectiveness of BMPs/CPs on agricultural lands on water quality can take many years. It is possible that future iterations of this MAM plan would include long-term monitoring requirements, ranging anywhere between 5 and 7-plus years.

Table 4. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-Construction and Planning	Construction	Post-Construction
Number of installed CPs and BMPs on cropland and grazing land			X
Reduction in TN and TP from cropland and grazing land	X		X
Reduction in TSS and turbidity from cropland and grazing land	X		X
Reduction in *Escherichia coli*, enterococci, and fecal coliform from cropland and grazing land	X		X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this monitoring plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 5. Because there is no project-specific information at this time, Table 5 would need to be updated once the CNMP is completed and details about the CPs and BMPs, project locations, sampling techniques, etc., are known.

Table 5. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Number of installed CPs and BMPs on cropland and grazing land	CPs and BMP counts and photographs	Direct observation of installed CPs and BMPs at various project sites	To be determined (TBD) in the CNMP	TBD in the CNMP
Reduction in TN and TP from cropland and grazing land	Statistical and analytical data for TN and TP	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in TSS and turbidity from cropland and grazing land	Statistical and analytical data for TSS and turbidity	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in *Escherichia coli*, enterococci, and fecal coliform from cropland and grazing land	Statistical and analytical data for *Escherichia coli*, enterococci, and fecal coliform	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP

All data would be collected either by hand on monitoring or surveys forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

Water samples would be collected using the appropriate and standard monitoring techniques. Standard analytical techniques would be used to document water quality improvements following state and local standard operating procedures (SOPs). A chain-of-custody (COC) form would be used to transmit any samples collected in the field to the analyzing laboratory. In addition, all data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual, Section 3.2 (DWH Trustees 2017).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate QA/QC process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the data submitted to the Trustees using the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that USDA can adequately conduct a final QA/QC check for non-data entry errors (e.g., date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for USDA to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016:Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016:Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, this project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

The first report would be submitted after the completion of pre-construction monitoring of a proposed project under Theme 2. Subsequent reports would be submitted after the completion of post-construction monitoring. The number of reports would be dependent on the CPs and BMPs installed, and other project-specific details (such as location) that are not known at this time. This MAM plan would be updated once the CNMP is completed and project-specific information is understood.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (Trustees Council 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing party, USDA is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the TIG, and submitting MAM data and project information to the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, USDA, is responsible for all maintenance activities and costs related to the CPs/BMPs, including any repairs needed over the life of the CNMP.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C3

Draft Monitoring and Adaptive Management Plan

Theme 3: Winter Water Holding on Cropland

1 INTRODUCTION

Excessive nutrient enrichment, or eutrophication, of Gulf Coast estuaries and their watersheds is a chronic threat that can lead to hypoxia (low oxygen levels), harmful algal blooms, habitat loss, and fish kills (Deepwater Horizon [DWH] Oil Spill Trustees [DWH Trustees] 2016:Section 5.5.4). The primary goal for the nutrient reduction projects is water quality improvement through nutrient and sediment reduction. The health of the Gulf of Mexico depends on the health of its estuaries, and the health of those coastal waters is influenced by land uses in the watersheds of its tributaries. Nutrient reduction projects would help to restore and enhance the ecological and hydrological integrity of the area's water resources, including improved water quality and ensuring natural water quantity levels to the area's coastal rivers and streams and coastal bays and estuaries. To this end, the objective of these projects is to reduce rural non-point source pollution through the implementation of conservation practices (CPs) on agricultural lands.

Implementing U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)–developed CPs has been proven to successfully address natural resource concerns related to agricultural lands. Many of these practices can be used to achieve a number of the restoration types identified in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS)* (Final PDARP/PEIS) (DWH Trustees 2016). CPs are technical methods designed to help conserve soil, water, air, energy, and related plant and animal resources. Appendix D in the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018; hereafter the RP/EA), provides a list of CPs that would be available for implementation under the proposed Theme 3 projects. Two CPs, 1) Pumping Plant and 2) Shallow Water Development and Management, are discussed below to provide examples of the potential CPs that may be used under Theme 3.

A pumping plant is a facility installed to transfer water for a conservation need, including removing excess surface or groundwater; filling ponds, ditches, or wetlands; or pumping from wells, ponds, streams, and other sources. The purpose of a pumping plant is to provide a dependable water source or disposal facility for water management on wetlands or to provide a water supply for irrigation, recreation, livestock, or wildlife. A pumping plant is useful for maintaining critical water levels in existing swamps, marshes, or open water and for providing water sources for newly constructed wetlands and ponds. Pumps may be mounted in the open, on pilings, or in a well or pit.

Shallow water development and management is the inundation of lands to provide habitat for fish and/or wildlife. The purpose is to provide habitat for wildlife such as shorebirds, waterfowl, wading birds, mammals, fish, reptiles, amphibians, and other species that require shallow water for at least part of their life cycle. Areas considered for shallow water developments require soils with low permeability or a seasonally high water table to inhibit subsurface drainage and allow for maintenance of proper water levels. Sites must be free of hazardous materials. The water supply for flooding during periods of planned inundation must be adequate and a methodology for dewatering is required when water levels must be artificially lowered in order to produce the desired habitat condition. Water levels must be maintained between 1 and 18 inches in depth over most of the area during periods of planned inundation, except for floodplain habitats connected to stream channels where water depths of up to 6 feet provide habitat for native fish species. Points of access must be developed for management activities and existing drainage systems would be used. Lastly, management techniques would be used to control invasive, federally and state listed noxious and nuisance plant species.

USDA proposes the following three Theme 3 projects to accomplish nutrient reduction on agricultural lands:

- Winter Water Holding on Cropland in Vermilion and Cameron Parishes Plus Agricultural Best Management Practices (BMPs)
- Winter Water Holding on Cropland in St. Mary, St. Martin, Iberia, Lafayette, Acadia, and Jefferson Davis Parishes
- Winter Water Holding on Cropland in Concordia, Tensas, and Catahoula Parishes

Louisiana includes some of the most diverse and intensively used agricultural land in the Gulf South. Despite decades of successful agricultural conservation and ecosystem restoration activities, the state still contains multiple watersheds, identified in the *FINAL 2016 Louisiana Water Quality Inventory: Integrated Report (305(b)/303(d))* as not meeting their designated uses for Primary Contact Recreation, Secondary Contact Recreation, and Fish and Wildlife Propagation (Louisiana Department of Environmental Quality 2016). Winter water holding for nutrient management on agricultural lands can allow the filtering of nutrients and sediment prior to water release into the watersheds, which assists in improving water quality in the Gulf of Mexico. These projects also create a diversity of habitats for waterfowl, wading bird, shorebird, invertebrate, and other species that require shallow water areas during part of their life cycle.

Winter water holding requires retention of irrigation water over the fall/winter, usually from October through March, or other specified periods of time as desired, for the purpose of improving water quality and the creation of wildlife habitat. Croplands currently in rice production with levee and irrigation systems in place, as well as fallow fields formerly planted with rice, but that are currently grazed continuously or intermittently that retain the original levee with irrigation systems would be targeted for projects under Theme 3. The retained water allows for sediment deposition, nutrient uptake by emergent aquatic vegetation, use of the previous planting year's crop residue to reduce soil disturbance from wind-induced water movement, and animal feeding activity. De-watering is done in 1- to 2-inch increments to prevent erosive current velocity, prevent nutrient/bacteria loading in receiving water bodies, provide wildlife habitat, and to enhance native vegetation density and diversity. Levels of nutrients and suspended sediments in impounded or retained water would be assessed prior to de-watering, which provides improvements to water quality downstream.

Given the success of the USDA Farm Bill programs such as EQIP and their strong acceptance by private landowners, there is a significant opportunity to implement CPs for winter water holding on cropland that would reduce the levels of nutrients, fecal coliform bacteria, and sediments entering the Gulf of Mexico and create and/or enhance wildlife habitats. The primary goal of the Theme 3 projects is to enhance overall ecosystem health by benefitting the estuaries that are integral habitat providing food, shelter, and nursery grounds for many of the Gulf of Mexico's ecologically and economically important species. Cropland in Louisiana can have a considerable negative effect on water quality. Nutrients and sediment originating from cropland can enter water bodies through runoff. Winter water holding management and implementation of BMPs/CPs on cropland can improve water quality for the receiving water body and the downstream water bodies.

Conservation on agricultural lands normally begins with a complete operational and natural resource assessment, conducted with the operator's plans and objectives in mind, while striving to address all present and future resource concerns associated with the operation. All enrolled agricultural land tracts would be included in development of a CNMP which would be used to define all conservation practice design parameters.

The proposed Winter Water Holding on Cropland proposed projects would target efforts for measurable impact by clustering projects at the Hydrologic Unit Code (HUC) 12 watershed scale that directly impacts coastal wetlands (Figures 1a–1c). The identified HUC 12s are located within the multiple parishes and proposed projects Theme 3 are identified by the parish in which priority HUCs are located (Table 1). Activities associated with proposed projects under Theme 3 would occur on private lands on a voluntary basis.

Table 1. HUC 12 Watershed by Proposed Project

Winter Water Holding on Cropland in Vermilion and Cameron Parishes Plus Agricultural BMPs	
Bayou Misere-Frontal Grand Lake	Collicon Lake-Frontal Grand Lake
Catfish Bayou-Frontal Grand Lake	Warren Canal-Schooner Bayou Canal
Belle Isle Bayou-Freshwater Bayou Canal	Sledge Canal-Frontal Intercoastal Waterway
Isle Marrone Canal-Frontal Intercoastal Waterway	Seventh Ward Canal-Frontal Intercoastal Waterway
Maple Marsh-Frontal Intercoastal Waterway	Cameron Canal-Frontal Intercoastal Waterway
Latanier Bayou-Frontal Intercoastal Waterway	Warren Canal-Intercoastal Waterway
Blackfish Pirouge Trail-Frontal White Lake	Florence Canal-Frontal White Lake
Schooner Bayou Canal-Frontal White Lake	Floating Turf Bayou-Frontal White Lake
Thornwell Drainage Canal-Bayou Lacassine	Lake Arthur
Little Pecan Bayou	Hog Bayou-Frontal Gulf of Mexico
Upper Mud Lake-Mermentau River	Pecan Island-Frontal Gulf of Mexico
Pipeline Canal-Frontal Gulf of Mexico	Little Pecan Canal
Headquarters Canal-Frontal Gulf of Mexico	Constance Bayou-Frontal Gulf of Mexico
East Constance Bayou-Frontal of Gulf of Mexico	Little Bayou-Vermilion River
Vermilion River-Frontal Intercoastal Waterway	
Winter Water Holding on Cropland in St. Mary, St. Martin, Iberia, Lafayette, Acadia, and Jefferson Davis Parishes	
Bayou Chicot-Lake Chicot	West Fork-Bayou Plaquemine Brule
Bayou Grand Marais	Francois Coulee-Vermilion River
Little Bayou	Bayou Jonas
Bayou Duralde-Bayou Nezpique	Millers Lake-East Fork Bayou Nezpique
Bayou Petite Passe	Bayou Cypermort-Frontal Intercoastal Waterway
Bayou Wikoff-Roberts Cove	Loreauville Canal-Bayou Teche
Bayou Tigre-Delcambre Canal	Mitchell Creek-Castor Creek
Jennings Norwood Canal-Bayou Nezpique	Coulee Ile Des Cannes
Bayou Carencro	Bayou Courtableau-Bayou Toulouse
Bayou Pointe Aux Loups-Bayou Des Cannes	Bayou Cocodrie-Elm Bayou
Indian Bayou Canal	Mountain Bayou Lake-Bayou Cocodrie
Deblane Coulee-Bayou Petite Anse	Caney Creek-Castor Creek
Indian Bayou-Bayou Queue De Tortue	Reeves Creek-Calcasieu River
Kinder Ditch-Calcasieu River	Bayou Bourbeux-Grand Coteau
Youngs South Coulee-Vermilion River	Sonnier Bayou-Bayou Blue

Beaver Creek	Bayou Tortue-La Salle Coulee
West Bayou Lacassine	Delahoussaye Canal
Bayou Wikoff	Tete Bayou
Bayou Arceneaux	Bayou Marron-Bayou Des Cannes
Turkey Creek-Caney Bayou	Bayou Mallet
Dry Slough-Bayou Nezpique	Bayou Veillon-coulee Coteau Holmes
West Fork Caney Creek	Bayou Grand Louis-Bayou Carron
Bayou Cypermort-Frontal Vermilion Bay	Keystone Ditch-Mermentau River
East Bayou Lacassine	East Fork Bayou Nezpique
Bayou Doza-Bayou Mallet	Grand coulee Ditch-Long Point Gully
Anselm coulee-Vermilion River	Richards Gully-Bayou Des Cannes
Bayou Teche	Chinquapin Creek-Calcasieu River
Black Lake-Bayou Cocodrie	Lyons Point Gully
Bayou Carlin-Frontal Intercoastal Waterway	Middle Bayou Serpent
Coulee Mine	Bayou Plaquemine Brule-Esterwood
Curtis Creek-Calcasieu River	Boggy Bayou
Bayou Blue	Bayou Portage-Coulee Portage
Bayou Chene	Grand Coulee Ditch-Bayou Plaquemine Brule
Bayou Choupique-Frontal Intercoastal Waterway	Lazy Point Canal-Bayou Queue De Tortue
Bayou Joe Marcel-Bayou Des Cannes	Lower Bayou Serpent
Bayou Du Portage-Coulee Du Portage	Evangeline Canal-Vermilion River
Bayou Bourbeux	Little Mill Creek
Bayou Berard Canal-Catahoula Coulee	Rogers Gully-Bayou Nezpique
Bayou Carron-Bayou Little Teche	Grand Louis Bayou-Bayou Nezpique
Prime Gully-Bayou Queue De Torte	Bayou Blanc-Bayou Plaquemine Brule
Tiger Point Gully-Bayou Des Cannes	Bayou Pont Brule-Coulee Cocodrie
Bayou Teche-Bayou Gerimond	Cypress Creek
Coulee Kenny	Bayou Tortue-Spanish Lake
Stines Creek-Calcasieu River	Bayou Cocodrie
West Bayou Grand Marais-Middle Bayou Grand Marais	Weeks Bayou-Frontal Intercoastal Waterway
Gum Gully-West Bayou Grand Marais	Upper Bayou Serpent
Bayou Pare Perdu-Lake Peigneur	Bayou Portage

Winter Water Holding on Cropland in Concordia, Tensas, and Catahoula Parishes	
Larto Lake-Saline Bayou	Larto Bayou-Red River
Bayou Milligan-Red River	Bayou Natchitoches
Long Fork-Bayou L'Eau Noire	Bayou Joson-Petite Riviere
Tiger Bayou	Black Bayou
Lake Louis-Bayou Louis	Gastis Creek
Rawson Creek	Big Creek-Ouachita River
Callahan Branch-Ouachita River	Haha Bayou
Brushley Bayou-Ouachita River	Crackets Bayou
Hibbs Bayou	Long Branch
Muddy Bayou	Big Bayou
Brushy Creek	Ford Creek
Salem Creek	Birds Creek-Sandy Lake
Greens Creek	Hawthorne Creek-Bushley Creek
Elm Slough-Little River	Rhinehart Creek-Bushley Creek
Black River Lake-Black River	Lake St. John-Black Bayou Lake
Cross Bayou	Glade Bayou-Black River
Brushy Bayou	Lake Concordia-Bayou Cocodrie
Boggy Bayou	Cocodrie Lake
Vidalia Canal-Bayou Cocodrie	Bayou Courville
Bayou Des Glaises	Outflow Channel-Red River
Long Bayou-Alligator Bayou	Bayou Natchitoches-Red River
Whites Bayou-Bayou Cocodrie	Wyches Bayou-Bayou Cocodrie
Greens Bayou	Durham Prong
Excelsior Lake-Bayou Cocodrie	Dismal Swamp-Bayou Cocodrie
Big Cash Bayou-Tensas River	Pool Lake Bayou

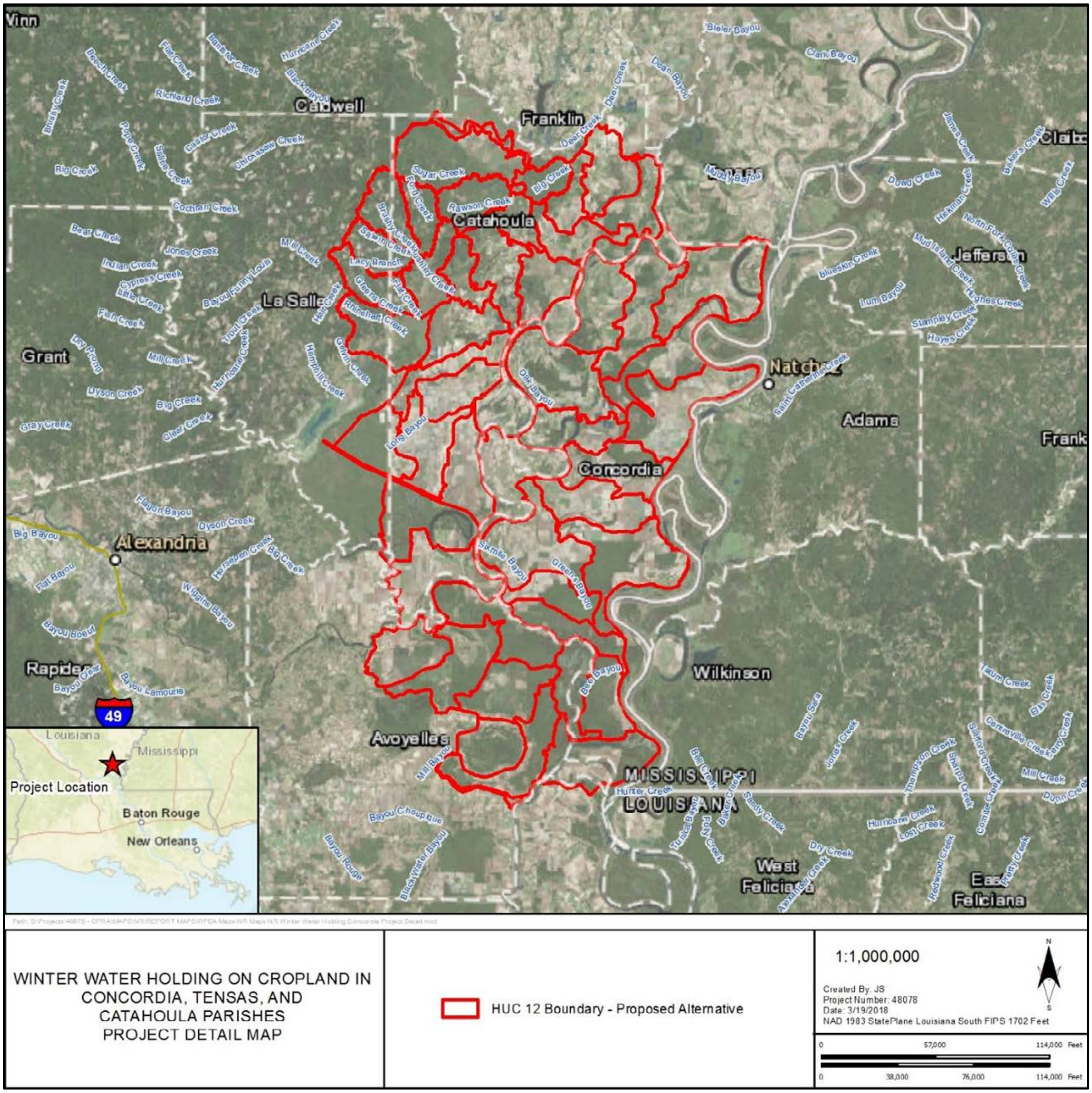

Figure 1a. Boundary for the Winter Water Holding on Cropland in Concordia, Tensas, and Catahoula Parishes project, Theme 3.

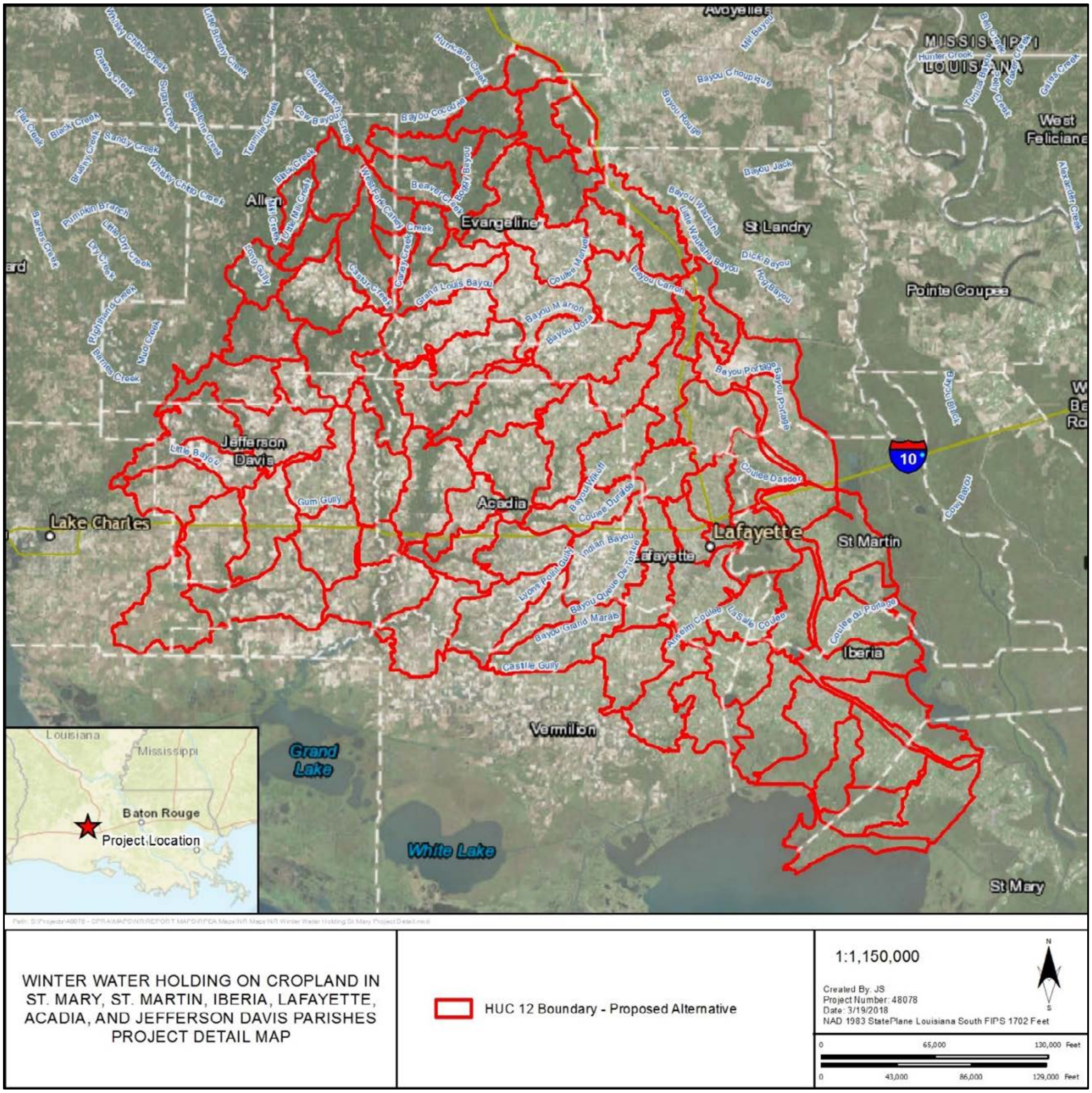

Figure 1b. Boundary for the Winter Water Holding on Cropland in St. Mary, St. Martin, Iberia, Lafayette, Acadia, and Jefferson Parishes project, Theme 3.

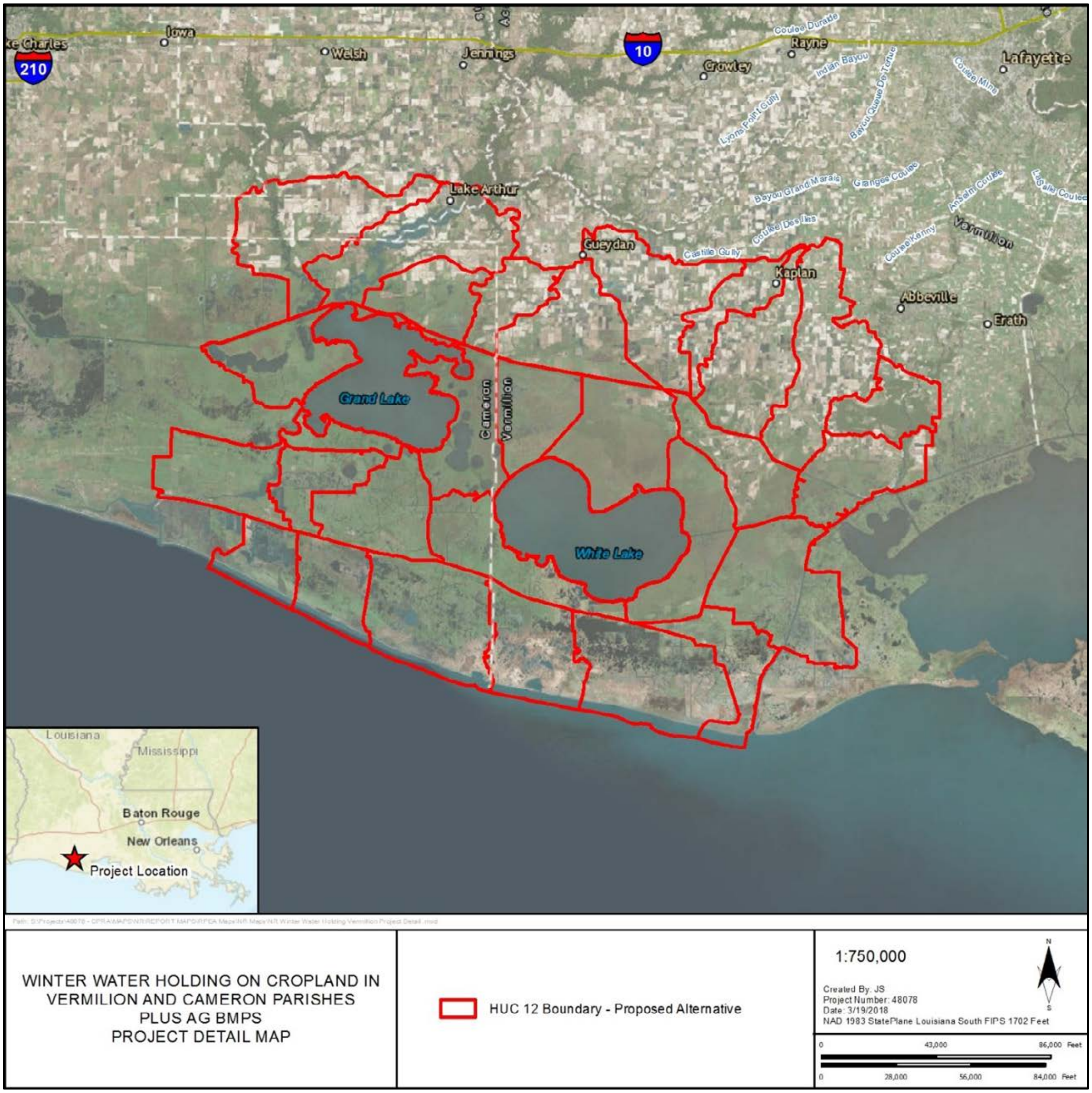

Figure 1c. Boundary for the Winter Water Holding on Cropland in Vermilion and Cameron Parishes Plus Agricultural Best Management Practices project, Theme 3.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Trustees in the Final PDARP/PEIS is to "restore water quality" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals, and further identified specific goals for each restoration type. The Theme 3 projects fit within the restoration type of nutrient reduction (nonpoint source), which addresses the overall programmatic goal of restoring water quality. The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.4.1):

- Reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms or that suffer habitat losses associated with water quality degradation.
- Where appropriate, co-locate nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches.
- Enhance ecosystem services of existing and restored Gulf Coast habitats.

The proposed projects fall within the first restoration type goal because they propose to reduce nutrient loadings to the Gulf Coast. Theme 3 projects would meet the restoration goals outlined in the Final PDARP/PEIS through planning and implementation of CPs and BMPs on agricultural lands to hold water over the fall/winter months.

As described in Section 3.2.2 of the RP/EA (LA TIG 2018), the proposed projects would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the projects have a strong nexus to the injuries described in the Final PDARP/PEIS. The DWH Oil Spill resulted in impacts to ecological connectivity throughout nearshore habitats. To restore these ecological linkages, the DWH Trustees have suggested that an integrated restoration approach that includes restoration of various ecosystem attributes needs to occur. One of these attributes is water quality. When combined with nearshore habitat restoration approaches, water quality restoration projects can provide large-scale benefits that address chronic threats to the Gulf ecosystem. Reducing nutrient loading is part of the restoration approach that would mitigate the chronic and pervasive ecosystem threats incurred by eutrophic Gulf Coast waters. As the Theme 3 projects propose, implementation of CPs on privately owned lands would reduce nutrient enrichment, levels of fecal coliform bacteria, and sedimentation to help restore water quality in Gulf of Mexico coastal watersheds. The watershed-scale approach of the proposed projects under Theme 3 would restore water quality impacted by the DWH Oil Spill by reducing the levels of nutrients and sediments entering the Gulf of Mexico.

The overall goal of these projects is to reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms, or that suffer habitat losses associated with water quality degradation. The specific objective of the Theme 3 projects is as follows:

- To reduce nutrient, sediment, and/or pathogen (e.g., bacteria) concentrations and loadings to the Gulf of Mexico through the development and implementation of conservation plans and practices on croplands

The goals and objectives of the Theme 3 projects should be refined upon completion of the CNMP. Information included in the CNMP, such as the exact types of BMPs/CPs proposed, locations, and quantitative anticipated nutrient reduction values, are required in order to establish more project-specific goals and objectives.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project, and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the projects can be found in the RP/EA in Sections 4.1 and 4.5, respectively (LA TIG 2018).

Aspects of the ecological system that may be affected by implementation of Theme 3 projects will depend on the type of BMPs/CPs implemented on the agricultural lands throughout the identified HUC 12 watersheds. For example, establishing a pumping facility on agricultural lands would result in changes to the hydrologic regime of the project area; the surface water flow and hydrology would be influenced by soil excavation and grading to construct the facility. In addition, there could be short-term minor impacts to terrestrial habitats with the installation of a pumping plant or shallow water development/management system on agricultural lands. These impacts would likely result from vegetation clearing and loss of habitat due to placement of facilities. However, there may be long-term beneficial effects with the creation of wetlands from implementing the proposed CPs. For example, creating a shallow water development/management system would provide additional habitat for wildlife and encourage plant diversity on the project site. As the proposed Theme 3 project locations and specific BMPs/CPs have not yet been identified, this monitoring and adaptive management (MAM) plan will need to be updated to include a more robust analysis of the conceptual setting.

In addition, subsequent environmental review will need to occur to determine whether a planned project-specific action is below the maximum impacts described in the RP/EA. An example of the Environmental Evaluation Worksheet used to document this review is included in Appendix D of the RP/EA (LA TIG 2018). If the project-specific action is below the maximum impacts described in the RP/EA, the analysis of the effects will be documented on the Environmental Evaluation Worksheet and the action will proceed. The Environmental Evaluation Worksheet will be routed through the LA TIG to the administrative record, where it will be publicly available. If the evaluation of the planned site-specific action indicates the effects are likely to exceed the maximum impacts described in the RP/EA, the LA TIG will undertake additional project-specific environmental review consistent with National Environmental Policy Act requirements and other requirements for protection of the environment. The LA TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of these projects.

1.2.1 Drivers

As outlined in the *Monitoring and Adaptive Management Procedures and Guidelines Manual* (MAM Manual), drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.5.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating these projects, the following outside drivers and stressors were considered:

- Changes in land use
- Land-use practices (e.g., planting water intensive crops)
- Alterations to freshwater flow

Changes in land use and land use practices could greatly affect the proposed projects under Theme 3. For example, if some agricultural land that has been identified in the CNMP is converted from cropland to commercial use, then the site may no longer be suitable for inclusion in this restoration project. Likewise, if the landowner changes the types of crops being grown on the project site to a more water intensive species, than it may no longer be feasible to implement a pump facility on that property due to increased water demands. In addition, if the surface and/or groundwater flows from some of the croplands were altered to change the runoff patterns, then the proposed water holding CPs and BMPs may no longer achieve the restoration goal of reducing nutrient loading to the Gulf of Mexico. This list should not be considered exhaustive; additional drivers may be identified as the projects are implemented and/or monitored. If additional drivers are identified, this MAM plan would need to be updated. If any drivers are negatively impacting the projects, adaptive management may be necessary to ensure the projects' goals and objectives are being achieved. The adaptive management strategy for the projects is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating these nutrient reduction projects, the following uncertainties were considered:

- Willingness of landowners to participate in the development and implementation of a CNMP
- Linkages between water quality improvements and ecosystem benefits
- Degree to which local improvements in water quality contribute to water quality improvements downstream
- Combination and placement of projects within a watershed to maximize benefits in receiving estuary
- Pollutant transport and freshwater flow through Gulf coastal watersheds
- Relationship between watershed pollutant loadings and occurrence of Gulf coastal ecosystem threats and human use impacts

This list should not be considered exhaustive; additional uncertainties may be identified as the projects are implemented and/or monitored. During the planning phase of the projects, it was assumed that USDA would be able to attract landowners to participate in the development and implementation of CPs through a CNMP. However, anticipated participation for the proposed projects was not gauged before Theme 3 was assessed by the LA TIG. Therefore, the ability of USDA to engage the landowners to participate in the Theme 3 projects is an unknown. Likewise, the degree to which the local fall/winter water holdings at the croplands would contribute to water quality improvements downstream is not fully known at this time. Impacts to the community and environment are considered in the RP/EA that was completed for the Theme 3 projects (LA TIG 2018:Section 4.5.2). BMPs to mitigate the potential environmental and socioeconomic impacts of the Nutrient Reduction (Nonpoint Source) restoration type are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the projects are implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. Additional discussion and specific details regarding how uncertainties may affect the Theme 3 projects should be added to this MAM plan after completing the CNMP. If negative impacts from the projects occur, or if the projects are unable to attract recreational users, adaptive management may be necessary to ensure the projects' goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the projects. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the projects' ability to fully achieve their objectives. The adaptive management strategy for these projects is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the projects achieve the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that were considered were geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH Trustees restoration projects. The sections below outline the monitoring parameters and the methods for measuring these parameters for the Theme 3 nutrient reduction projects. Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the “reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds” Restoration Approaches (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to nutrient reduction projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

One core performance monitoring parameter has been identified for the Theme 3 projects is the number of water quality improvement practices (BMPs and/or CPs) implemented. The number of BMPs/CPs is considered a “core performance” monitoring type because it can be used consistently across projects that fall under the Nutrient Reduction (Nonpoint Source) restoration type. In addition, several project-specific objectives have been identified for the Theme 3 projects. The monitoring parameters associated with the project-specific objectives outlined in Table 2 would be collected in addition to the core performance parameter.

Table 2. Project-Specific Objectives and Performance Monitoring Parameters for Theme 3 Projects

Project-Specific Objective	Objective-Specific Performance Monitoring Parameters
Reduce nutrient concentrations and loadings leaving croplands	Total nitrogen and total phosphorus
Reduce sediment concentrations and loadings leaving croplands	Total suspended solids and turbidity
Reduce pathogen concentrations and/or exposures leaving croplands	*Escherichia coli*, enterococci, and fecal coliform

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the “reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds” restoration approach to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring. As the exact locations and types of BMPs/CPs have yet to be determined, this MAM plan will need to be updated once the CNMP is complete. Specific details on the monitoring schedule, methodology (i.e., number of samples, location of samples, etc.), and reporting will need to be included in subsequent versions of this plan. Review and approval of the updated plan by the LA TIG would be necessary prior to implementation of the practices outlined herein

2.2.1 Parameter 1: Number of CPs/BMPs Implemented

The recommended methodology for monitoring this parameter is to count the number of improvements implemented at each cropland that participates in the CNMP. Gathering information on the amount of CPs and BMPs implemented should occur throughout the implementation period of the CNMP, and not during planning, because environmental and economic factors may change, resulting in implementation of fewer, or perhaps more, CPs and BMPs. Monitoring of this parameter should occur on-site through direct observation of the implemented CPs and BMPs (winter water holdings). One observation is sufficient to record this parameter; follow-up visits to the participating croplands for data collection would not be necessary, unless changes to the CPs and BMPs are made after initial implementation.

2.2.2 Parameter 2: Total Nitrogen and Total Phosphorus

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the sum of all forms of phosphorus and nitrogen, including organic and inorganic forms. Guidance for specific water sampling methodology to measure total nitrogen (TN) can be found in the American Society for Testing and Materials (ASTM) D5176 Volumes 11.01 and 11.02 (ASTM 2013a, 2013b) and the USGS *National Field Manual for the Collection of Water-Quality Data* (USGS variously dated). For guidance on potential methodologies to measure total phosphorous (TP), see the U.S. Environmental Protection Agency (EPA) Methodologies 300.0, 365.2, 365.3, and 300.1 (EPA 1997, 1993a, 1971a, 1978). Also, for additional guidance see the Standard Methodologies 4110C and 4110B (National Environmental Methods Index 2011a, 2011b), and the *USGS Methodology for Evaluation of Alkaline Persulfate Digestion as an Alternative to Kjeldal Digestion for Determination of Total and Dissolved Nitrogen and Phosphorus in Water* (USGS 2003).

Additional information would also be collected when sampling for TN and total phosphorus (TP), such as loads (i.e., water level and flow, which is an invaluable measurement for determining nutrient loading), depth of the sample, and collection method. Further, ammonium nitrogen (NH4-N), nitrite plus nitrate nitrogen (NO2-N + NO3-N), and total Kjeldahl nitrogen (TKN) could be analyzed from the samples.

Data collection and calibration procedures of detection instruments would be determined by the respective instrument’s quality assurance and quality control (QA/QC) procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations and number of winter water holdings (CPs and BMPs) are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.3 Parameter 3: Total Suspended Solids and Turbidity

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the total suspended solids (TSS) and turbidity. TSS is defined as the dry weight of sediment from the known volume of a sub-sample of the original water sample, and is measured as milligrams per liter (mg/L) or parts-per-million (ppm) (DWH Trustees 2017:Section E.9.27). Turbidity is defined as a measure of intensity of light scatter by a sample, or the cloudiness/haziness of a sample, and is measured in nephelometric turbidity units (NTUs) (DWH Trustees 2017:Section E.9.27).

For methods on collection of TSS, see EPA 160.2 (EPA 1971b), and for methods on assessing water turbidity see EPA 180.1 (EPA 1993b) and Wagner et al. (2006). Data collection and calibration procedures of detection instruments would be determined by the respective instrument's QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations and numbers of winter water holdings (CPs and BMPs) are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

2.2.4 Parameter 4: Escherichia coli, Enterococci, and Fecal Coliform

The recommended methodology for monitoring this parameter is direct sampling and detection to measure the indicators (*Escherichia coli*, enterococci, and fecal coliform) of recent fecal matter contamination. The presence of these indicator pathogens in water samples signifies that pathogens dangerous to human health may be present in the water body. *Escherichia coli* is measured in water samples as either the most probable number (MPN)/100 liters (L) or colony-forming units (CFU)/100 milliliters (mL). Guidance on methods of detection of *Escherichia coli* in water samples can be found in EPA 1604 and SM 9223 B (EPA 2002, 2004). Enterococci are measured the same way as *Escherichia coli* (MPN/100 L or CFU/100 mL). Guidance on the appropriate methods used to assess enterococci in water samples can be found in IDEXX Enterolert (Baird et al. 2017; EPA 2004). Fecal coliform, which is a subset of total coliform bacteria, are indicators that pathogenic bacteria, viruses, or protozoans dangerous to human beings may be present in a water body. Fecal coliform is measured as CFU per 100 mL. Guidance on sampling methodology and analytical techniques for determining fecal coliform can be found in the *Standard Methods for the Examination of Water and Wastewater* (Baird et al. 2017).

Data collection and calibration procedures of detection instruments would be determined by the respective instrument's QA/QC procedures. Site determination for the data collection, as well as the frequency and duration, would be presented in the CNMP. At this time, the exact locations, and numbers of winter water holdings (CPs and BMPs) are unknown; therefore, it is impossible to establish exact sampling methodologies and guidance in the first version of this MAM plan. However, the CNMP would outline the specifics necessary to update this MAM plan to include the locations, frequencies, sample size, and durations of sampling for this monitoring parameter.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques, or have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011). The projects proposed under Theme 3 of the restoration type—nutrient reduction—would use previously established types of CPs and BMPs. USDA has demonstrated success in developing and implementing the same types of CPs that would be included in the CNMP within similar watersheds across the Gulf Coast. Given their extensive experience and expertise in CPs, the success and legacy of the USDA Farm Bill programs, and their established level of trust and cooperation with private landowners, there is a significant opportunity to implement CPs on private lands. Implementation of CPs would reduce the levels of nutrients and sediments entering watersheds that could provide benefits to marine resources and coastal watersheds.

Examples of past successful water quality restoration projects include regional watershed management plans, state Clean Water Act (CWA) 319 programs, and USDA conservation programs (i.e., EQIP, Conservation Reserve Program, Wetlands Reserve Program, Wildlife Habitat Incentives Program). Additionally, the USDA conservation programs and EPA have funded the successful implementation of agriculture CPs throughout the nation, resulting in significant reductions in nutrient loadings to water bodies nationwide. Recently, USDA's Conservation Effects Assessment Program (CEAP) evaluated the ecological impact of the agricultural CPs implemented in the Texas Gulf Basin (NRCS 2015). These practices combine structural practices for controlling water erosion with structural or tillage and residue management practices to reduce nutrient runoff throughout the Texas Gulf Basin. The combined use of these CPs has reduced sediment, nitrogen, and phosphorus loads delivered from cropland to rivers and streams by 60%, 41%, and 55%, respectively. Additionally, under Section 319 of the CWA, EPA provides grants to states who work with partners and stakeholders to control non-point source pollution. This program has documented numerous examples of the use of conservation systems to restore water quality.

Although adaptive management is a critical component of the restoration planning process, adaptive management on the specific conservation practices being proposed under Theme 3 is not needed because of the nature of the sampling approaches (standard and reliable), the objectives of the projects, the scale of the sites in which the data would be collected (watershed scale), and the understanding of the conservation practices that would be applied. However, if monitoring determines that the projects are not meeting their goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 5 of this document.

4 EVALUATION

The projects proposed under Theme 3 would be considered successful if they meet the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are quantitative and based on the projects' goals and objectives:

- Increase in the number of nutrient reduction CPs and BMPs (winter water holdings) on croplands
- Targeted reduction (percent nutrient reduction over time) of TN and TP leaving croplands
- Targeted reduction (percent nutrient reduction over time) of TSS and turbidity leaving croplands
- Targeted reduction (percent nutrient reduction over time) of *Escherichia coli*, enterococci, and fecal coliform leaving croplands

To properly establish if the BMPs/CPs are achieving nutrient reduction, pre-construction evaluations would need to occur. Pre-construction water quality monitoring would provide baseline information on the project-specific nutrient loads entering the ecosystem from the agricultural lands. Using the baseline data, USDA will be able to gauge whether targeted reduction of TN, TP, TSS, *Escherichia coli*, enterococci, and fecal coliform is occurring as a result of installation of winter water holding CPs. Because the details of the proposed monitoring regimes are unknown, the following methods for analyzing, evaluating, and interpreting the monitoring data collected for Theme 3 could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., linear regression of TN within the proposed sampling location(s). This information would form the basis for a more comprehensive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the projects are meeting their performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate that there is an increase in TSS and turbidity entering the nearest waterway, there may be an issue with the CPs and BMPs, or increased agricultural use on the site. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in nutrient loading and water quality over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Specific analysis methods would be applied to all of the monitoring parameters once the CNMP is finalized with project specifics. At that time, this MAM plan would also be updated to include project-specific information.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring objective for projects included under Theme 3 (Table 3). Additional corrective actions may be identified once the CNMP is complete and specific project details are known, and/or during post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 3. Performance Criteria and Potential Corrective Actions by Monitoring Objective

Monitoring Objective	Final Performance Criteria	Potential Corrective Actions
Increase the number of nutrient reduction CPs and BMP on croplands	Increased number of installed CPs and BMPs (water holdings) on croplands	Adding additional CPs and BMPs to participating agricultural operations, as necessary, to increase the reduction of nutrient loading to the Gulf Coast
Reduce nutrient concentrations and loadings leaving croplands	Identifiable reduction in TN and TP from croplands	Improving project infrastructure (e.g., adding additional detention ponds to collect pumped water onsite) Conducting routine maintenance activities (e.g., dredging and maintaining detention ponds)

Monitoring Objective	Final Performance Criteria	Potential Corrective Actions
Reduce sediment concentrations and loadings leaving croplands	Identifiable reduction in TSS and turbidity from croplands	Improving project infrastructure (e.g., adding an additional pumping station on the project site) Conducting routine maintenance activities (e.g., pipeline maintenance for distribution of water from the pumping station to wetlands or ponds)
Reduce pathogen concentrations and/or exposures leaving croplands	Identifiable reduction in *Escherichia coli*, enterococci, and fecal coliform from croplands	Conducting routine maintenance activities (e.g., upkeep of the pumping facilities)

6 MONITORING SCHEDULE

The schedule for the project monitoring is in Table 4, separated by monitoring activity. The duration of monitoring activities will be determined upon completion of the CNMP and prior to implementation of this MAM plan. This information will be added to and revised in this MAM plan as needed whenever monitoring methods are refined or revised. However, monitoring the effectiveness of BMPs/CPs on agricultural lands on water quality can take many years. It is possible that future iterations of this MAM plan would include long-term monitoring requirements, ranging anywhere between 5 and 7-plus years.

Table 4. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction and Planning	Construction	Post-construction
Number of installed CPs and BMPs on croplands			X
Reduction in TN and TP from croplands	X		X
Reduction in TSS and turbidity from croplands	X		X
Reduction in *Escherichia coli*, enterococci, and fecal coliform from croplands	X		X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this monitoring plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 5. Because there is no project-specific information at this time, Table 5 would need to be updated once the CNMP is completed and details about the CPs and BMPs, project locations, sampling techniques, etc. are known.

Table 5. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Number of installed CPs and BMPs on croplands	CPs and BMP counts and photographs	Direct observation of installed CPs and BMPs at various project sites	To be determined (TBD) in the CNMP	TBD in the CNMP
Reduction in TN and TP from croplands	Statistical and analytical data for TN and TP	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in TSS and turbidity from croplands	Statistical and analytical data for TSS and turbidity	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP
Reduction in *Escherichia coli*, enterococci, and fecal coliform from croplands	Statistical and analytical data for *Escherichia coli*, enterococci, and fecal coliform	Water samples taken from the project site(s) and potentially reference sites	TBD in the CNMP	TBD in the CNMP

All data would be collected either by hand on monitoring or surveys forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

Water samples would be collected using the appropriate and standard monitoring techniques. Standard analytical techniques would be used to document water quality improvements following state and local standard operating procedures (SOPs). A chain-of-custody (COC) form would be used to transmit any samples collected in the field to the analyzing laboratory. In addition, all data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual, Section 3.2 (DWH Trustees 2017).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate QA/QC process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the data submitted to the Trustees using the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.

3. Data validation and final QA/QC: Ensure that USDA can adequately conduct a final QA/QC check for non-data entry errors (e.g., date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for USDA to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016:Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016:Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, this project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.

4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

The first report would be submitted after the completion of pre-construction monitoring of a proposed project under Theme 3. Subsequent reports would be submitted after the completion of post-construction monitoring. The number of reports would be dependent on the CPs and BMPs installed, and other project-specific details (such as location) that are not known at this time. This MAM plan would be updated once the CNMP is completed and project-specific information is understood.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (Trustees Council 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, USDA is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, USDA, is responsible for all maintenance activities and costs related to the CPs/BMPs, including any repairs needed over the life of the CNMP.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C4

Draft Monitoring and Adaptive Management Plan

Pass-a-Loutre Wildlife Management Area Crevasse Access

1 INTRODUCTION

The Pass-a-Loutre Wildlife Management Area (WMA) consists of a multitude of passes, canals, cuts, and crevasses, and is located on an 115,000-acre area managed by the Louisiana Department of Wildlife and Fisheries (LDWF). The WMA is widely regarded as a world-class public waterfowl destination and hosts approximately 20,000 visitors annually. Although most of the recreational users are anglers in pursuit of both freshwater and brackish-water fish, waterfowl hunting is also very popular in the WMA. Pass-a-Loutre WMA was the first WMA in the state and was established by an act of the state legislature on November 1, 1921, on the opening day of waterfowl season (LDWF 2014). Public access to this WMA is strictly by boat from one of the public boat launches throughout the parish; the nearest boat launch is located 10 miles north of the WMA in Venice. There are no roads onto or through this WMA.

LDWF is proposing boating access enhancement on Pass-a-Loutre WMA. The WMA is approximately 10 miles south of Venice, Louisiana, in southern Plaquemines Parish near the mouth of the Mississippi River. This project would be implemented on lands owned and managed by the LDWF, and would include constructing five crevasses (openings) in the natural spoil banks of the WMA's passes. These crevasses will provide recreational hunters, fishermen, and non-consumptive user access to wetlands that are currently inaccessible by boat. These crevasses will also divert sediment-laden river water into shallow open ponds, enhancing habitat for wildlife and fisheries. This project will further enhance recreational use for the users of the WMA. The five crevasses that would be cleared by dredging and are shown in Figure 1. The crevasses would be various depths and widths depending upon site conditions. The crevasses would include the following:

- Southeast Pass Crevasse: This is an existing small crevasse that opens into a large open water bay. The existing crevasse would be dredged to approximately 10 feet deep and widened to an average width of 100 feet for a length of approximately 1,550 feet.
- Small Downstream South Pass Crevasse: This crevasse would be a new feature created in an area of low vegetation density just off of South Pass Crevasse. This new crevasse would be dredged to 8 feet deep and widened to 40 feet for a length of 1,100 feet.
- Johnson Crevasse: This would be a newly constructed feature extending eastward from the open water of Johnson Pass and into a marsh area. The new crevasse would be dredged to 8 feet deep and widened to 30 feet for a length of approximately 250 feet.
- Cheniere Crevasse: This would be a newly constructed feature extending eastward from the open water of Cheniere Pass and into a marsh area. The new crevasse would be dredged to 8 feet deep and widened to 30 feet for a length of approximately 200 feet.
- Loomis Pass Crevasse: This would be a newly constructed feature extending southward from open water near Loomis Pass and into a marsh area. The new crevasse would be dredged to 8 feet deep and widened to 30 feet for a length of approximately 250 feet.

The construction schedule has not been determined, and would be finalized during design. Project design is currently underway, but construction methods have yet to be finalized.

Figure 1. Location of the proposed Pass-a-Loutre Wildlife Management Area Access project.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational opportunities for recreational boaters, hunters, and fishers.

If during project planning the LDWF proposes to use dredged material to create or enhance wetland habitat, this monitoring and adaptive management (MAM) plan must be revised in close collaboration with the Louisiana Trustee Implementation Group (LA TIG) to incorporate goals, objectives, and the associated monitoring parameters and methods specific to the "create, restore, and enhance coastal wetlands" restoration type.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (LA TIG 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities conducted by individuals at locations near beaches and other shoreline areas. These activities include swimming, sunbathing, surfing, walking, kayaking, fishing, and hunting that take place from the shoreline or from shoreline structures such as piers and docks. Boating refers to a variety of recreational boating activities that begin at sites providing access to salt water near the Gulf Coast.

The proposed project is designed to enhance recreational hunting experiences by increasing access to recreational hunting areas in the Pass-a-Loutre WMA and by enhancing user experience. Therefore, the proposed project has a strong nexus to the public's lost recreational hunting and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing Pass-a-Loutre WMA by way of the new access structures are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of the project is to provide and enhance public access to natural resources through recreational use. The specific objective of the proposed project is to

- enhance public access through infrastructure development by constructing five new crevasses to provide enhanced access to Pass-a-Loutre WMA.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Two aspects of the ecological system that may be affected include water quality and habitat. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, the crevasses may not be engineered sufficiently to withstand these natural disasters. Therefore the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, hunting, wildlife viewing, and boating. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new access would attract public use to previously underused areas of the Pass-a-Loutre WMA. However, anticipated user data for the project were not collected (e.g., boaters and/or fishermen in the area were not polled for anticipated use of the new and improved crevasses). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the Pass-a-Loutre WMA Crevasse project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the “enhance public access to natural resources for recreational use restoration approach” (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use of the WMA. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the “public access to the natural resources or project area and/or the number of visitors using the recreational area” (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the “core performance” monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any provide and enhance recreational opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building access ways to increase recreation use in areas of the Pass-a-Loutre WMA that are currently underused, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Because the project site is located in a remote area, information collected on visitor use may need to occur at the public boat launches in Venice, Louisiana, which are located approximately 10 miles north of the WMA. Establishing cameras at some of the newly created crevasses to record access information may also be used to determine if visitor use and access have increased at the project site Due to the remoteness of the project site, remote sensing (i.e. use of cameras) for visitor counts and usage information is recommended. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may need to be located at the public boat launches in Venice, Louisiana. However, LDWF staff may also be stationed across the project site, at newly constructed or enhanced crevasses to determine user numbers. At either location (public boat launch, or out at the project site) the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 data collection events from cameras located throughout the project area would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include public outreach and marketing for the project (e.g., news articles or signage promoting the access waterways). Promoting the new access ways into the WMA may increase the user attendance at the project site. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	At the crevasse sites throughout the WMA	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

For the project, it is recommended that monitoring occur for at least 1 year after project implementation.

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because design of the crevasses is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Pass-a-Loutre WMA Crevasse project proposes to use standard engineering specifications and tried-and-tested construction methodology for dredging channels throughout the Gulf Coast, which typically includes a bucket-style dredge or hydraulic dredge depending upon site conditions and amount of material to be moved. Dredge locations for this project are not near dry land, so dredges are anticipated to be barge-mounted units. Dredge spoils would typically be deposited in water in areas adjacent to the dredging location, or slightly further away, e.g., along a shoreline if boat navigation could be impacted. No novel restoration approaches would be used for this small-scale, localized project. Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct and enhance the new waterways. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project’s goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Pass-a-Loutre WMA Crevasse restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.

- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the constructed waterways. Or, it may be possible to compare the number of users at the project site to other comparable WMAs along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.

- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users, over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the new and improved access ways).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e., kayaks]), and users	Camera counts and observations.	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the crevasse sites throughout the WMA 72 surveys would be collected during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by electronic photo data. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, LDWF, is responsible for all maintenance activities and costs related to the new and improved crevasses, including any repairs needed over the life of the facility.

10 REFERENCES

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C5

Draft Monitoring and Adaptive Management Plan

Pass-a-Loutre Wildlife Management Area Campgrounds

1 INTRODUCTION

The Pass-a-Loutre Wildlife Management Area (WMA) comprises a multitude of passes, canals, cuts, and crevasses, and is located on a 115,000-acre area managed by the Louisiana Department of Wildlife and Fisheries (LDWF). Pass-a-Loutre WMA was the first WMA in the state and was established by an act of the state legislature on November 1, 1921, on the opening day of waterfowl season (LDWF 2014). Public access to this WMA is strictly by boat, which can be accomplished from one of the public boat launches throughout the parish, the nearest of which is located 10 miles north of the WMA in Venice. There are no roads onto or through this WMA.

The WMA is widely regarded as a world-class public recreational destination, which hosts approximately 20,000 visitors annually. The majority of recreational users are anglers in pursuit of both freshwater and brackish water fish, such as bass, catfish, redfish, and speckled trout. The WMA is also frequented by waterfowl and deer hunters. Many recreational users stay at one of the five public “tent only” campgrounds on the WMA. These campgrounds are currently unimproved and provide only mowed lawns and small docks for recreational users to pitch tents.

LDWF is proposing campground improvement in the Pass-a-Loutre WMA. The Pass-a-Loutre WMA is located approximately 10 miles south of Venice, Louisiana, in southern Plaquemines Parish near the mouth of the Mississippi River. The project would be implemented on lands owned and managed by LDWF and would include improvements at five existing campgrounds throughout the WMA (Figure 1). Campground improvements would include new picnic tables, fire pit/barbeque areas, and docks at all campgrounds. The project would also install bulkheads at two campgrounds and dredge shallow areas at three other campgrounds. The campground improvements would enhance the experience of campground users visiting the WMA, reduce ongoing erosion, and improve public access. Campgrounds where improvements are planned are shown in Figure 1 and include South Pass, Cadro, Loomis #1, Loomis #2, and Southeast Pass.

Proposed project elements by campground include the following:

- South Pass Campground
  - Install 266 linear feet of bulkhead and associated backfill. Backfill material would come from the adjacent waterway.
  - Install 100 linear feet of boat dock. Dock dimensions and construction type would be determined during project design.
  - Install five mobile picnic tables made of steel dipped in a rubber coating.
  - Install five fire pit/barbeques.
  - Dredge approximately 6,500 cubic yards of sediment to enhance access to the campground.
- Cadro Campground
  - Install 100 linear feet of boat dock. Dock dimensions and construction type would be determined during project design.
  - Install eight mobile picnic tables made of steel dipped in a rubber coating.
  - Install eight fire pit/barbeques.
- Loomis #1 Campground
  - Install 210 linear feet of boat dock. Dock dimensions and construction type would be determined during project design.
  - Install eight mobile picnic tables made of steel dipped in a rubber coating.
  - Install eight fire pit/barbeques.

- Loomis #2 Campground
  - Install 65 linear feet of boat dock. Dock dimensions and construction type would be determined by during project design.
  - Install three mobile picnic tables made of steel dipped in a rubber coating.
  - Remove vegetation and install three fire pit/barbeques.
  - Dredge approximately 400 cubic yards of sediment to be placed on the campground.
- Southeast Pass Campground
  - Install 150 linear feet of bulkhead and associated backfill. Backfill material would come from the adjacent waterway.
  - Install 105 linear feet of boat dock. Dock dimensions and construction type would be determined during project design.
  - Install five mobile picnic tables made of steel dipped in a rubber coating.
  - Install five fire pit/barbeques.
  - Dredge approximately 750 cubic yards of sediment to improve boater access near the campground and new boat dock.

Figure 1. Location of the proposed Pass-a-Loutre Wildlife Management Area Campgrounds project.

The campground improvements would enhance the experience of campground users visiting the WMA, reduce site erosion, and improve public access. Construction of this project would take place between February 1 and November 1. Projects of this scope typically require approximately 6 months to complete.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to “provide and enhance recreational opportunities” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type “provide and enhance recreational opportunities.” The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for campers, boaters, fishers, and hunters in the Pass-a-Loutre WMA.

If during project planning LDWF proposes to use dredged material to create or enhance wetland habitat, this monitoring and adaptive management (MAM) plan must be revised in close collaboration with the Louisiana Trustee Implementation Group (LA TIG) to incorporate goals, objectives, and the associated monitoring parameters and methods specific to the “create, restore, and enhance coastal wetlands” restoration type.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (LA TIG 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public’s lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance camping and docking facilities for recreational hunters and anglers in the in the Pass-a-Loutre WMA by enhancing the conditions of five existing campgrounds (see Figure 1). The campgrounds serve both shoreline and boating recreational users; therefore, the proposed project has a strong nexus to the public’s lost recreational hunting and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the campgrounds are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the Pass-a-Loutre WMA through infrastructure development and enhancement of five campgrounds.
- Enhance public access by increasing visitor use of protected or enhanced lands (the WMA), by enhancing the recreational opportunities at five campgrounds within the Pass-a-Loutre WMA.
- Enhance public access by improving the availability of recreational opportunities/protected lands, by improving the campgrounds.

The objectives of this project must be refined upon completion of the engineering and development phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of other facilities, such as the picnic tables or fire pits/barbeques, unless erosion control measures are implemented. Disturbed areas, such as those that will be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information is available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need
- Time and resources (e.g., income, transportation) available to participate in recreational activities

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, or if there is an increase in the rate of sea level rise, the new docks may need to be reengineered to withstand the new environmental conditions. Unknowns in weather patterns could result in the project not being engineered sufficiently to withstand these natural forces; therefore the project could no longer achieve the restoration goal of increasing recreational opportunities, such as fishing and camping in the Pass-a-Loutre WMA. Likewise, if the state of the economy changes, recreational users may no longer able to afford the fuel and boat maintenance costs required to access the campgrounds, Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities at such a remote location. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g. impacts to species and habitat)
- Potential need for ecological restoration (e.g. as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to the campgrounds would attract increased public use to the Pass-a-Loutre WMA and the campgrounds themselves. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the docks). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the Pass-a-Loutre WMA Campgrounds project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use of the campgrounds and of the Pass-a-Loutre WMA. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project

objectives include building infrastructure in order to increase recreation use of the Pass-a-Loutre WMA, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vessels, boats, and/or other recreational vehicles, and users at the project site. Because the project site is located in a remote area, collection of information on visitor use may need to occur at the public boat launch in Venice, Louisiana. Establishing cameras at the campgrounds to record access information may also be used to determine if visitor use and access have increased at the project sites. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. However, due to the remote location of the project site, camera counts are recommended. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may be cameras stationed at the campgrounds to determine user numbers. The cameras can count the number of vehicles, boats, or other recreational vessels (e.g. kayaks) and recreational users that access the project site.

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring camera sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 camera sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure and/or routine maintenance activities. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Campground	72 camera monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because design and planning for the campgrounds is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Pass-a-Loutre WMA Campgrounds project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the campground improvements. No novel restoration approaches would be used for this small-scale, localized project. It is expected that dock construction and associated pile driving would be completed from the water on a floating vessel, and would include a connected walkway from the dock to the shoreline. Approximately 450 linear feet of dock would be constructed. Dredging is expected to be conducted to a depth appropriate for recreational boat passage (approximately 8 to 10 feet) using standard bucket-style or hydraulic dredge equipment. Dredge spoils would likely be placed in water or on the campgrounds themselves. If there is need for backfill behind newly installed bulkheads, and site conditions are suitable, spoil material may be used in these areas. Typical bulkhead installations include interlocking sheet pile (steel, aluminum, vinyl, or composite material based on site conditions) that are driven directly into the sediment. If wooden pilings are used as bulkheads, they would typically be driven into the sediment, and include sheeting material (e.g., treated lumber) placed behind the pilings. Because the piles or sheet piling would be installed in water, typical installation would likely occur from a boat- or barge-mounted vibratory or impact hammer system. It is anticipated that pre-constructed picnic tables, made of steel dipped in a rubber coating, would be used and placed at campsites within each campground. Construction of fire pit/barbeque areas would consist of a heavy gauge steel fire ring with a barbeque grate on top.

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct the new campground features. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Pass-a-Loutre WMA Campgrounds restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decrease in recreational users, there may be an issue with new campground infrastructure. Or, it may be possible to compare the number of users at the project site to other comparable campgrounds along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform on how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved features at the campgrounds).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e., kayaks]), and users	Camera counts located at the campground.	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	72 camera observation sessions, each lasting 4 hours, would be conducted during the 1-year period.

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER

(DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for “addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group” (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, LDWF, is responsible for all maintenance activities and costs related to the improved campgrounds, including any repairs needed to the new facilities over their lifetime.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C6

Draft Monitoring and Adaptive Management Plan

Grand Isle State Park Improvements

1 INTRODUCTION

The State of Louisiana purchased the 150-acre site that became the Grand Isle State Park in 1968. Since then, infrastructure has been added to the park, which currently includes roads, nature trails, four parking lots, recreational vehicle (RV) campsite, one fishing pier, one crabbing pier, two bathhouses with boardwalks, and multiple rock jetties. The Grand Isle State Park provides access to recreational activities including fishing, crabbing, beach access, bird watching, and nature trails.

The Louisiana Office of State Parks is proposing the Grand Isle State Park Improvements project to repair and upgrade existing recreational infrastructure in and around the Grand Isle State Park and to improve access to recreational opportunities and natural resources, including the protection of shoreline integrity and inshore infrastructure. Existing facilities at the park have been deteriorating due to natural forces such as hurricanes, floods, and erosion. The existing T-shaped fishing pier, which extends approximately 300 feet southeast into the Gulf of Mexico from the edge of high tide, has experienced sediment build up around the pier that effectively degrades fishing access by reducing water depth, which limits the fish species diversity by reducing fish access and reducing available shallow-water habitat to the areas around the pier. These conditions have had a negative effect on recreational use of the fishing pier.

The existing rock jetty at the north end of Grand Isle State Park is currently functioning well, but an extension of this rock jetty would allow for greater protection and expansion of the shallow-water and lagoon natural areas, which provide important habitat for fish, birds, and other wildlife. The existing rock jetty off of the southern coastline of the Grand Isle West property is insufficient and failing to prevent erosion of the beach at the southern tip of the Grand Isle. The existing rock jetty off of the southern coastline of the Fort Livingston property is also insufficient, causing the historic pre–Civil War fort to be vulnerable to potential natural threats, including erosion and flooding. The beach is receding just east of the fort, and erosion is migrating behind the existing jetty toward the fort's foundation. The shore on the west side just north of the fort is also receding and the erosion is migrating behind the existing jetty toward the fort. These threats are impacting safe shoreline access by recreational users through the loss of shoreline. If current erosion patterns continue, the entire west end of Grand Terre Island could be lost, thereby severely restricting shoreline access by recreational users.

The existing roads and nature trails throughout Grand Isle State Park are in need of repairs and upgrades due to damage from repeated flooding of the park. The existing asphalt roads are currently in such poor condition that they would be considered unimproved roads. The existing nature trails, which are mostly composed of limestone and wood boardwalks trails, require improvement and expansion. These trails have incurred damages from repeated floods and storms that have resulted in the loss of limestone surfacing on trains and accelerated deterioration of boardwalks.

The proposed project would involve three elements: 1) upgrading an existing pier to improve fishing access; 2) upgrading existing rock jetties at the eastern end of the park known as Grand Isle West, as well as at the Fort Livingston property, to provide habitat for shallow-water nearshore marine species of recreational value; and 3) repairing and upgrading existing roads and nature trails damaged by repeated flooding. The project is located in Jefferson Parish on the southeastern tip of Grand Isle (Figure 1). The majority of the project area is located southeast of the corner of Louisiana Highway 1 and Admiral Craik Drive, extending east for approximately 0.95 mile and south from Admiral Craik Drive to the Gulf of Mexico.

Figure 1. Location of elements within the Grand Isle State Park Improvements project location.

In addition, the rock jetties proposed by the project would be implemented in the following locations:

1. Directly north of the Grand Isle State Park on the northern tip of Grand Isle, extending northwest and southeast over an approximately 0.75-mile-wide area
2. South and west of the southwestern coastline of the Fort Livingston property approximately 0.80 mile northeast from where Admiral Craik Drive dead-ends, across the entrance to Barataria Bay, and on the southwestern tip of Isle Grande Terre
3. East of the southern coastline of the park property know as Grand Isle West, which is located at the southwestern tip of Grand Isle approximately 0.40 mile south of the southeastern end of the Caminada Pass Bridge (Louisiana Highway 1)

The proposed project would provide improved fishing and recreational use of the state park and also provide protection of coastal nearshore marine habitats and inland infrastructure. Each of the three proposed project elements are further described below.

Fishing Pier

This element would include upgrades to the existing fishing pier to improve fishing access and provide needed amenities, including lighting, Americans with Disabilities Act–compliant fishing rail sections, benches, shaded structure area(s), and a fish-cleaning station. This element includes the construction of a 400-foot-long × 16-foot-wide pier extension from the northeast corner of the T-portion of the existing pier, likely at a 30-degree angle, with a heading due east. The angle change of the pier would place the extension perpendicular to the beach line, reaching deeper water in the shortest distance possible. These improvements would increase recreational fishing opportunities for all visitors and improve the overall fishing experience.

Upgrading the existing fishing pier would include the following:

- Fifty-four piles measuring 40 feet each, driven into the sand bottom by at least 15 feet with pairs spaced 15 feet apart.
- One 400-foot-long and 16-foot-wide pier with built-in benches, lighting, and fish-cleaning area constructed from large, marine-grade, pressure-treated, timber members and stainless steel fasteners.

Rock Jetties

This element would include upgrades to the existing rock jetties at the Grand Isle State Park, the Grand Isle West property, and the Fort Livingston property. These upgrades would involve the extension of existing rock jetties and groins that would provide protection for several different aspects of the natural and built environment, including: protection and expansion of the shallow-water and lagoon habitats to the north of the Grand Isle State Park, protection from continued beach erosion along the southern coastline of the Louisiana Office of State Parks–owned Grand Isle West property, and protection of the historic pre–Civil War fort on the Louisiana Office of State Parks–owned Fort Livingston property from continued flooding and erosional forces. The rock jetty upgrades to the north end of the Grand Isle State Park would not only provide ecological benefits to this natural area, which historically served as a fish nursery, site for nesting birds, and flock resting areas. They would also provide visitors with additional fishing opportunities and a place to learn about natural processes and habitats of the local region.

Upgrading the existing rock jetties would include the following:

- One 200-foot-long × 35-foot-wide × 48-inch-deep jetty extension at the northeast corner of the Grand Isle State Park. Approximately 1,556 tons of rock would be needed for the jetty extension, constructed with large to boulder size rocks, averaging at least 200 hundred pounds each and matching existing jetty material. The purpose of this jetty extension is to trap sediment along the shoreline.
- One 1,700-foot-long × 22.5-foot-wide × 24-inch-deep jetty extension to the north starting at the north end of the existing jetty on the north end of Grand Isle State Park (Grand Isle East), turning to run west to cover a small land break, and ending at the tip of a small island at the mouth of the lagoon habitat. Approximately 4,250 tons of rock would be needed for the jetty extension, constructed with large to boulder size rocks, averaging at least 200 hundred pounds each and matching existing jetty material. The purpose of this jetty extension is to protect the shoreline from erosion and prevent land loss.

- Three 200-foot-long rock groins with gaps between each of them, totaling between 900 and 1,000 feet long with variable groin and gap lengths, southeast of the Fort Livingston property, constructed with large to boulder size rocks, averaging at least 200 hundred pounds each and matching existing jetty material. The purpose of the groins is to trap sediment, prevent continued shoreline erosion, and prevent the eventual undermining of the fort.
- One 900-foot-long jetty extension to the north starting at the north end of the existing jetty west of the Fort Livingston property and ending at the northern tip of the island and constructed with large to boulder size rocks, averaging at least 200 hundred pounds each and matching existing jetty material. The purpose of this jetty extension is to protect the shoreline, prevent land loss, and prevent the eventual undermining of the fort.
- Three 200-foot-long rock groins with gaps between each of them, totaling between 900 and 1,000 feet long with variable groin and gap lengths, southeast of the Grand Isle West property, constructed with large to boulder size rocks, averaging at least 200 hundred pounds each and matching existing jetty material. The purpose of the groins is to trap sediment and prevent continued shoreline erosion.

Roads and Trails

This element of the proposed project would include repairs to roads and trails within the Grand Isle State Park for damages associated with heavy equipment used to remove sand from the roadways after flood events. The roads and parking lots provide access to the park, campsites, bathhouses, fishing and crabbing piers, and trails. The trails provide access to onshore fishing and offer educational opportunities regarding plant and wildlife habitats. Repairing the park’s road and trail infrastructure is vital for preserving public access to and recreational opportunities from the park’s natural resources.

Repairing and upgrading existing roads and trails would include the following:

- Two roads totaling 3.05 miles and approximately 296,630 square feet of roadway would be repaired in the following areas:
    - Approximately 1.3 miles and 167,270 square feet of existing roads, including the divided entry road from the public street and the two main park roads leading to the campground and fishing piers, with 12-foot-wide lanes and a stone-dressed shoulder of no more than 2 feet wide. Repair would primarily include pothole repairs to the road base and a 2-inch asphalt overlay.
    - Approximately 1.75 miles and 129,360 square feet of existing roads, which includes three one-way travel lanes and multiple camp spurs, with 12-foot-wide lanes and a stone-dressed shoulder of no more than 2 feet wide. Repair would primarily include pothole repairs to the road base and a 2-inch asphalt overlay.
- Four paved parking lots, totaling 77,500 square feet, with repairs consisting primarily of pothole repairs to the road base and a 2-inch asphalt overlay at the following areas: a campground bathhouse, day-use bathhouse, fishing pier, and crabbing pier.
- Approximately 1.8 miles (9,755 linear feet) of nature trails (one continuous loop), averaging approximately 4 feet wide, consisting primarily of crushed stone. Repair would be consistent with original construction methods and include laying new crushed stone paths and repairing wooden boardwalks.

A conceptual design for the proposed project has been developed, however, engineering and design (E&D) is still occurring. The project's specific construction schedule would be determined during E&D, but it is estimated that if work is done concurrently all work could be complete in 27 to 29 months. If the work is done sequentially it would take approximately 65 months to complete the proposed project. In-water work would take approximately 24 months. All work would be subject to approval of permits and environmental review. The construction schedule would include contracting, pre-construction, and construction activities.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, camping, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for boaters, fishermen, and hunters in Grand Isle State Park.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance camping and docking facilities for recreational users (campers, wildlife viewers, etc.) and anglers in the in Grand Isle State Park by enhancing the conditions of existing rock jetties, roadways/parking lots, and fishing pier. All features of the proposed project benefit shoreline and fishing recreational users; therefore, the proposed project has a strong nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the state park are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to recreational activities in Grand Isle State Park through infrastructure enhancement of existing rock jetties, roadways/parking lots, and a fishing pier.
- Enhance public access by increasing visitor use of protected or enhanced lands (the state park), by enhancing the recreational opportunities at the rock jetties and the pier in Grand Isle State Park.
- Enhance public access by improving the availability of recreational opportunities/protected lands, by improving roadways/parking lots, fishing pier, and rock jetties.

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of trail and road improvements unless erosion control measures are implemented. Post-construction, hydrology at and around the jetty improvement areas could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information is available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Sea level rise
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, or if there is an increase in the rate of sea level rise, the enhanced jetties may need to be reengineered to withstand the new environmental conditions. Unknowns in weather patterns could result in the project not being engineered sufficiently to withstand these natural forces; therefore the project could no longer achieve the restoration goal of increasing recreational opportunities, such as fishing and wildlife viewing in Grand Isle State Park. Likewise, if the state of the economy changes, recreational users may no longer able to afford the fuel and boat maintenance costs required to access the state park. Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities at the park. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g. impacts to species and habitat)
- Potential need for ecological restoration (e.g. as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to the pier, rock jetties, and roadways/parking lots would attract increased public use to the state park. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the improved pier). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment (NRDA) restoration projects. The sections below outline the Grand Isle State Park Improvements project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use at Grand Isle State Park. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project

objectives include building enhanced infrastructure in order to increase recreation use of the state park, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, recreational vessels (such as kayaks), and users at the project site. Establishing cameras at the fishing pier or state park entrance to record access information may also be used to determine if visitor use and access have increased at the project sites. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that the same on-site monitor be used to gage the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may be at the enhanced pier or at the entrance to the state park. At either location the on-site monitor can count the number of vehicles, recreational vessels (e.g., kayaks), and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, hunting, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure and/or routine maintenance activities (e.g., re-paving the roadways lot if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Pier or state park entrance	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because E&D for the improvements is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Grand Isle State Park Improvements project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the state park improvements. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe (27 to 29 months if completed consecutively, or approximately 65 months if done sequentially). For example, construction methods for the pier extension would be similar to those of the existing pier and include the use of large, marine-grade, pressure-treated timber piles and stainless steel fasteners. Pressure-treated wood products are manufactured and installed in a manner that minimizes any potential for adverse impacts to aquatic environments. The piles would be driven using an impact hammer pile (vibratory hammers are not typically used on timber piles) with standard equipment (crane, boom, set of leads, pile hammer, helmet, pile gate, and pile monkey). The crane and associated equipment would likely be staged on a barge. Pier construction would likely include built-in benches, lighting, a fish-cleaning area, an ADA fishing rail, and shade structure section(s). For additional information on the construction methodologies for this proposed project, please see Section 3.3.3 of the RP/EA (LA TIG 2018).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct and enhance the recreational features at Grand Isle State Park. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Grand Isle State Park Improvements project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is a decrease in recreational users, there may be an issue with enhanced infrastructure. Or it may be possible to compare the number of users at the project site to other comparable state parks along the coast of Louisiana, to see if the project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information is available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved features at the state park).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

The data to be collected as part of this MAM plan are described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [e.g., kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the improved pier. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Louisiana Office of State Parks can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the Louisiana Office of State Parks to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Louisiana Office of State Parks is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the Louisiana Office of State Parks, is responsible for all maintenance activities and costs related to the improved pier, rock jetties, and roadways/parking lots, including any repairs needed to the new facilities over their lifetime.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C7

Draft Monitoring and Adaptive Management Plan

Chitimacha Boat Launch

1 INTRODUCTION

The Chitimacha Boat Launch project, submitted by the Chitimacha Tribe of Louisiana (Chitimacha Tribe), would involve replacing the Chitimacha Tribe's existing boat launch, which is inadequate in size, deteriorated, and is becoming unsafe for public use. The new launch would provide a safe, larger boat launch facility to access numerous water bodies, including Bayou Teche, Lake Fausse Point, Lake Dauterive, Grand Avoille Cove, the Atchafalaya River Basin, West Cote Blanche Bay, and the Gulf of Mexico for fishing and recreation.

The project is located in St. Mary Parish within Chitimacha Tribal Lands, adjacent to Charenton, Louisiana (Figure 1). The project is on the south side of Bayou Techeand and on the north side of Chitimacha Trail (Louisiana Highway 326). The project address is 3726 Chitimacha Trail, Jeanerette, Louisiana 70544.

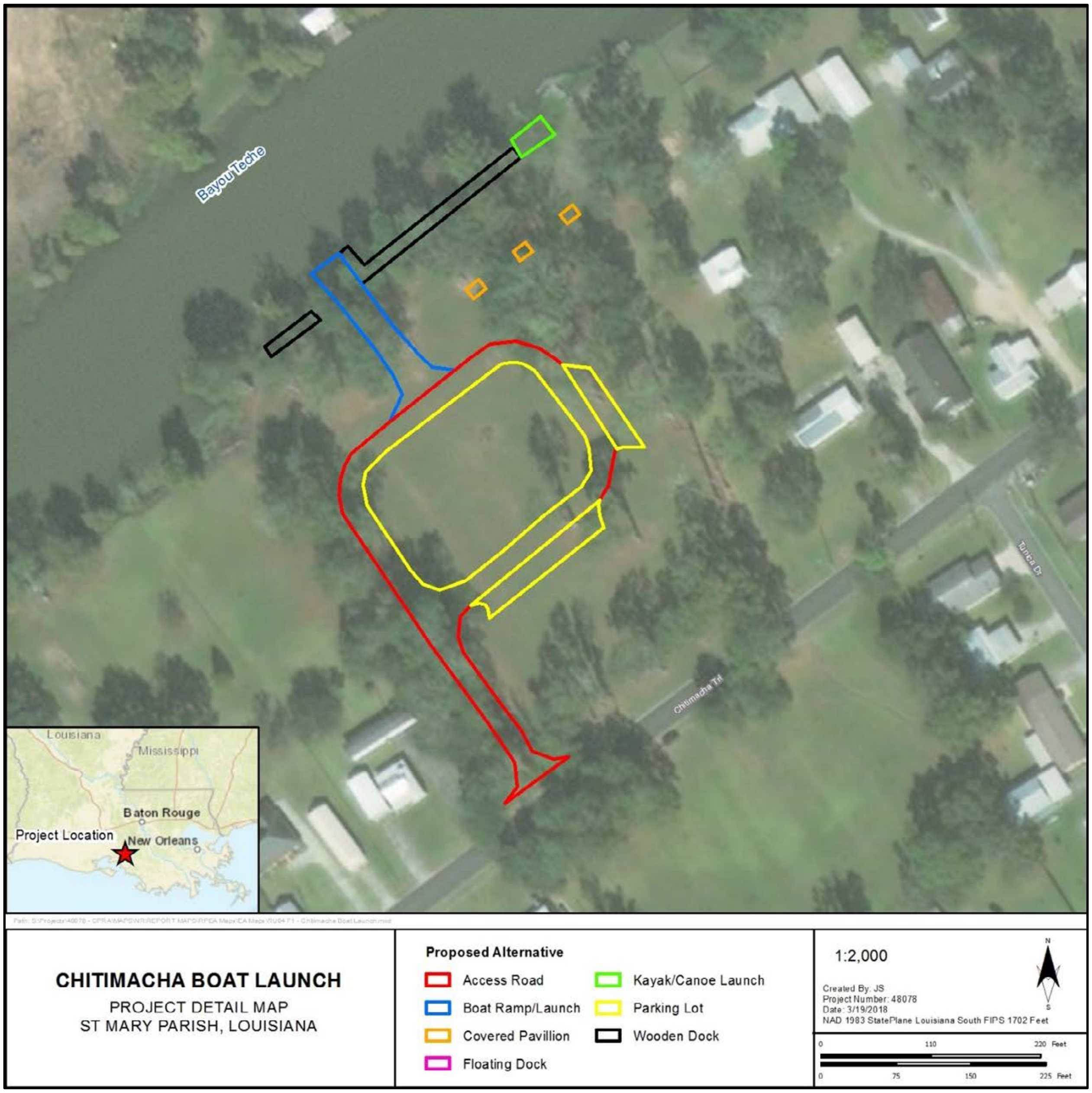

Figure 1. Location of the Chitimacha Boat Launch project and proposed enhancements.

The project would consist of construction of a new boat launch on the south bank of the Bayou Teche. The existing boat launch is on another property on the Bayou Teche, approximately 0.35 mile downstream of the proposed new boat launch, and it would be closed after construction of the new facility. The new boat launch would safely accommodate parking for approximately 22 vehicles with boat trailers. In addition, the project would create overflow parking capacity on contoured grassy areas adjacent to the developed parking lots. For planning purposes, it is assumed that the project would permanently impact the entire 5-acre site. Although not all vegetation is anticipated to be removed, the 5-acre site is considered the development envelope.

The new facility would include construction of the following:

- One 50,880-square-foot aggregate parking lot with ingress and egress and 22 spaces large enough to accommodate a vehicle with a trailer
- One 160-foot-long × 30-foot-wide paved boat ramp from the paved parking lot to the Bayou Teche
- One 480-square-foot floating dock, constructed of treated structural lumber with composite decking
- Two wooden docks totaling 3,360 square feet, constructed of treated wood

A conceptual design has already been developed for the project. Implementation of the project would occur over a 12-month period, from start to finish, subject to approval of permits and environmental review. Preliminary planning and project commencement activities are anticipated to take approximately 3 months, and the engineering and design (E&D) are anticipated to take approximately 5 months. After E&D are complete, the contracting and pre-construction activities are anticipated to take approximately 3 months. Construction of the new facilities is planned to occur over a 4-month period.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational opportunities in Bayou Teche and the surrounding waterways.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the boat launch and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of the project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development by building a publicly accessible boat launch on the southern bank of the Bayou Teche
- Enhance public access by improving the availability of recreational opportunities by building a parking lot at the boat launch to accommodate approximately 22 vehicles with boat trailers and 20 single cars without trailers

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a recreational use restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of the parking lot or access road unless erosion control measures are implemented. Post-construction, hydrology at and around the parking lot and access road could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating this boat launch project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the land use at the proposed boat launch is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, beach-going, camping, and boating. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new recreational facilities would attract public use to Bayou Teche based on the project's proximity to the larger surrounding towns of Jeanerette, Baldwin, and Franklin. However, anticipated user data for the project were not collected (e.g., boaters and/or fishermen in the area were not polled for anticipated use of the new boat launch facility). Therefore, the ability of the new launch to increase recreation use in the area is unknown. Likewise, the potential project impacts on the local community of Charenton, Louisiana, and the local environment based on anticipated user numbers are not fully known at this time. Impacts to the community and environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental and socioeconomic impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the Chitimacha Boat Launch project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goals and project-specific objectives are related to increasing and enhancing recreational use in the Bayou Teche area. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the Chitimacha Boat Launch project objectives include building facilities to increase recreation use in the area, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The preferred methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the boat launch gate. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For this project , it is recommended that the same on-site monitor be used to gage the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the project, the priority areas for counts would be at the boat launch itself. By establishing the monitoring location at the boat launch, the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation at the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing lights at the launch), public outreach and marketing for the project (e.g., news articles or signage promoting the new boat launch), and/or routine maintenance activities (e.g., re-paving the launch or parking lot if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

For the project, it is recommended that monitoring occur for at least 1 year after project implementation.

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a 1-year time frame (planning and design are anticipated to take approximately 8 months; construction approximately 4 months). If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Chitimacha Boat Launch project proposes to use standard engineering specifications and tried-and-tested construction methodology for standard boat launches. No novel restoration approaches would be used for this small-scale, localized project. In addition, the project is proposed to occur over a 12-month period, which is a standard and realistic timeframe. Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct a boat launch at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Improved visitation rates following implementation of the restoration elements and services
- The Chitimacha Boat Launch project designed, constructed, and implemented according to plans and permitting requirements

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is a decrease in recreational users, there may be an issue with the project facilities. Or it may be possible to compare the number of users at the project site to other boat launch facilities in the area, to see if the project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information is available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates following implementation of the restoration elements and services	Public outreach and marketing for the project (e.g., news articles or signage promoting the improved boat launch)
Infrastructure completed as designed	Project designed, constructed, and implemented according to plans and permitting requirements	Working with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (8 months)	Construction (4 months)	Post-construction (1 year)
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

The data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions for 1 year	At the boat launch 72 monitoring sessions would be completed during the 1 year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Chitimacha Tribe can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the Chitimacha Tribe to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1 year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Chitimacha Tribe is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the Chitimacha Tribe, is responsible for all maintenance activities and costs related to the boat launch, including any repairs needed over the life of the facility.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C8

Draft Monitoring and Adaptive Management Plan

Sam Houston Jones State Park Improvements

1 INTRODUCTION

The State of Louisiana established the 1,087-acre site that became the Sam Houston Jones State Park (originally called the Sam Houston State Park) in 1944. Recreational opportunities within the park include campsites, cabins, a picnic area with pavilions, a playground, multiple restrooms, two boat launches located on the West Fork of the Calcasieu River with access to Lake Charles and the Gulf of Mexico, boat rentals, three hiking trails, bird watching, fishing, and a disc golf course.

The majority of the old cabins within the park were replaced with temporary trailer cabin units when they were determined to be beyond repair and the Louisiana Office of State Parks could not afford to replace cabins with in-kind models. The temporary trailer cabins did not meet expectations when purchased; they are currently deteriorating faster than originally projected and need to be replaced to maintain adequate lodging for visitors. The availability of cabins within the park allows visitors to stay longer and participate in more recreational opportunities, such as fishing, bird and wildlife viewing, hiking, and biking.

The Louisiana Office of State Parks is proposing the Sam Houston Jones State Park Improvements project. The project would involve three elements intended to improve the recreational camping experience and increase visitor retention to participate in additional recreational opportunities (e.g., fishing): 1) replacing 10 trailer cabins with state park standard cabins, 2) renovating the interior and exterior of a day-use area restroom, and 3) constructing a new restroom to address an underserved area of the park at a popular trailhead. The project would provide improved camping and day-use facilities for increased recreational use of the Sam Houston Jones State Park, benefiting public visitors' recreational experience. The project areas are located entirely within the Sam Houston Jones State Park property, specifically near the southwest portion of the Sam Houston Jones State Park Road that loops through the main portion of the park and is accessible from Sutherland Road (Figure 1).

The Louisiana Office of State Parks is pursuing the project to replace and upgrade existing recreational infrastructure and service facilities within the Sam Houston Jones State Park to improve the recreational camping experience and increase visitor use. Each of the project elements would help achieve the project goal and would likely increase park visitation and enjoyment of recreational activities, such as fishing. The new and remodeled structures would be updated to have a similar architectural style to match the park design and would also improve Americans with Disabilities Act accessibility.

The new and remodeled Sam Houston Jones State Park cabins and restrooms would include the following construction elements:

- Removal of 10 trailer cabins with an average size of 800 square feet
- Construction of 10 state park standard cabins with an average size of 1,100 to 1,200 square feet, each using existing utility infrastructure, including landscaping around each of the new cabins
- Repair of existing cabin parking and walkway paving for access to cabins
- Replacement of interior finishes and fixtures and repair of exterior rot and weather proofing at an existing approximately 900-square-foot restroom
- Construction of a new approximately 750-square-foot restroom
- Extension of existing park utilities to serve the new restroom

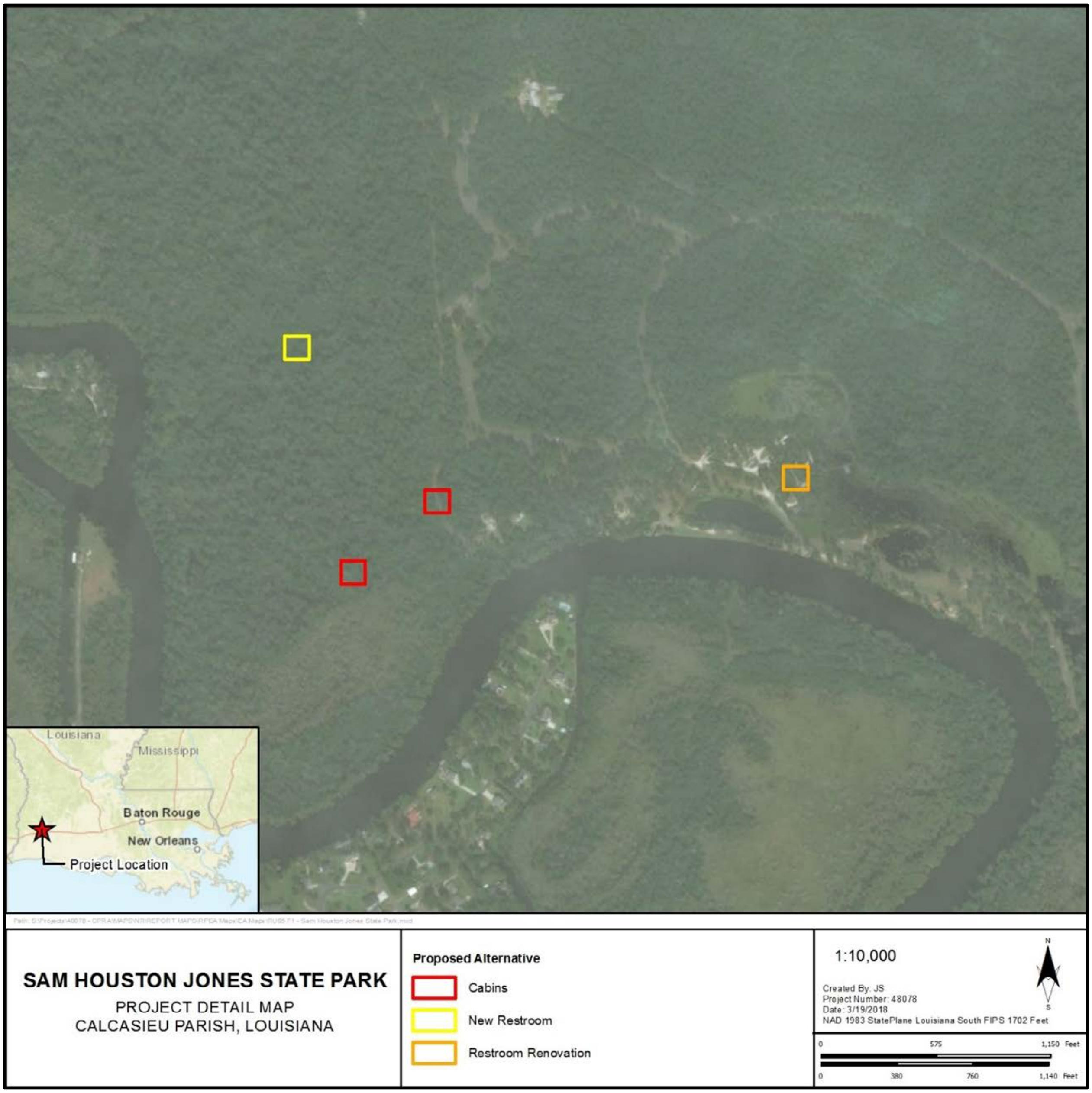

Figure 1. Location of the proposed Sam Houston Jones State Park Improvements project.

A conceptual design for the proposed project has been developed. The project construction schedule would be determined during engineering and design (E&D), but it is estimated that if work is done concurrently, all work would be completed in 20 to 22 months and if the work is done sequentially it would take approximately 46 months to complete. All work would be subject to approval of permits and environmental review. The construction schedule would include contracting and pre-construction and construction activities.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for campers, boaters, fishermen, and hunters in the Sam Houston Jones State Park.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance recreational fishing experiences through the improvements of infrastructure supporting the use of the state park's existing boat launch, such as overnight campgrounds and day-use restrooms, which would likely increase visitation and enhance the quality of future recreational visits to the area. Although the proposed project is located inland from the Gulf Coast, the boat launch on the Calcasieu West Fork has access to the Gulf of Mexico through major recreational water bodies, such as Lake Charles and Calcasieu Lake, and would provide fishing and water-based recreational opportunities in those water bodies. Therefore, the project has a nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the campgrounds are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the Sam Houston Jones State Park through infrastructure development and enhancement of campground facilities.
- Enhance public access by increasing visitor use of protected or enhanced lands (the state park), by enhancing the recreational opportunities within the Sam Houston Jones State Park.
- Enhance public access by improving the availability of recreational opportunities/protected lands, by improving the infrastructure at the state park.

The objectives of this project must be refined upon completion of the E&D and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be impacted during removal of existing facilities and construction of new and/or improved facilities unless erosion control measures are implemented. Post-construction, hydrology at and around the larger cabin structures, parking lot, walkway, or restroom could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbed areas, such as the new landscaping areas around the cabins or along extended utility lines to the new restroom, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of landscaping plants and restored temporary impact areas. Disturbance of terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. Likewise, if the public's interest in outdoor recreational activities wanes, visitor use and satisfaction with the project site would decrease. Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities at the state park. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g. impacts to species and habitat)
- Potential need for ecological restoration (e.g. as a result of increased use of the area)
- Potential negative impacts on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to the state park facilities would attract increased public use to the Sam Houston Jones State Park. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the new facilities). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential project impacts on the City of Westlake, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are

achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH restoration projects. The sections below outline the Sam Houston Jones State Park Improvements project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use of the campground facilities at the state park. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building infrastructure in order to increase recreation use of the Sam Houston Jones State Park, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vessels, boats, and/or other recreational vehicles, and users (hikers, campers, picnickers, etc.) at the project site. Establishing cameras at the entrance(s) to the new facilities to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor be used to gage the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may be located at the entrance(s) to the state park, or outside the newly constructed cabins. By establishing the monitoring location at the newly constructed facilities or at the park entrance(s), the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g. kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as boating, fishing, camping, picnicking etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure and/or routine maintenance activities. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Entrance(s) to the state park and/or cabins	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because engineering and design of the new facilities and features is still underway. However, it is estimated that if work is done consecutively, all facilities and features would be completed in 20 to 22 months. If the work is done sequentially, then the project would take approximately 46 months to complete. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Sam Houston Jones State Park Improvements project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the campground improvements. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe (20 to 22 months if constructed consecutively, or 46 months if completed sequentially). To construct the 10 replacement cabins, the existing temporary trailer cabins would be removed to accommodate the new approximately 1,100- to 1,200-square-foot state park standard cabins. Minimal site preparation and utility work would be needed because the replacement cabins would occupy the same footprint as the existing cabins and would tie into existing utility lines. The new cabins would be standard stick construction with 2 × 4 stud framing. Special wood alternatives would be required, where possible, because of the presence of Formosan termites (*Coptotermes formosanus*) in the general area. Cabins would be built either on a pier and beam or concrete slab foundation, depending on grade. Additionally, some improvements may be required to the surrounding grounds, including improvements to the parking and access walkways and landscaping around the new cabins to restore construction impacts.

Renovation of the existing 900-square-foot restroom would include the replacement of all interior finishes and fixtures, as well as repairs to some exterior areas that have wood rot and old weather proofing. Interior finishes would include sinks, toilets, mirrors, toilet partitions, lights, hand dryers, and some tile on the floor and walls. Repairs to the exterior would mostly be limited to exposed roof elements, such as the soffit and large timber accent pieces.

Construction of the new approximately 750-square-foot restroom facility would require at least three toilets and sinks for each of the two sides of the restroom facility to meet the anticipated user needs. Construction methods and architectural style would match existing park restroom and bathhouse facilities. In addition, existing park utilities would be extended to serve the new restroom and would be located in buried lines. Water and electrical lines would be extended by 950 feet and the sewer line would be extended by 1,200 feet.

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct the new recreational features at Sam Houston Jones State Park. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Sam Houston Jones State Park Improvements project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- <u>Data summarization and characterization</u>: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- <u>Status determination</u>: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is a decrease in recreational users, there may be an issue with the new state park infrastructure. Or it may be possible to compare the number of users at the project site to other comparable state parks and campgrounds in the area, to see if the project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- <u>Trends evaluation</u>: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information is available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved features at the state park).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

The data to be collected as part of this MAM plan are described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e. kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Either at the entrance(s) of the state park or at the newly constructed cabins. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Louisiana Office of State Parks can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for Louisiana Office of State Parks to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Louisiana Office of State Parks is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the Louisiana Office of State Parks, is responsible for all maintenance activities and costs related to the new and improved facilities and features proposed at the Sam Houston Jones State Park, including any repairs needed over the life of the facilities.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C9

Draft Monitoring and Adaptive Management Plan

Pointe-aux-Chenes Wildlife Management Area Recreation Use Enhancement

1 INTRODUCTION

The Louisiana Department of Wildlife and Fisheries (LDWF) is proposing multiple recreational improvement projects in the Point-aux-Chenes Wildlife Management Area (WMA), which is located on lands owned and managed by LDWF. The Pointe-aux-Chenes WMA is located in Terrebonne and Lafourche Parishes, between the towns of Galliano and Montegut and bisected by the town of Pointe-aux-Chenes. The Point-aux-Chenes WMA is an approximately 35,000-acre marsh area that was purchased by LDWF in 1968 from the Humble Oil Company. Approximately 40% (13,855 acres) of the WMA is under active management by LDWF and is broken up into multiple water management units (Montegut, Pointe-aux-Chenes, Grand Bayou #1 and Grand Bayou #2 Units). These management units were established to control water and salinity levels to protect sensitive marsh habitat for wildlife, and recreational uses.

This WMA is accessible by boat or by paved road (State Route 665 and 55). There is a boat launch at Grand Bayou, which provides access to the St. Louis Canal and the Grand Bayou Unit, and a boat launch along the Island Road, which provides access to the Pointe-aux-Chenes Unit. Both launches are accessible by State Route 665. There is a primitive public campground on the WMA located across State Route 665 near the WMA headquarters, with two nearby wildlife observation towers. The Pointe-aux-Chenes WMA is a highly popular destination for recreational fishing and waterfowl hunting due to its habitat quality and public accessibility. Other common recreational activities include boating (motorized and non-motorized depending upon restrictions), birdwatching, and photography. The WMA receives roughly 30,000 recreational visitors annually (LDWF 2014).

The proposed project consists of four discrete elements: 1) pirogue pullovers, 2) a pirogue launch, 3) fishing piers at water control structures, and 4) a boat launch renovation (Figure 1). These activities would occur within the Montegut, Point-aux-Chenes, and Grand Bayou Management Units of the WMA, as well as the designated limited access areas (LAAs). The construction schedule for the project would be determined during final project design. Construction of the proposed project elements would vary, but similar project activities would typically take 12 to 18 months to complete. The proposed project elements are primarily intended to enhance recreational access and provide improved recreational facilities for fishing, hunting, and boating. Each of the project elements is discussed in further detail below.

Pirogue Pullovers

Three new pirogue pullover structures would be constructed across the Morganza to the Gulf Hurricane Protection Reach of the J-2 Levee. These pullovers would be located in the Montegut and Point-aux-Chenes Units of the WMA, but also within the designated LAA. These structures would typically consist of an aluminum or other lightweight material framework that could be used to ease the effort of pulling non-motorized boats (pirogues) over the levee. Local fill material would be used on both sides of the levee at both pullover locations. A winch system would be installed on the westernmost pullover to aid boaters in hauling their equipment over the levee, depending on site conditions. Because this levee is still under construction and would need continuous maintenance, these structures would be designed for relatively simple installation and dismantling for levee maintenance events.

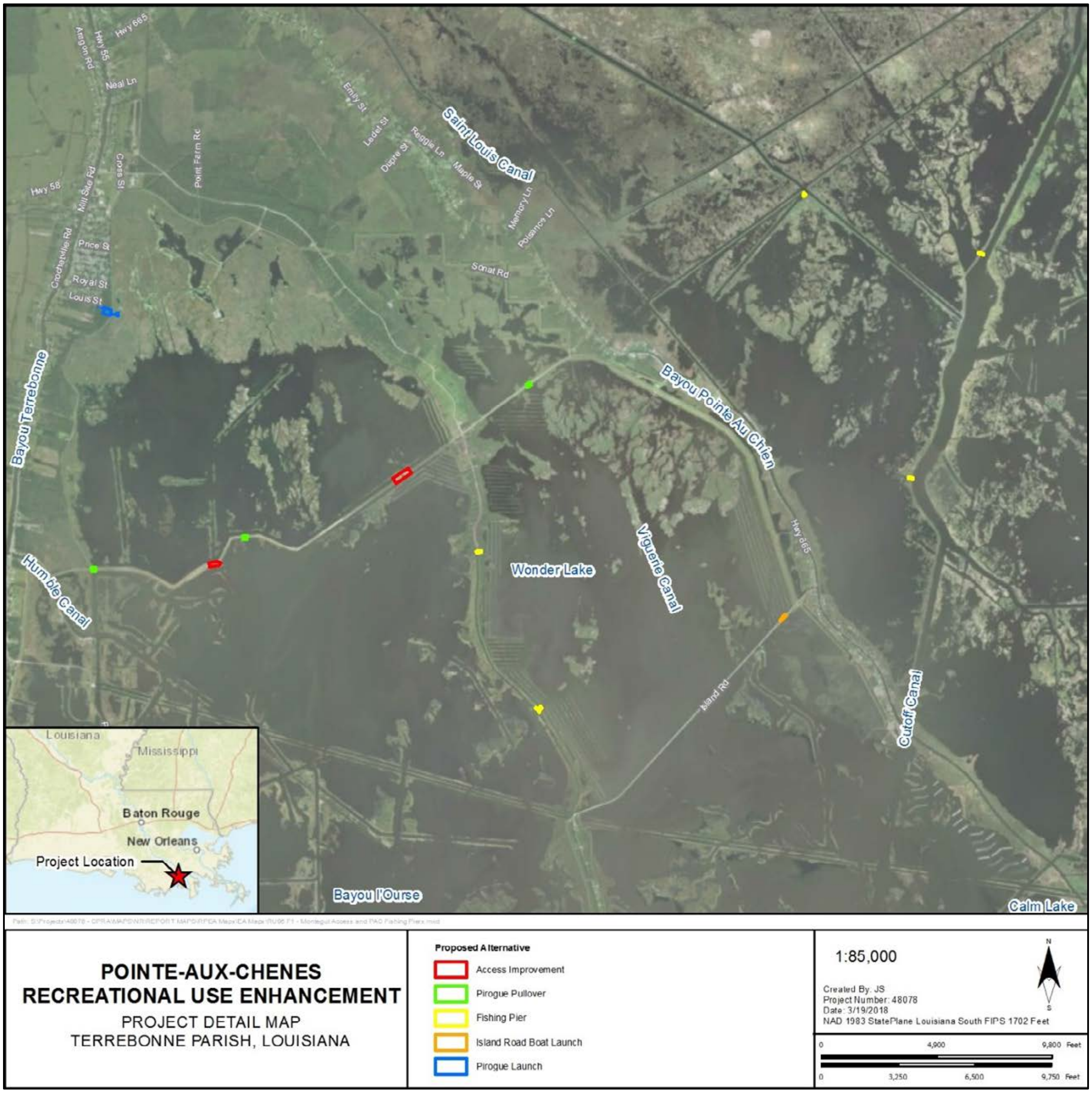

Figure1. The proposed project at the Point-aux-Chenes Wildlife Management Area.

Pirogue Launch

A new pirogue launch site would be constructed in the Montegut Unit of the WMA, but also within the designated LAA near the south end of the town of Montegut. Primary land access to the site would be through Wilderness Street (a public roadway) in Montegut.

The project features would consist of the following:

- A new 20-foot-wide × 270-foot-long graveled access road. This access road would extend eastward from Wilderness Street to a new graveled parking lot. This would require clearing approximately 3,240 square feet of upland area along the new access road.
- A 1.5-acre (200-foot-wide × 320-foot-long) graveled parking lot within the WMA boundary. This area is vegetated and would be cleared prior to construction.
- A bridge over the Montegut canal and levee into the adjacent marsh. The bridge would be a 20-foot-wide × 290-foot-long bridge and pier system over the existing Montegut Canal that would extend up and over the levee to open water east of the levee. At the east end of the bridge, two new piers would be constructed for hunters and anglers to dock their pirogues. These piers would be 6 feet wide, oriented north-south, extend 100 feet to opposite sides of the main bridge/pier, and then continue 44 feet east. The construction of the bridge would be fiberglass grating over wood piling supports.

Fishing Piers at Water Control Structures

New pier-supported docks and articulated concrete block walkways would be constructed at two locations in the LAA of the Montegut Unit. These new features would be collocated with existing water control structures along the J-2 Levee. At both sites, new 96-foot-long × 8-foot-wide docks supported by timber piers would be constructed on each side of the existing water control structure (totaling four pier-supported docks at each site). New 8-foot-wide articulated concrete block walkways would be extended to the new docks from the existing walkways on top of the J-2 Levee. The new concrete block walkways would range from 80 to 120 feet in length.

Public docks would be constructed adjacent to water control structures at five locations in the WMA. The project would construct four new docks at each of the five locations, 20 feet from each water control structure, creating 20 docks built for use by anglers. All of the docks would be 8 feet wide, and range from 50 to 120 feet long. The docks would be constructed using a fiberglass grating as deck material, and elevated on wood pile supports.

Island Road Boat Launch Renovation

Repairs would be conducted at the existing Pointe-aux-Chenes Island Road Boat Launch to improve public user access. Boat launch repairs would include the following:

- New concrete boat launch/ramp
- Repairs or replacement to the bulkhead surrounding the parking lot (approximately 370 linear feet)
- Two new boat docks/piers
- New parking lot lighting
- Dredge out silted-in access canal (approximately 3,000 feet) along the Island Road. Spoils would be beneficially placed in water to construct marsh terraces. Terraces would have 50-foot gaps between them.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for hunters, fishermen, and boaters within the Montegut, Point-aux-Chenes, and Grand Bayou Management Units of the WMA.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, kayaking, fishing, and hunting) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance recreational hunting experiences by increasing access to recreational hunting areas in the Point-aux-Chenes WMA and by enhancing user experience. Therefore, the proposed project has a strong nexus to the public's lost recreational hunting and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the new and improved access structures and recreational features are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the Point-aux-Chenes WMA through new and improved infrastructure (e.g. new pirogue launch site, new pier-supported docks, and renovations to the existing Pointe-aux-Chenes Island Road Boat Launch).
- Enhance public access by improving the availability of recreational opportunities for hunting, fishing, and boating within the Point-aux-Chenes WMA.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of other facilities, such as the parking lot or access road at the new pirogue launch, unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information is available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, the new access ways, piers, and pirogue launch may not engineered sufficiently to withstand these natural disasters; therefore the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, hunting, and boating throughout the WMA. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new access ways and recreational features would attract public use to previously underused areas of the Point-aux-Chenes WMA. However, anticipated user data for the project were not collected (e.g., boaters and/or fishermen in the area were not polled for anticipated use of the features). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment (NRDA) restoration projects. The sections below outline the Point-aux-Chenes WMA Recreation Use Enhancement project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use in the WMA. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building access ways and recreational features (e.g., pirogue launch, fishing piers, etc.) to enhance recreation use in areas of the Point-aux-Chenes WMA, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Because the proposed project includes constructing and updating recreational features throughout the WMA, information collected on visitor use may need to occur at several different locations. For example, monitors could be stationed at the Pointe-aux-Chenes Island Road Boat Launch, as well as the pirogue launch. Establishing cameras at launches to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vessels may be recorded, and the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended an on-site monitor be used to gage the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may need to be located at the boat and pirogue launches. However, LDWF staff may also be stationed at the various fishing piers to determine user numbers. At either location (public boat launch, or piers) the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g., kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure and/or routine maintenance activities. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

For the project, it is recommended that monitoring occur for at least 1 year after project implementation.

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because planning and design of the new features are still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Point-aux-Chenes WMA Recreation Use Enhancement project proposes to use standard engineering specifications and tried-and-tested construction methodology for constructing the various features recreational features. No novel restoration approaches would be used for this small-scale, localized project. For example, planned piers and docks would be constructed on treated timber. Pilings would typically be capped with plastic. Piers and docks would be supported on a parallel series of timber pilings. Timber pilings are typically set in place by a crane or boom, and driven into place with using a pile hammer (vibratory hammers are typically not used on timber piles). The crane or boom and associated equipment would operate from the landward side where possible, or staged on a barge. Pier and dock framing would likely be pressure-treated, marine-grade dimensional wood. Piers and docks are anticipated to be surfaced with fiberglass decking. For additional information regarding the planned construction methodology of the proposed project, see Section 3.3.6 of the RP/EA (LA TIG 2018).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct the new recreational facilities in the WMA. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Point-aux-Chenes WMA Access restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.

- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with new recreational features. Or, it may be possible to compare the number of users at the project site to other comparable WMAs along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.

- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information is available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the new recreational features at the WMA).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

The data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e. kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Various locations throughout the project area. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, LDWF, is responsible for all maintenance activities and costs related to the improved passes, including any repairs needed over the life of the waterways (e.g. continued dredging activities).

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C10

Draft Monitoring and Adaptive Management Plan

WHARF Phase 1

1 INTRODUCTION

The Westwego Airport, located on the south side of Lapalco Boulevard in the City of Westwego, served the oil field industry for decades. While in operation the airport included a full-time fixed-base operator, several hangars, and 5,300 linear feet of wet and 4,200 linear feet of dry airstrips to accommodate both seaplanes and conventional aircraft. The airport provided services and transported personnel to the oil industry's myriad facilities along the coast of Louisiana. The airport was closed in the early 1990s after an abrupt downturn of the oil industry. Closure of the airport has left the property dormant. After closure of the Westwego airport, the site has suffered from vandalism and trash dumping. The City of Westwego purchased the 132-acre land parcel for $2,500,000 and has made committed efforts to mitigate trash dumping and abuse of the site. All buildings were removed from the site prior to the city purchasing the property, including all hangers and mobile homes; however, some concrete foundations from these structures still remain. In addition, oil operations and infrastructure at the south end of Van Ness Drive remains active. Although it is overgrown with vegetation, the public currently uses the area to fish in the enclosed wet runway as well as the adjacent Dugues Canal. Additional recreational activities that are currently provided by the area include bird watching, hiking, and biking.

To convert the old airport site into a public recreational facility, the City of Westwego is proposing the Wetlands Harbor Activities Recreational Facility (WHARF) Phase 1 project (Figure 1). The project would involve construction of a boardwalk along an existing canal for fishing and wildlife observation, construction of fishing piers, installation of lighting poles, and installation of restroom facilities, including construction of an on-site sewage treatment plant or connection to an off-site sewage collection system. Future phases may include developing additional areas for kayak and boat launches, an activity center, a multi-purpose center with meeting facilities, recreational vehicle (RV) camping, and cabins. The project would provide access to numerous water bodies from the Dugues Canal, including Bayou Segnette, Lake Cataouatche, Lake Salvador, Jean Lafitte National Historical Park and Preserve, and nearby game management areas. At the forefront of the City of Westwego's mission for the site is providing an avenue to share the wetlands with all recreational users, especially considering the needs of those who require specialized access due to mobility or other issues.

Just west of the proposed project site, Bayou Segnette offers the opportunity for a thriving tour boat business bringing visitors to the cypress swamps. The proposed project includes the construction of a boardwalk along the existing canals for fishing, fishing piers, restroom facilities, and on-site or off-site sewage treatment plant or sewage connection, as well as installation of lighting poles. The fishing pier would provide access from the project site to the waterside for shoreline fishing. The boardwalk would provide pedestrian access from the upland parking and restroom areas as part of the overall water-oriented recreational enjoyment, which may include bird and wildlife viewing and fishing. These project elements would create new recreational opportunities for the public within the Bayou Segnette watershed and improve access to fishing opportunities and other water-based recreational activities.

Figure 1. The proposed project site at the Wetlands Harbor Activities Recreational Facility.

The project would include the following elements:

- Recreational enhancement construction, including the following actions:
  - Construction of an approximately 1,200-foot-long and 6-foot-wide boardwalk
  - Construction of four approximately 12 × 20–foot fishing piers
  - Installation of approximately 30 20-foot-tall aluminum lighting poles
  - Construction of small on-site sewage treatment plant or sewer connection to adjacent off-site sewer collection system
  - Construction of restroom facilities

The project is expected to take approximately 2 to 3 years from start to finish, subject to approval of permits and environmental review. A conceptual design has already been developed. Preliminary planning and project commencement activities are anticipated to take approximately 3 months. Engineering and design (E&D) are anticipated to take approximately 9 months. Contracting and pre-construction activities, such as permitting, are anticipated to take approximately 6 months. Construction is anticipated to take approximately 18 months.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, non-motorized boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for non-motorized boaters, fishermen, and shoreline users in the Bayou Segnette watershed.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (LA TIG 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to build new infrastructure for recreational users (non-motorized boaters [kayakers], wildlife viewers, etc.) and anglers in the Bayou Segnette watershed by constructing a boardwalk along the existing canals for fishing; construction of fishing piers and restroom facilities; construction of an on-site sewage treatment plant or connection to an off-site sewage collection system; and installation of lighting poles. All features of the proposed project benefit shoreline and fishing recreational users; therefore, the proposed project has a strong nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access).

Visitors accessing the proposed project are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development of recreational facilities in the Bayou Segnette watershed.
- Enhance public access by improving the availability of recreational opportunities in the Bayou Segnette watershed.

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of the boardwalk or restroom facilities unless erosion control measures are implemented. The sewage treatment plant or sewer connection has the potential to impact water quality, and monitoring would help to ensure that facilities are constructed as designed. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the proposed project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need
- Time and resources (e.g., income, transportation) available to participate in recreational activities

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. Likewise, if the public's interest in outdoor recreational activities wanes, visitor use at the project site would decrease. Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities within the Bayou Segnette watershed. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new recreational facilities would attract increased public use to the proposed project. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the new piers, boat launch, multi-purpose center, etc.). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are

achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment (NRDA) restoration projects. The sections below outline the WHARF Phase 1 proposed project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use within the Bayou Segnette watershed. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is meeting this objective.

The first parameter fits within the "core performance" monitoring type because it will be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building enhanced infrastructure in order to increase recreation use of the proposed project, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Recreational Use restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitors on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, recreational vessels (such as kayaks), and users at the project site. Establishing cameras at the project entrance to record access information may also be used to determine if visitor use and access have increased at the project sites. The information generated from remote sensing would not be as accurate as an on-site monitoring because the total users and recreational activities being undertaken may need to be estimated. For this project it is recommended that an on-site monitor be used to gage the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may be at the new piers, boardwalk, or even at the entrance to the proposed project. At any location, the on-site monitor can count the number of vehicles, recreational vessels (e.g., kayaks), and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as boating, fishing, wildlife viewing, picnicking, etc.).

Data collection should be conducted post-implementation of the facilities during various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing cleaning stations at the fishing piers) and/or routine maintenance activities (e.g., re-paving and maintaining the roadway if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Various locations throughout the project site	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because planning and design is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The WHARF Phase 1 project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the proposed recreational facilities. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe (2 to 3 years).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct the new recreational facilities. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The WHARF Phase 1 restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the new infrastructure. Or, it may be possible to compare the number of users at the project site to other comparable recreational use areas along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users, over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the new recreational site).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, recreational vessels (e.g., kayaks), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Various locations throughout the project site. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completed accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the City of Westwego can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the City of Westwego to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing entity, the City of Westwego is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the City of Westwego, is responsible for all maintenance activities and costs related to the new boardwalk, fishing piers, restroom facilities, the on-site sewage treatment plant or connection to an off-site sewage collection system, and lighting poles, including any repairs needed to the new facilities over their lifetime.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C11

Draft Monitoring and Adaptive Management Plan

Bayou Segnette State Park Improvements

1 INTRODUCTION

The State of Louisiana established the 676-acre Bayou Segnette State Park in 1987. Recreational opportunities within the park include campsites, cabins, comfort stations with showers and laundry, recreational vehicle dump stations, a group camp with kitchen and dormitories, a meeting room, a wave pool, a swimming pool, nature trails, bird watching, fishing, and a boat launch with access to the marshlands and waterways of the bayou.

The entire park has been significantly affected by soil subsidence (land sinking) that has resulted in safety issues in many areas, threatening the recreational use of the park. The boating areas of the park include two areas divided by a flood protection levee: one area that includes parking, access roads, and a restroom is located on the protected side of the levee; the other area that includes the boat launches, docks, floating pier, and access drive is located on the unprotected side of the levee. Soil subsidence has reduced the drainage of the parking area which now floods during high tide and has caused and continues to cause the boat launch area to sink further. These issues need to be addressed to keep the boating area functional. In addition, soil subsidence has caused road elevation problems at bridges throughout the park because the pile-supported bridges subside at a different rate than the surrounding roads. This poses a threat to the safety and accessibility of the park.

Over the life of the park, most of the park has not been Americans with Disabilities Act (ADA) compliant; however, recent infrastructure upgrades for ADA compliance have aided in improving the recreational experience for those users that require specialized access infrastructure. Currently, the playground areas are not ADA compliant, which limits use of this area for certain users.

The Louisiana Office of State Parks is proposing the Bayou Segnette State Park Improvements project to repair the existing boating area and re-pave most roads and parking lots throughout the park to address damage caused by repeated flooding and soil subsidence issues within the Bayou Segnette State Park and to improve recreational access and safety in these areas, as well as upgrading the existing playground to improve ADA access. The proposed project would achieve these goals by 1) re-paving approximately 4.52 miles (649,032 square feet) of roads and 445,471 square feet of parking lots to raise the surface elevation by 2 to 6 inches; and 2) replacing the existing non-ADA-compliant playground with ADA-compliant surfacing, play structures, and access. The new playground area would be targeted to 5- to 12-year olds and would have 18 to 22 play features with divided ground and above-ground levels. Each of these elements would help achieve the proposed project’s goals and would likely increase park visitation and enjoyment of multiple recreational activities.

Repairing the existing roads and parking lots within the Bayou Segnette State Park, including the boating area, would include the following:

- Approximately 0.435 mile of existing two-way circulation road, with 12-foot-wide lanes, and 107,682 square feet of parking in the boating area
- Approximately 0.17 mile of existing two-way launch area road, with 12-foot-wide lanes, and 43,976 square feet of overflow parking in the boating area
- Approximately 1.4 miles of existing four-lane divided main entry boulevard
- Approximately 2.51 miles of existing roads throughout the park, consisting of the Day Use Loop road, group camp access road, and main cabin and campground access road
- Approximately 293,813 square feet of existing parking areas (wave pool parking lot, southern campground road and paved camping areas)

Figure 1. Location of the proposed Bayou Segnette State Park Improvements project.

Upgrading the existing playground area within the Bayou Segnette State Park would include the following:

- Removal of existing playground structures, fall surfacing, and barriers within the playground area
- Construction of new concrete slab foundation with ADA-compliant fall surfacing in the existing playground area
- Construction of new playground equipment

The proposed project would take approximately 18 to 44 months from start to finish, depending on whether the project's elements would be constructed in unison or sequenced, subject to approval of permits and environmental review. A conceptual design has already been developed, and preliminary planning, commencement activities, and engineering and design are anticipated to take from 4 to 6 months for each element. Construction, including contracting and pre-construction activities, is anticipated to take from 6 to 12 months for each project element.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for boaters and fishermen in the Bayou Segnette State Park.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance recreational fishing experiences through the improvements of infrastructure supporting the use of the state park's existing boat launch, such as road and parking improvements and improvements to the nearby playground, which would likely increase visitation and enhance the quality of future recreational visits to the area. Although the proposed project is located inland from the Gulf Coast, the boat launch on Bayou Segnette has access to the Gulf of Mexico through major recreational water bodies, such as Lake Cataouatche and Lake Salvador, and would provide fishing and water-based recreational opportunities in those water bodies. Therefore, the project has a nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the state park are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the Bayou Segnette State Park through infrastructure enhancement of supporting structures (roadways and parking lots) and recreational facilities.
- Enhance public access by increasing visitor use of protected or enhanced lands (the state park), by enhancing the recreational opportunities within the Bayou Segnette State Park.

The objectives of this project must be refined upon completion of the engineering and design (E&D) phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be impacted during removal of existing facilities and construction of new and/or improved facilities unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information is available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Human attachment to or interest in recreational activities
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need
- Time and resources (e.g., income, transportation) available to participate in recreational activities

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. Likewise, if the public's interest in outdoor recreational activities wanes, visitor use would decrease. Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities at the state park. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential negative impacts on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to state park facilities would attract increased public use to the Bayou Segnette State Park. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the new facilities). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential project impacts on the City of Westwego, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH restoration projects. The sections below outline the Bayou Segnette State Park Improvements project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "enhance public access to natural resources for recreational use restoration approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use of the boat launch and playground facilities at the state park. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project

objectives include enhancing infrastructure in order to increase recreation use of the Bayou Segnette State Park, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vessels, boats, and/or other recreational vehicles, and users (picnickers, fisherman, boaters, etc.) at the project site. Establishing cameras at the entrance(s) to the new facilities to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may be located at the entrance(s) to the state park, or at the boat launch and playground areas. By establishing the monitoring location at the newly enhanced facilities or at the park entrance(s), the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g., kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as boating, fishing, picnicking etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., adding playground equipment) and/or routine maintenance activities (e.g., re-paving the roadways or parking lot if ruts/potholes occur).Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Entrance(s) to the state park, or at the boat launch and playground areas	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The exact construction schedule for this project has not yet been determined because engineering and design of the enhanced features is still underway. However, it is estimated that preliminary planning, commencement activities, and E&D would to take from 4 to 6 months for each feature, and that construction, including contracting and pre-construction activities, is anticipated to take from 6 to 12 months for each feature. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

The project team must work in close collaboration with the LA TIG upon completion of E&D to revise this MAM plan to ensure that the monitoring methodology for this parameter is sufficient to allow for evaluation of project success. Additional considerations that may need to be incorporated under this monitoring parameter include, but are not limited to, monitoring subsidence of infrastructure (e.g., roads, parking lot) after construction is complete, or annual surveys of infrastructure.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Bayou Segnette State Park Improvements project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the playground and road/parking improvements. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe (10 to 18 months for each feature). For example, construction of the new playground would include the removal of existing play structures, fall surfacing with a containment barrier, and construction of a new foundation (likely concrete slab) with ADA-compliant fall surfacing (such as No-Fault), new playground structures, and connection to the existing accessible walkway. Some terrestrial piling work may be conducted at the playground area associated with these improvements. For additional information on the construction methodologies for this proposed project, please see Section 3.3.8 of the RP/EA (LA TIG 2018).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to enhance the roadways/parking lots and playground. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Bayou Segnette State Park restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the new state park infrastructure. Or, it may be possible to compare the number of users at the project site to other comparable state parks in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform on how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved features at the state park).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e. kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Either at the entrance(s) of the state park or at the boat launch and playground. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Louisiana Office of State Parks can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the Louisiana Office of State Parks to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standards.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Louisiana Office of State Parks is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the Louisiana Office of State Parks, is responsible for all maintenance activities and costs related to the new and improved facilities and features proposed at the Bayou Segnette State Park, including any repairs needed over the life of the facilities.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C12

Draft Monitoring and Adaptive Management Plan
Atchafalaya Delta Wildlife Management Area Access

1 INTRODUCTION

The Atchafalaya Delta Wildlife Management Area (WMA) is a 137,695-acre area located at the mouths of the Atchafalaya River and the Wax Lake Outlet in St. Mary Parish (Figure 1). The WMA is owned and managed by State of Louisiana. The WMA is located approximately 25 miles south of Calumet, Louisiana, and is accessible only by boat. Most of the area consists of open water in Atchafalaya Bay. The Atchafalaya Delta WMA is highly used for recreational hunting and fishing and hosts approximately 25,000 visitors annually (Louisiana Department of Wildlife and Fisheries [LDWF] 2016).

Figure 1. Location of the proposed Atchafalaya Delta WMA Access project.

The Atchafalaya Delta WMA Access project, submitted by LDWF, would involve dredging two project-specific areas in order to enhance recreational access for hunters, anglers, and wildlife viewers. The project would enhance the ability of boaters and hunters to access the Breaux Pass, Cul-de-sac Pass, and many interior waterways and wetlands of the Atchafalaya Delta WMA. Within the Atchafalaya Bay, two deltas (the Main Delta and the Wax Lake Delta) have formed from the accretion of sediments from the Atchafalaya River and from the deposition of dredged material by the U.S. Army Corps of Engineers (USACE). The project would be located on the Main Delta of the Atchafalaya River and would restore hydrology to two shoaled passes.

The LDWF is proposing to dredge Breaux Pass and Cul-de-sac Pass in order to enhance access for hunters, anglers, and wildlife viewers to the interior marsh. A floating bucket dredge would be used to excavate each pass:

- Dredging in Breaux Pass would include excavation of approximately 25,000 cubic yards of material (2,000 feet long, 80 feet wide, and 10 feet deep). Dredge spoils from Breaux Pass would be placed along the south bank of the pass (see Figure 1). The dredging and dredge spoil footprints for Breaux Pass would not exceed approximately 15 acres of open/in-water areas.
- Dredging in Cul-de-sac Pass would include excavation of approximately 31,000 cubic yards of material (4,000 feet long, 50 feet wide, and 10 feet deep). Dredge spoils from Cul-de-sac Pass would be placed in alternate deposits along both banks of the pass (see Figure 1). The dredging and dredge spoil footprints for Cul-de-sac Pass would not exceed approximately 8 acres of open/in-water areas.

Dredging at Breaux and Cul-de-sac Passes would result in deeper and wider passes than currently exist, allowing boats deeper draft space, which also would accommodate a greater diversity of boat types and sizes.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Oil Spill Trustees (DWH Trustees) in the Deepwater Horizon *Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to “provide and enhance recreational opportunities” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type “provide and enhance recreational opportunities.” The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for hunters and fishermen in the Atchafalaya Delta WMA.

If during project planning the LDWF proposes to use dredged material to nourish or enhance wetland habitat, this monitoring and adaptive management (MAM) plan must be revised in close collaboration with the Louisiana Trustee Implementation Group (LA TIG) to incorporate goals, objectives, and the associated monitoring parameters and methods specific to the "create, restore, and enhance coastal wetlands" restoration type.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (LA TIG 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, kayaking, fishing, and hunting) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance recreational hunting and fishing experiences by increasing access to recreational areas in the Atchafalaya Delta WMA and by enhancing user experiences after that access. Therefore, the proposed project has a strong nexus to the public's lost recreational hunting, fishing, and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the WMA are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the interior waterways and marshes of the Atchafalaya Delta WMA through navigational channel improvements and dredging two new passes, the Breaux Pass and Cul-de-sac Pass.
- Enhance public access by improving the availability of recreational opportunities by opening up previously inaccessible marshland for hunting and fishing.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance

Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a wetlands, coastal, and nearshore habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Two aspects of the ecological system that may be affected include water quality and habitat. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Disturbance of aquatic habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, the new access passes may not be engineered sufficiently to withstand these natural disasters; therefore the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing and hunting in the interior marsh. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new access ways to the interior marsh would attract public use to previously underused areas of the Atchafalaya Delta WMA. However, anticipated user data for the project were not collected (e.g., boaters and/or fishers in the area were not polled for anticipated use of the new passes). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project’s goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project’s ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment (NRDA) restoration projects. The sections below outline the Atchafalaya Delta WMA Access project’s monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the “enhance public access to natural resources for recreational use restoration approach” (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use in the interior marsh of the WMA. The project will collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the “public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building access ways to increase recreation use in areas of the Atchafalaya Delta WMA that are currently underused, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing cameras at the dredged passes to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vessels may be recorded, and the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005), Leggett (2015, 2017), and Horsch et al. (2017).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may need to be located at nearby public boat launches that are known to support users of the Atchafalaya Delta WMA. However, LDWF staff may also be stationed at the Breaux and Cul-de-sac Passes to determine user numbers. At either location (public boat launch, or out at the project site) the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g., kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of use the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (i.e., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing signage within the WMA for the new access routes) and/or routine maintenance activities (e.g., routine dredging or dredging of the access ways after storm events). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Nearby public boat launches	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because design of the enhanced waterways is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Atchafalaya Delta WMA Access project proposes to use standard engineering specifications and tried-and-tested construction methodology for dredging channels throughout the Gulf Coast, which typically includes a floating bucket dredge. Staging would take place on a floating barge, due to the exclusive in-water work that is expected. Dredge locations for this project are not near dry land, so dredges are anticipated to be barge-mounted units. Dredge spoils would typically be deposited in water in areas adjacent to the dredging location, or slightly further away, e.g., along a shoreline if boat navigation could be impacted. No novel restoration approaches would be used for this small-scale, localized project. Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct and enhance the new waterways. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Visitation rates are improved following implementation of the restoration elements and services.
- The Atchafalaya Delta WMA Access restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the constructed waterways. Or it may be possible to compare the number of users at the project site to other comparable WMAs along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation will be refined at a later date when additional project information is available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved access ways).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring will be determined prior to implementation of this MAM plan. This information will be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [i.e., kayaks]), and users	Direct observation	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Camera surveys located at Breaux Pass and Cul-de-sac Pass. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team n.d.).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standards.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the LDWF, is responsible for all maintenance activities and costs related to the improved passes, including any repairs needed over the life of the waterways (e.g., continued dredging activities).

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C13

Draft Monitoring and Adaptive Management Plan

Atchafalaya Delta Wildlife Management Area Campgrounds

1 INTRODUCTION

The Atchafalaya Delta Wildlife Management Area (WMA) is a 137,695-acre area located at the mouths of the Atchafalaya River and the Wax Lake Outlet in St. Mary Parish (Figure 1). The WMA is owned and managed by the State of Louisiana. The WMA is located approximately 25 miles south of Calumet, Louisiana, and is accessible only by boat. Most of the WMA consists of open water in Atchafalaya Bay. The Atchafalaya Delta WMA is highly used for recreational hunting and fishing and hosts approximately 25,000 visitors annually (Louisiana Department of Wildlife and Fisheries [LDWF] 2016).

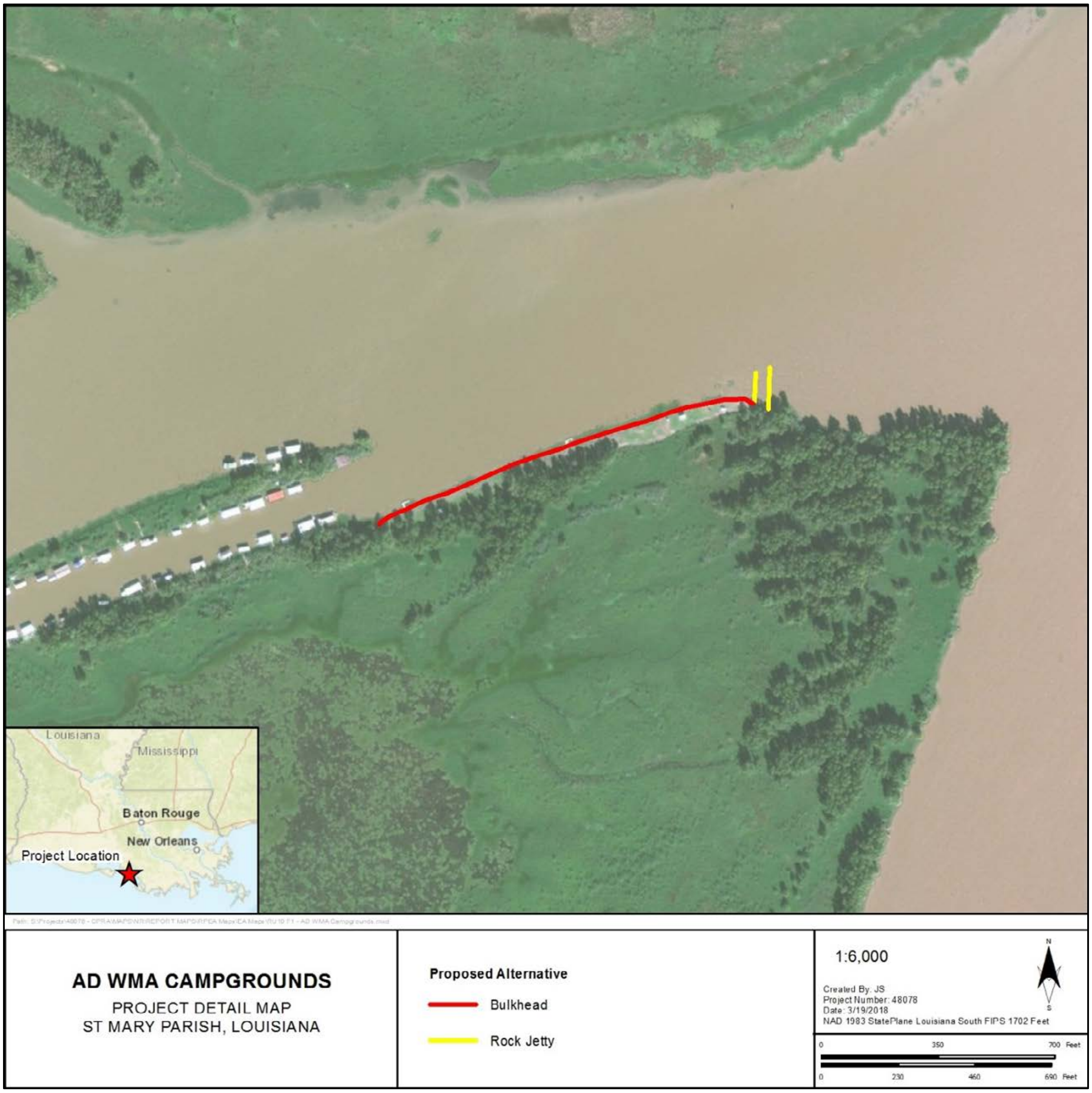

Figure 1. Location of the proposed Atchafalaya Delta WMA Campgrounds project.

The proposed Atchafalaya Delta Campgrounds project would enhance recreational usage by creating more attractive and user-friendly recreational facilities. In addition, the project would also preserve a public-use facility that is eroding at a rapid rate. The location of the campground is on “Campground Pass,” which captures significant flow from the Wax Lake Outlet. This flow is currently eroding the campground at a rate of 3 feet per year, which could erode the entire campground into the adjacent pass in 13 years. Without continued maintenance or structural improvements, all visitor use of the campground would be eliminated. In the past, LDWF has dredged soil from “Campground Pass” to stabilize the campground; however, this is a very costly and reactionary response that has not been well received by the public due to visual impacts and issues associated with diminished site accessibility.

LDWF is proposing the Atchafalaya Delta Campgrounds project, which entails improving the existing Wax Lake Outlet campground to provide enhanced recreational setting and opportunities for hunters, anglers, wildlife viewers, and campers. The project would enhance the recreation setting and opportunity for boaters and hunters to camp by offering a safe, protected campsite that is accessible by boaters. LDWF proposes to install a bulkhead along the campground approximately 30 feet from the existing shoreline on the east side of the campground. Local sediment would be placed behind the bulkhead on the eastern end to restore some of the lost acreage of the campground. Additionally, construction of jetties would keep the bank and bulkhead stabilized (see Figure 1). Currently, the approximately 1,200-foot-long shoreline at the campground has eroded away, making docking and mooring difficult and dangerous. After the bulkhead is complete, two additional 40-foot docks would be installed adjacent to portions of the bulkhead. The project would be located on the Wax Lake Delta of the Atchafalaya River within the Atchafalaya Bay.

LDWF is proposing to install two jetties and a bulkhead at the campground (see Figure 1). The two jetties would be located at the far eastern end of the campground where water flow is the strongest (southerly flow from Wax Lake toward the Gulf of Mexico). The jetties would function as a breakwater and the material used for the jetties defends the riverbank and the bulkhead by training the active channel away from the campground. One jetty (west) would be 85 feet in length and the other jetty (east) would be 120 feet long. The jetties would be parallel and approximately 50 feet apart from each other. Materials used for the jetties would be determined during final design by the engineer, but would likely either be rock, soils, and gravel or timbers and vinyl, from approved sources.

The bulkhead would be installed to follow the contour of the shoreline following the entire length of the campground (approximately be 1,200 linear feet). The eastern end of the bulkhead would be installed approximately 30 feet from the shoreline; backfilling with local sediment would be needed behind the new bulkhead to restore the footprint of the campground. The bulkhead is designed so that boats may dock or moor to the bulkhead or to two new 40-foot docks, offering direct and safe access to the campground. The jetties and bulkhead would provide stronger, safer streambanks at the campground that would be less susceptible to existing and future erosion.

In-water work and upland work are expected because the construction for the jetties and bulkhead would take place both within the water and along the immediate shoreline. The construction start date and duration would be determined by LDWF during final design, but would not take place between November and January.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing, hunting, boating, and wildlife viewing experiences by both increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for hunters and anglers in the Atchafalaya Delta WMA.

If during project planning LDWF proposes to use dredged material to create or enhance wetland habitat, this MAM plan must be revised in close collaboration with the Louisiana Trustee Implementation Group (LA TIG) to incorporate goals, objectives, and the associated monitoring parameters and methods specific to the "create, restore, and enhance coastal wetlands" restoration type.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (LA TIG 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities (such as swimming, sunbathing, surfing, walking, hunting, and camping) conducted by individuals at locations near beaches and other shoreline areas.

The proposed project is designed to enhance camping and docking facilities for recreational hunters and anglers in the in the Atchafalaya Delta WMA by enhancing the conditions of the existing campground. Because the campground serves both shoreline and boating recreational users, the proposed project has a strong nexus to the public's lost recreational hunting, fishing, and access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors using the campground are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the Atchafalaya Delta WMA through infrastructure development of two jetties and bulkhead at the campground.
- Enhance public access by increasing visitor use of protected or enhanced lands (the WMA), by ensuring the campground is safe for users and protected against erosion.
- Enhance public access by improving the availability of recreational opportunities/protected lands, by improving the safety and stability of the campground.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during upland construction activities unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, or if there is an increase in the rate of sea level rise, the new jetties and bulkhead may not provide sufficient erosion control. Unknowns in weather patterns could result in the project not being engineered sufficiently to withstand these natural forces; therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities, such as fishing and camping in the Atchafalaya Delta WMA. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to the campground would attract increased public use to the Atchafalaya Delta WMA and the campground itself. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of campground improvements). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the Atchafalaya Delta WMA Campgrounds project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goal and project-specific objective for this project are related to preserving, increasing, and enhancing recreational use of the campground and of the Atchafalaya Delta WMA. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the

Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building infrastructure for a sustainable and safe campground in order to increase recreation use in areas of the Atchafalaya Delta WMA that are currently underused, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vessels, boats, and/or other recreational vehicles, and users at the project site. Because the project site is located in a remote area, information collected on visitor use may need to occur at the public boat launches in the nearby towns of Berwick, Idlewild, or Patterson. Establishing cameras at the campground to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), U.S. Fish and Wildlife Service (2005).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may need to be located at nearby public boat launches that are known to support users of the Atchafalaya Delta WMA. However, LDWF staff may also be stationed at the campground to determine user numbers. At either location (public boat launch, or out at the project site) the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g. kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing picnic tables or fire rings) and/or routine maintenance activities (e.g., dredging around and maintaining the bulkhead). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Nearby public boat launch(es)	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because design of the enhanced waterways is still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Atchafalaya Delta WMA Campgrounds project proposes to use standard engineering specifications and tried-and-tested construction methodology for building jetties and bulkheads. In-water work and upland work are expected during construction, as both the jetties and bulkhead would be installed both within the water and along the immediate shoreline. A floating bucket dredge would be used to excavate, place, and compact material. Minor upland activity may include hand digging and loading. Typical construction equipment used for this type of project includes a crane, boom, set of leads, pile hammer, helmet, pile gate, and pile monkey. Some associated equipment can be staged either onshore at the campground, or on a barge in the waterway.

Some backfilling with local sediment would be needed behind the new bulkhead. Backfill would use local materials (e.g., sedimentation build-up) and would not create new materials pits or holes. The bulkhead would be installed with a crane and impact hammer pile, but would also require hand crews on the upland (i.e., the campground) portions of the proposed project.

No novel restoration approaches would be used for this small-scale, localized project. Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct and enhance the new waterways. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are qualitative and based on the project's goals and objectives:

- Improved visitation rates are taking place following implementation of the restoration elements and services.
- The Atchafalaya Delta WMA Campgrounds project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- <u>Data summarization and characterization</u>: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- <u>Status determination</u>: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with accessing the campground. Or, it may be possible to compare the number of users at the project site to other comparable campgrounds along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- <u>Trends evaluation</u>: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved campground).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

A description of the data to be collected as part of this MAM plan is described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [e.g., kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the campground. 72 observation sessions, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.

2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.

3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).

4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, LDWF, is responsible for all maintenance activities and costs related to the improved campground, including any repairs needed over the life of the jetties and the bulkhead.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C14

Draft Monitoring and Adaptive Management Plan

Rockefeller Piers and Rockefeller Signage

1 INTRODUCTION

The Rockefeller Wildlife Refuge (RWR or Refuge) is within the southeastern portion of the Chenier Plain Region of southwestern Louisiana in Cameron and Vermilion Parishes, and originally encompassed approximately 86,000 acres. The RWR borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge 6 miles from the Gulf. The Refuge is one of the most biologically diverse wildlife areas in the nation and is managed and operated by the Louisiana Department of Wildlife and Fisheries (LDWF).

The RWR has more than 200,000 public visitors annually. The RWR offers areas that are designated for public recreation use seasonally and year-around. Abundant fisheries, crab, and shrimp populations provides diverse recreational opportunities to anglers. Although the area is a refuge, visitors can fish from two roadside areas, as well as miles of canals from a boat. In addition to fishing, birdwatching is also popular. Hunting, commercial activities, and some non-consumptive uses (camping, riding, swimming) are not allowed within the RWR because of the Refuge's game preserve status and safety.

Public vehicle access to the RWR is via Louisiana Highway 82. Once on the RWR, the public can use approximately 6 miles of interior roads, the most popular access being Price Lake Road, located along the western boundary of RWR. To access most of the Refuge, there are three boat ramps that are open to public use. Two of these ramps are state owned, maintained by LDWF, and free to the public. These ramps, located by Joseph Harbor Canal just off Louisiana Highway 82 in Cameron Parish, are very heavily used (LDWF 2014).

LDWF is proposing the Rockefeller Piers and Rockefeller Signage project, which would include recreation enhancements within the Refuge, including new fishing piers and signage. The proposed project includes construction of up to 560 feet of new piers at three locations within the Refuge (Figure 1). The construction of new observation and fishing piers in Unit 4 within the Refuge would be for the continued benefit for public use and recreation. Past pier enhancements for recreational fishing and observation within the RWR have been successful and well received by the public. Because engineering and design (E&D) are ongoing, location and details on the piers are limited. New piers would be of similar design to piers recently developed in the RWR.

Development of signage at the entrance of the Price Lake Road, East End Locks Road, Joseph Harbor Boat Launch, and along other roads and canals in the RWR would inform the public of management considerations and use (see Figure 1). Proposed signage would provide location information, as well as education to the public on how the RWR works with other partners and parishes in order to reach common goals based around coastal conservation. Because coastal erosion is a particular concern within the RWR, proposed educational signage would also explain the steps being taken to protect the shoreline and create marsh in areas that need to be rehabilitated on the Refuge. Signage would also provide information on how the public can help in the effort to preserve lands within the Refuge. Likewise, because the RWR's system of canals plays such an important role in helping landowners to the north drain water after heavy rains or floods (drainage is an important characteristic of the Mermentau Basin), signage would provide another chance to educate the public on the importance of the Refuge to many homes and businesses in areas of north Cameron and Vermillion Parishes.

Figure 1. Location of the proposed Rockefeller Piers and Rockefeller Signage project.

Currently, there are few signs on the Refuge marking the names of roadways, canals, or water-control structures. The RWR proposed installation of ultraviolet-resistant and sealed directional signs and location markers within these area, each branded to coordinate with the LDWF guidelines for refuges and wildlife management areas. Areas proposed for signage include the following:

- The Price Lake Road currently brings visitors along a stretch of pristine marsh and provides visitors with the unique opportunity of fishing for shrimp and crabs without the need for a boat. Signage at the entrance of the Price Lake Road requires informational signs about activities allowed on the road, a history of the Refuge, and a map of where facilities are located (e.g., bird observatory, fishing piers, turnarounds, etc.). The placement of three large-panel informational signs, measuring 4 × 8 feet would be placed on an existing wooden frame that currently holds a number of highways signs.

- The East End Locks Road is on the on the eastern side of the Joseph's Harbor Canal and provides visitor access to new parking and fishing from recently replaced bulkheads. The road entrance at this site would have three panel signs on an existing wooden frame that is similar to the size, content, and branding of the signs on the Price Lake Road. Information at this location would pertain to management and information for this area.
- The Joseph Harbor Boat Launch is a free boat launch on the west side of the Joseph's Harbor Canal, with two launch spots lined with concrete bulkheads and large parking lot for trucks and trailers. The entrances at this site would have three panel signs on an existing wooden frame that is similar to the size, content, and branding of the signs on the Price Lake Road and East End Locks Road. Information at this location would pertain to management and information for this area.
- Various signs would be installed on other roadside access points from Louisiana Highway 82 delineating areas that are not publicly accessible or roads that are not public use. Currently, these roads do not have signage. Small signs on either new wooden posts or u-channel galvanized posts would be installed within road rights-of-way.
- Various signs would be installed along 60 miles of canals within the RWR to aid boaters as to where they are located on the Refuge. Currently, there are no signs along any of the major canals (i.e., Joseph Harbor Canal, Superior Canal) or the intersection of various canals. Small signs on either new wooden posts or u-channel galvanized posts would be installed along canals.

Collectively referred to as the proposed project, the development of the piers and signage would provide the RWR additional opportunity to benefit management and public use of the Refuge's resources. The proposed improvements are expected to take approximately 12 to 24 months from start to finish, subject to approval of permits and environmental review. Preliminary planning and E&D is anticipated to be completed in the first 6 months of the project.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within both restoration type goals because it is designed to enhance recreational fishing, boating, and wildlife viewing experiences by development of new piers, and because it proposes to install new educational signage throughout the RWR. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure and creating natural resource-related education facilities (signage) as restoration techniques to increase the recreational opportunities for shoreline and boating visitors, as well as introducing educational signage across the RWR.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities conducted by individuals at locations near beaches and other shoreline areas. These activities include swimming, sunbathing, surfing, walking, kayaking, fishing, and hunting that take place from the shoreline or from shoreline structures such as piers and docks. Boating refers to a variety of recreational boating activities that begin at sites providing access to salt water near the Gulf Coast.

The proposed project is designed to enhance recreational fishing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. For this reason, the proposed project's goal of creating and enhancing visitor access to recreational use (fishing) has the added benefit of providing both boat-based and shoreline-based recreational activities and fishing. Therefore, the proposed project has a strong nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the proposed project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the piers and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the Rockefeller Piers and Rockefeller Signage project. Therefore, the project represents in-place, in-kind restoration.

The overall objectives of this project are to provide and enhance public access to natural resources through recreational use, and to use education to promote engagement in stewardship of natural resources. Specific objectives include the following:

- Enhance public access to shoreline recreational activities (such as fishing and bird watching) through infrastructure development of approximately 560 feet of new piers at three locations within the RWR.
- Increase access and visitor's use of environmental education resources through installation of interpretive and informative signage in the RWR.
- Improve the availability of educational resources provided by installing new educational signage throughout the RWR.

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Two aspects of the ecological system that may be affected include water quality and habitat. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Disturbed areas, such as those that may be cleared during construction, could create an opportunity for invasive plant species to establish and spread, unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Lack of understanding of the natural science, resources, and environment of the Gulf coastal region
- Human attachment to or interest in the environment
- Public opinion of environmental issues
- Public interest or need in educational and recreational facilities and opportunities

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of this project. For example, if the public opinion of environmental issues changes over time, (e.g., the opinion that coastal erosion is exacerbated by the change and frequency of hurricanes and other weather events), then the informative signage throughout the RWR may be viewed as outdated and no longer useful. Therefore, the project would no longer achieve the restoration goal of education and outreach to promote engagement in the stewardship of natural resources. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for this project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public interest and use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)
- Optimum location of outreach materials or opportunities to maximize public access or participation

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the locations of the educational signage would attract the most use by visitors in the RWR. However, anticipated user data for the project were not collected (e.g., traffic counts and visitor use data at the specific signage locations were not collected). Therefore, the ability of the proposed project to educate the public on natural resource stewardship in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area, with installation of the new piers, is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the Rockefeller Piers and Rockefeller Signage project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustee's identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

Two core performance monitoring parameters have been identified for the project:

- Visitor use and access
- Nature and extent of educational materials produced and distributed

In addition, several project-specific objectives have been identified for the proposed project. The monitoring parameters associated with the project-specific objectives outlined in Table 1 would be collected in addition to the core performance parameters listed above.

Table 1. Project-Specific Objectives and Performance Monitoring Parameters for the Rockefeller Piers and Rockefeller Signage Project

Project-Specific Objective	Objective-specific Performance Monitoring Parameters
Enhance recreational access through building three new piers in the RWR.	Infrastructure constructed and completed as designed
Increase visitor use of recreational activities (e.g., fishing and wildlife viewing) at the RWR by installing new piers.	The nature and extent of recreational activities used by the public (i.e., visitor use and access)
Improve the availability of recreational and educational facilities in the RWR	The nature and extent of recreational activities used by the public (i.e., visitor use and access)
Enhance natural resource education through installation of signage throughout the RWR	Infrastructure constructed and completed as designed
Increase the public's interest and understanding of the natural resources in the RWR through interpretive and educational signage	Nature and extent of educational materials produced and distributed

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for this project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access have increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site include use of remote sensing tools such as pressure pads at the entrances to the new piers. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place; therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For this project, the priority area for counts would be at the piers themselves as well as at the educational signage locations throughout the RWR. By establishing the monitoring location at educational materials and new recreational access facilities, the on-site monitor could count the number of vehicles, boats, and recreational users that access and use the project site. In addition, the monitor could record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing fish cleaning stations at the pier) and/or routine maintenance activities. Table 2 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 2. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	At the new pier and signage locations	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

For the project, it is recommended that monitoring occur for at least 1 year after project implementation.

2.2.2 Parameter 2: Nature and Distribution of Educational Materials

The recommended methodology for monitoring this parameter is similar to those outlined in Parameter 1. In order to gauge if the nature and distribution of educational materials (in this case interpretive signage) are achieving the goal of education to promote engagement in the stewardship of natural resources, an on-site monitor should be present after project implementation is complete. The on-site monitor would survey RWR visitors in order to determine if the information on the educational signage is appropriate for the users, and if the signs are located in places throughout the Refuge that are reaching the maximum users. In addition, the on-site monitor should determine if the signs are constructed appropriately, to the specifications outlined in the engineered drawings.

User surveys should be administered at the project site and include questions that are geared toward user satisfaction of the nature and distribution of the educational materials. Because the methodology of the first parameter includes an on-site monitor, it is recommended that the same on-site monitor be used to gauge visitor satisfaction at the proposed project. On-site surveys would be conducted at the same locations as the user counts (i.e., the new piers and educational signage locations).

The selection of survey respondents should be random and can be chosen using a systematic random sampling procedure. Randomization is intended to weed out bias and ensure that the respondents have an equal probability of being asked to participate. In addition, by using a random sampling method, the choice of target respondents would be determined by the sampling system, and not by the surveyors.

The survey should be conducted post-implementation of the facilities and throughout various times of the year. To accurately determine if recreational users are satisfied with the new facilities at the project site, the surveys should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed survey results may occur (e.g., more people recreating on holidays versus a normal weekday). The surveys should be conducted on-site whenever possible, for at least 1 year after project implementation. Off-site regional telephone surveys may also be used to supplement the on-site monitoring.

Surveys would be conducted in a manner that offers six observations per month (two randomized weekend surveys and four randomized weekday surveys). These monthly observation surveys would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 surveys would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor satisfaction is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., providing additional or different information on the proposed signage).

2.2.3 Parameter 3: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the EA/RP) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted in order to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a 12- to 24-month timeframe. Preliminary planning and E&D are anticipated to be completed in 2018. Contracting, pre-construction activities, and construction would occur in 2019. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Rockefeller Piers and Rockefeller Signage project proposes to use standard engineering specifications and tried-and-tested construction methodology for installation of piers and interpretative signage. Construction methods for the pier extensions would be similar to that of the existing piers within the Refuge and include the use of marine-grade pressure-treated large timber members and stainless steel fasteners. Signage at the Price Lake Road, East End Locks Road, and Joseph Harbor Boat Launch locations would be on existing wooden structures and would not require new vegetation removal or excavation. Signage along other roads and canals described would require minimal vegetation removal and excavation (approximately 3-foot-diameter work area) to install the u-channel galvanized or wooden sign posts. No novel restoration approaches would be used for this small-scale, localized project. In addition, this project is proposed to occur over a 12- to 24-month period, which is a standard and realistic timeframe.

Because this project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct new piers at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are based on the project's goals and objectives:

- Improved visitation rates are taking place following implementation of the restoration elements and services.
- The Rockefeller Piers and Rockefeller Signage project is designed, constructed, and implemented according to plans and permitting requirements.
- Nature of signage is appropriate for the RWR users, and their locations are reaching a high number of visitors.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.

- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate that users are not satisfied by the educational information presented on the signs, then the project is not achieving its restoration goal. Or, it may be possible to compare the number of users at the project site to other comparable refuges' along the coast of Louisiana, to see if the project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the proposed project (Table 3). Additional corrective actions may be identified during project implementation, as well as during post-implementation, as appropriate. If additional corrective actions are identified, then this section of the MAM would be updated to reflect changes throughout project implementation.

Table 3. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the new piers and educational opportunities at the RWR).
Nature and distribution of educational materials	Nature of signage is appropriate for the RWR users, and their locations are reaching a high number of visitors.	Move signage locations to reach higher numbers of visitors. Change information on signage to better connect with the RWR visitors.
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements.	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 4, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 4. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (2018)	**Construction (2019)**	**Post-construction (~2019)**
Visitor use and access			X
Nature and distribution of educational materials			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

A description of the data to be collected as part of this MAM plan is described in Table 5, below.

Table 5. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users.	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the new pier and signage locations 72 surveys would be collected during the 1-year period.
Nature and distribution of educational materials	Visitor surveys	Personal survey conducted in-person and on-site via randomization method	Six surveys per month, post-project implementation (2 randomized weekend surveys and 4 randomized weekday surveys) for 1 year	At the new signage locations 72 surveys would be collected during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets and photographs confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.

3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, LDWF, is responsible for all activities and related costs of maintaining the piers and signage, including any repairs needed over the life of the Refuge operation.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C15

Draft Monitoring and Adaptive Management Plan

St. Bernard State Park Improvements

1 INTRODUCTION

The State of Louisiana received the 358-acre site through a donation from a local family business in 1971 that became the St. Bernard State Park. The park operated for 34 years as the only state park in the St. Bernard/Plaquemines Parish area until, in 2005, it was closed for a year due to severe damage from Hurricane Katrina. It re-opened in December 2006, but remains one of the least-attended state parks in Louisiana. Recreational opportunities within the park include campsites, picnic area with pavilion, multiple restrooms, swimming pool, and bathhouse.

Some upgrades have recently been made to the entrance station to improve aesthetics and to improve Americans with Disabilities Act (ADA) compliance; however, other upgrades are needed to improve visitor appeal and increase use. Restrooms are an important element for retention of visitors at park facilities. Visitors are less likely to visit or stay at a park if restrooms appear unsanitary or if there are not enough restrooms to serve the public need. To address this issue, Louisiana Office of State Parks has identified one restroom and one bathhouse that are in need of renovation and one restroom facility that needs replacement. These updates would also address ADA compliance for these facilities. Additionally, recreational use of the old swimming pool has declined over time, is currently under used, and is to be replaced with more attractive amenities that have higher demand.

The Louisiana Office of State Parks is proposing the St. Bernard State Park Improvements project to renovate and replace existing inadequate or deteriorating recreational infrastructure and service facilities within the park to improve the recreational camping experience and increase visitation. The project proposes to 1) renovate the entrance station to provide a better first impression of the park, 2) upgrade two restrooms and one bathhouse to improve appeal and sanitation, and 3) replace an existing swimming pool with a large pavilion to diversify potential recreational uses.

The new and renovated St. Bernard State Park entrance station, restroom and bathhouse facilities, and event pavilion would include the following:

- Interior renovations of the entrance facility, including removing and rebuilding interior walls and doors, electrical work, lighting, new exterior windows, and improving ADA compliance
- Renovations of one restroom and one bathhouse including all interior elements and some exterior elements
- Replacement of one existing bathhouse with a new 900- to 1,000-square-foot restroom facility with seven toilets and sinks and five drinking fountains to serve the pavilion
- Removal of pool deck and filling of the existing old swimming pool
- Construction of a 20,000-square-foot metal event pavilion

The replacement restroom and the new pavilion would be expected to accommodate as many as 400 people for an event. The new and remodeled structures would be updated to have a similar architectural style to match the park design and would also improve ADA accessibility in some areas. The project areas are located entirely within the St. Bernard State Park property, which is located south of Saint Bernard Parkway directly east of the unincorporated community of Caernarvon (Figure 1).

A conceptual design for the proposed project has been developed; however, engineering and design (E&D) is still occurring. The project construction schedule would be determined during E&D, but construction of projects similar to this would typically occur over 4 to 12 months, subject to approval of permits and environmental review. The construction schedule would include contracting and pre-construction and construction activities.

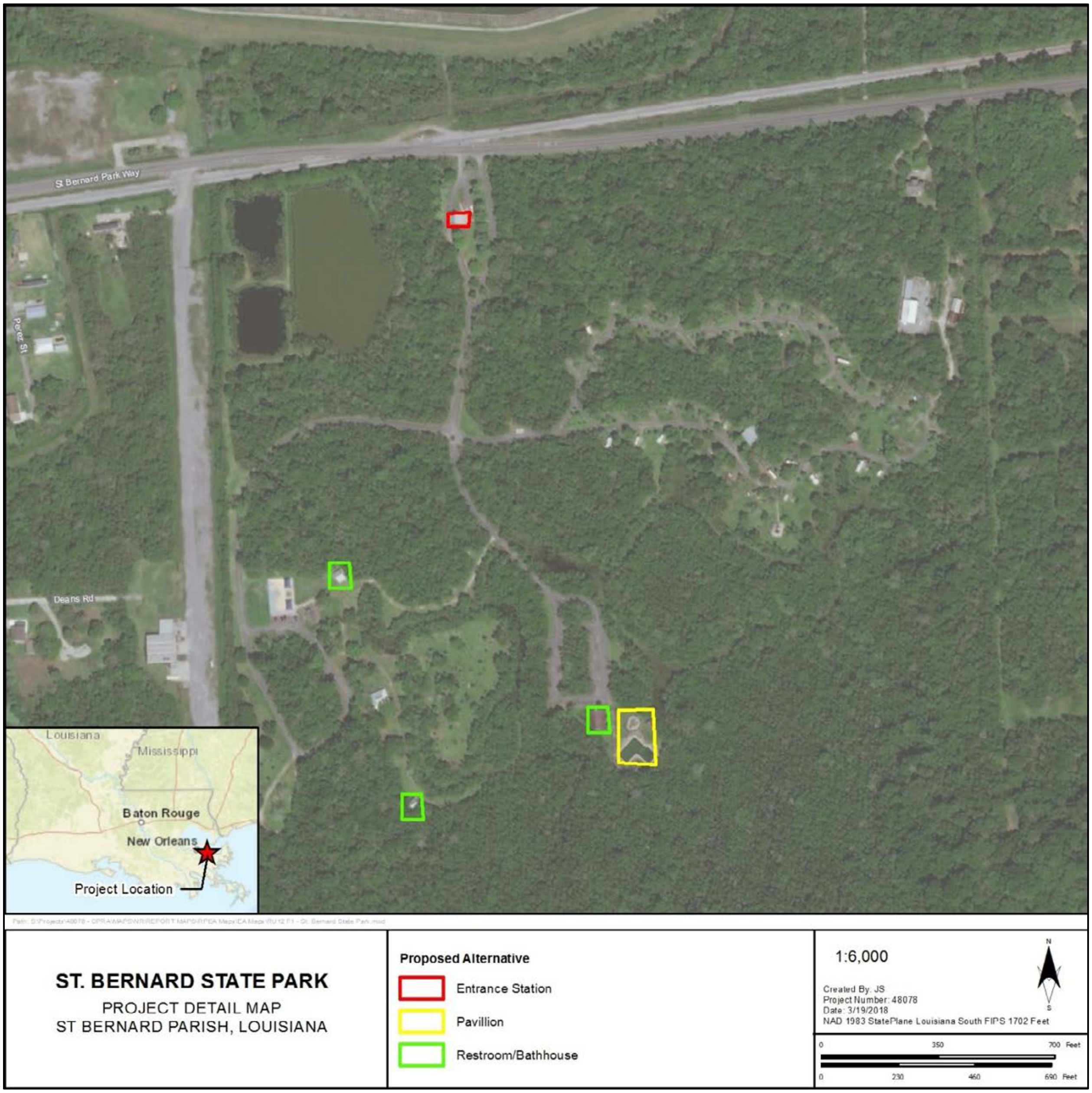

Figure 1. Location of the proposed St. Bernard State Park Improvements Project.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS by constructing infrastructure as a restoration technique to increase the recreational access and opportunities for campers, hikers, swimmers and general recreationalists in the St. Bernard State Park.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities conducted by individuals at locations near beaches and other shoreline areas. These activities include swimming, sunbathing, surfing, walking, kayaking, and fishing, and take place from the shoreline or from shoreline structures such as piers. Boating refers to a variety of recreational boating activities that begin at sites providing access to salt water near the Gulf Coast (boat-based fishing is included in this category).

The proposed project is designed to enhance recreational activities (e.g., walking, picnicking) through the improvements of infrastructure supporting recreational use, such as a new pavilion and day-use restrooms, which would likely increase visitation and enhance the quality of future recreational visits to the area. Therefore, the project has a nexus to the public's lost recreational access to shoreline uses. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors accessing the state park are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access to the St. Bernard State Park through infrastructure development and enhancement of campground facilities.
- Enhance public access by increasing visitor use of protected or enhanced lands (the state park), by enhancing the recreational opportunities within the St. Bernard State Park.
- Enhance public access by improving the availability of recreational opportunities/protected lands, by improving the infrastructure at the state park.

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be impacted during removal of existing facilities and construction of new and/or improved facilities unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered; monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. Likewise, if the land use at the proposed state park is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as camping, walking, and picnicking. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential negative impacts on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to state park facilities would attract increased public use to the St. Bernard State Park. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the new facilities). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential project impacts on the local community of Saint Bernard, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are

achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment restoration projects. The sections below outline the St. Bernard State Park Improvements project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective.

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use of the facilities at the state park. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Provide and Enhance Recreational Opportunities restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building and improving infrastructure in order to increase recreation use of the St. Bernard State Park, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Provide and Enhance Recreational Opportunities restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vessels, boats, and/or other recreational vehicles, and users (walker, swimmers, picnickers, etc.) at the project site. Establishing cameras at the entrance to the state park to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, therefore, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts should be located at the entrance to the state park. By establishing the monitoring location at the park entrance, the on-site monitor could count the number of vehicles and recreational users that access the project site. In addition, the monitor could record the types of recreational activities the users engage in (such as walking, picnicking, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., lights at some of the new facilities) and/or routine maintenance activities. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	State park entrance	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because E&D of the new facilities and features is still underway. However, construction of a project of this kind would typically occur over 4 to 12 months, subject to approval of permits and environmental review. The construction schedule would include contracting, pre-construction, and construction activities. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The St. Bernard State Park Improvements project proposes to use standard engineering specifications and tried-and-tested construction methodology for building the state park improvements. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe of 4 to 12 months. Construction of the entrance station interior renovations would likely include the following tasks: removing, moving, and rebuilding an interior wall with two doors; relocating data lines and electrical outlets; rearranging lighting and adding additional lights; addressing thresholds, door widths, counter heights, and ADA-compliance improvements; and installation of new exterior windows at least 3 × 4 feet or 3 × 5 feet.

Restroom and bathhouse renovations would involve interior and exterior construction that would be limited to existing footprints. All interior finishes and fixtures would be replaced and repairs would be made to exterior areas that have wood rot and old weather proofing. Interior finishes would include sinks, toilets, mirrors, toilet partitions, lights, hand dryers, and some floor and wall tile. Exterior repairs would be made to exposed roof elements (soffits, large timber accent pieces, weather proofing and paint). The new restroom would be approximately 900 to 1,000 square feet and would be constructed on the same site after demolition of the bathhouse. The new restroom would have a minimum seven toilets and sinks for each of the two sides of the restroom facility and five drinking fountains, to meet the anticipated user needs. Construction methods and architectural style would match the proposed event pavilion and relate to this region of the state.

For the site preparation for the construction of the new 20,000-square-foot event pavilion, the existing pool deck would be removed, holes would be drilled in the bottom of the existing swimming pool to allow it to drain, the empty pool would be filled and buried, and soils would be compacted to allow construction of the pavilion at this site. The new metal pavilion would be placed on a concrete slab, have a metal roof, and would require utility connections and upgrades.

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct and enhance the new features in St. Bernard state park. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project’s goals and objectives:

- Improved visitation rates are taking place following implementation of the restoration elements and services.
- The St. Bernard State Park Improvements project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the new state park infrastructure. Or, it may be possible to compare the number of users at the project site to other comparable state parks and campgrounds in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users, over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the improved features at the state park).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

A description of the data to be collected as part of this MAM plan is described in Table 4, below.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [e.g., kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Entrance of the state park. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a PDF file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Louisiana Office of State Parks can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for Louisiana Office of State Parks to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustees Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustees Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustees Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Louisiana Office of State Parks is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustees Council 2016).

The project proponent, the Louisiana Office of State Parks, is responsible for all maintenance activities and costs related to the new and improved facilities and features proposed at the St. Bernard State Park, including any repairs needed over the life of the facilities.

10 REFERENCES

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C16

Draft Monitoring and Adaptive Management Plan

Cypremort Point State Park Improvements

1 INTRODUCTION

The State of Louisiana acquired 40 acres and established the Cypremort Point State Park in 1970. In 2004, the State of Louisiana entered a new lease for an additional 330 acres. The Cypremort Point State Park is one of the few places on the Louisiana Gulf Coast that can be accessed by road. It provides multiple recreational opportunities for both day-use and overnight visitors—including picnicking, fishing, crabbing, water skiing, windsurfing, sailing, camping, and bird and wildlife viewing—via its 0.5-mile-long human-made beach, six cabins, a 100-foot-long fishing pier, three pavilions, boat docks, and convenient access to the Cypremort Point boat ramp just outside of the park's entrance. However, recreational opportunities have been diminished due to the deteriorating conditions at the park.

This proposed project is in an area that is constantly exposed to erosional forces and storms, which has resulted in degraded conditions in several key areas of the park. Since the creation of the 0.5-mile-long human-made beach, storms and continuous erosional forces have significantly reduced the size and appeal of the exposed beach area, thereby reducing recreational opportunities and use. In addition, the clay sub-soil underneath the beach has been exposed and has also begun to erode. This erosion has reached a historic level and has undercut two beach shade pavilions that are closed as a result. Similarly, the south side of Beach Lane has experienced constant erosion along Quintana Canal from storms and increased boat traffic from the Cypremort Point boat ramp at the head of the canal. This was exacerbated by inadequate erosion protection along the north bank and could cause future safety issues for the park's only access route. In addition, the existing 100-foot-long fishing pier has been damaged from storms to the point that it is unsafe to use, significantly diminishing pier-based fishing opportunities at the park. All of these conditions have had a negative effect on recreational use of the fishing pier and threaten the long-term viability of the site's use.

In response to the decreased recreational opportunities, the Louisiana Office of State Parks is proposing the Cypremort Point State Park Improvements project, which involves five elements: 1) reinforcing the existing rock jetties, mainly along the entry road, to prevent further erosion on the Quintana Canal side; 2) replacing the breakwater system that previously protected the beach from erosion; 3) restoring the degraded beach to its conditions before it was eroded; 4) installing a new marsh boardwalk to replace destroyed fishing piers; and 5) repairing and upgrading existing roads damaged by repeated flooding. The project is located in both Saint Mary and Iberia Parishes approximately 1.5 miles northeast of Cypremort Point in Vermilion Bay (Figure 1). The project area starts from Louisiana Highway 319 and extends along Beach Lane and Quintana Canal and includes the entire Cypremort Point State Park site and immediately adjacent offshore area. The project address is 306 Beach Lane, Cypremort Point, Louisiana 70538.

The proposed project would restore previously diminishing fishing and recreational opportunities, provide new opportunities for recreational and educational use, restore beach habitat for both recreation and wildlife, and provide protection of coastal nearshore marine habitats and recreational infrastructure. Each of the five proposed project elements are further described below. A conceptual design has already been developed. The construction schedule would be determined during engineering and design, but it is estimated that if work is done concurrently all work would be complete in 18 to 20 months, or if the work is done in sequence it would take approximately 65 months to complete. The order of construction for various proposed elements would be scheduled in a manner to ensure success (i.e., beach reclamation would occur after the breakwater is replaced). In-water work would total approximately 29 months. All work would be subject to approval of permits and environmental review. The construction schedule would include contracting, pre-construction, and construction activities.

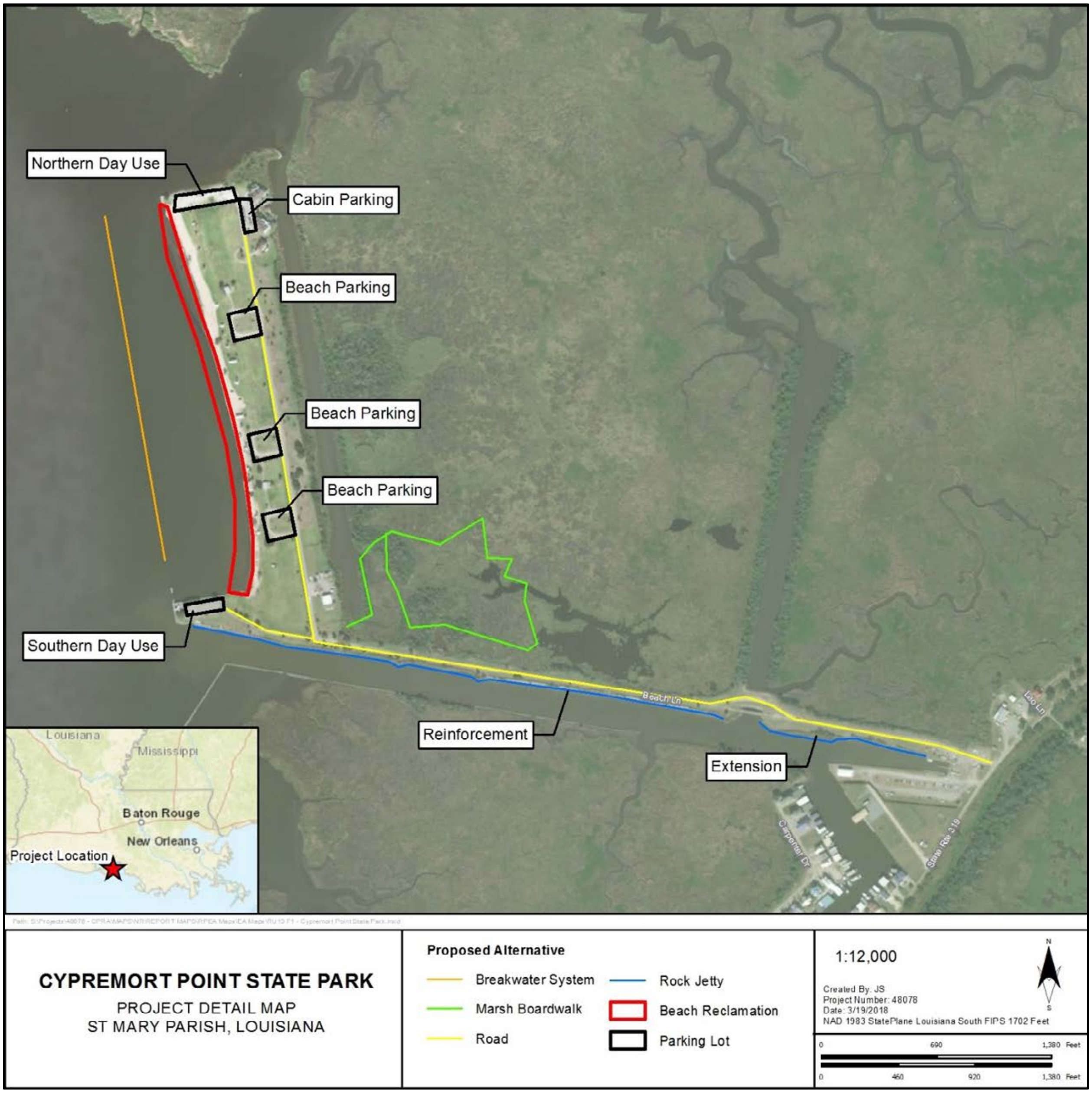

Figure 1. Location of the proposed Cypremort Point State Park Improvements project.

Rock Jetties

This element of the project would upgrade the existing inadequate rock jetty along the northern bank of the Quintana Canal and southern side of Beach Lane at the entrance to the Cypremort Point State Park. Upgrades would include extending the existing rock jetty east approximately 1,000 feet to the northern edge of the Cypremort Point boat ramp and reinforcing the remaining approximately 3,300 feet of the existing rock jetty to the northern end of the canal. After improvements, the total rock jetty would be approximately 4,400 feet long × 15 feet wide × 18 inches deep. Rock jetty improvements would provide protection to existing park infrastructure. Improving and expanding the existing erosion protection down most of the length of Beach Lane along Quintana Canal is needed to prevent compromising the entry to the State Park.

Improving the existing rock jetty would include the following:

- Approximately 1,000-foot-long extension of the existing rock jetty from the cross-canal bridge east to the northern end of the Cypremort Point boat ramp constructed with medium to large rocks
- Approximately 3,300 feet of reinforcement for the existing rock jetty from the cross-canal bridge west to the northern end of the Quintana Canal entrance/exit constructed with medium to large rocks matching the existing material
- Approximately 5,000 to 6,000 tons of rock for the rock jetty construction and reinforcement

Breakwater System

This element of the project would replace the breakwater system with a new system of rock groins approximately 2,100 feet long, 500 feet west of the proposed beach reclamation area. This element of the project would provide protection for the park's shoreline from erosional forces that have greatly reduced the quality and appeal of the park's beach area. The proposed breakwater system would greatly increase the long-term success of the proposed beach reclamation. The new breakwater system would provide ecological benefits by protecting the beach habitat and recreational opportunities by protecting the proposed beach reclamation area that has been damaged by erosion and storms.

Replacing the breakwater system would include:

- Seventeen 75-foot-long rock groins, spaced 50 feet apart, constructed with geotextile fabric bases, 6-inch-thick class II base material, core layers of lightweight concrete aggregate, two layers of stone armoring on the side-slopes, and 5-foot-wide crests made up of at least three armor stone units

Beach Reclamation

The proposed beach reclamation would restore the degraded beach area to its previous condition. The beach length is approximately 2,390 feet long and would be restored to approximately 78 feet wide and would need approximately 8,630 cubic yards of sand to reach a depth of 12 inches. The reclamation would include replacing the sub-soil layer as necessary, backfilling and compacting soil under the pavilions experiencing undercutting, and spreading imported sand across the approximately 186,420-square-foot beach shoreline. This beach is a very popular swimming spot, and continued erosion would further degrade beach habitat and also threatens the nearby recreational structures (i.e., pavilions and a restroom facility). The beach provides recreational access for swimming, sun bathing, paddle boards, and other water-based activities, as well as habitat for some shorebirds. Beach reclamation is needed even absent the proposed breakwater system. However, the breakwater system would provide additional erosion protection to the beach, thereby reducing the likelihood of future reclamation at this location.

Marsh Boardwalk to Replace Fishing Piers

The proposed marsh boardwalk system would provide improved recreational fishing opportunities at the inland marsh area north of Beach Lane and east of the Cypremort Point State Park grounds. The Louisiana Office of State Parks determined that replacing/upgrading the existing fishing pier in-place would be subject to the same damaging forces that destroyed the existing pier, and that protection from destruction was not feasible. An inland wooden boardwalk is proposed in the marsh area to the west and would provide fishing and other shoreline-based recreational opportunities. The proposed boardwalk/trail would have a target length of approximately 3,000 feet and be built of mixed media, with the majority constructed as an above-water boardwalk and some areas constructed at ground level from crushed stone. The boardwalk/trail is intended to provide access to several marsh microenvironments and different inshore water bodies and would be connected to the existing park grounds by a bridge across the canal to the west connecting to the southern portion of the State Park. The boardwalk/trail would restore recreational fishing opportunities for all visitors and improve other recreational uses, such as bird and wildlife viewing and educational opportunities.

Construction of the marsh boardwalk would include the following:

- Approximately 600 piles driven into the sand bottom to support the boardwalk
- An approximately 3,000-foot-long wooden boardwalk with a width of 4 or 5 feet constructed from 7- to 8-inch pile and either 6×6 or 8×8 marine-grade pressure-treated members and stainless steel fasteners
- Ground-level trails, where possible, with a width of 4 or 5 feet constructed from crushed stone
- Additional toe rails throughout the boardwalk with handrails at ramps, as well as benches and interpretive signs

Roads

The proposed road repairs in Cypremort Point State Park would address damages associated with repeated flooding. The roads and parking lots provide access to the park including the fishing pier, beach access, cabins, pavilions, boat docks, and restrooms. Repairing the park's roads and parking areas is vital for preserving public access and recreational opportunities to the park's natural resources.

Repairing the existing roads and parking areas would include the following:

- Four existing 2-way roads, totaling approximately 1.85 miles, with 12-foot-wide travel lanes. Total area of road surface to be repaired is approximately 410,573 square feet. Road improvements would primarily consists of pothole repairs to the road base and a 2-inch asphalt overlay, and includes the following areas:
  - Approximately 1.37-mile-long Beach Lane (park entry)
  - Approximately 0.11-mile-long southern day-use access road
  - Three approximately 0.113-mile-long day-use beach parking access roads
  - Approximately 0.034-mile-long cabin access road
- Six paved parking areas, totaling 116,337 square feet, pothole repairs as needed and a 2-inch asphalt overlay in the following areas:
  - Approximately 15,360-square-foot southern day-use parking lot
  - Three approximately 24,443-square-foot central beach loop parking areas
  - Approximately 20,655-square-foot northern day-use beach parking lot
  - Approximately 6,993-square-foot cabin parking area

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified

13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within both restoration type goals because it is designed to enhance recreational fishing, boating, and wildlife viewing experiences by development of new piers, a marsh boardwalk system, jetties, and enhancing the beachfront shoreline. The project would meet the restoration goals outlined in the Final PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique to increase the recreational opportunities for shoreline users, fisherman and boaters across the state park.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. Most of the recreational use loss in Louisiana as a result of the spill was to recreational fishing; however, the recreational assessment, discussed in the Final PDARP/PEIS, focuses on loss of multiple shoreline uses and boating. Shoreline use refers to recreational activities conducted by individuals at locations near beaches and other shoreline areas. These activities include swimming, sunbathing, surfing, walking, kayaking, fishing, and hunting that take place from the shoreline or from shoreline structures such as piers and docks. Boating refers to a variety of recreational boating activities that begin at sites providing access to salt water near the Gulf Coast.

The proposed project is designed to enhance recreational fishing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. For this reason, the proposed project's goal of creating and enhancing visitor access to recreational use (fishing) has the added benefit of providing both boat-based and shoreline-based recreational activities and fishing. Therefore, the proposed project has a strong nexus to the public's lost recreational fishing and access to shoreline uses. The recreational opportunities that would be created by the proposed project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the piers and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the Cypremort Point State Park Improvements project. Therefore, the project represents in-place, in-kind restoration.

The overall objectives of this project are to provide and enhance public access to natural resources through recreational use, and to use education to promote engagement in stewardship of natural resources. Specific objectives include the following:

- Enhance public access to shoreline recreational activities (such as fishing, boating, and swimming) through infrastructure development of new piers, enhanced beach and roadways, and rock jetty improvements at the state park.
- Enhance public access by increasing visitor use of recreational opportunities for fishing, swimming, and boating within the Cypremort Point State Park.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of other facilities, such as the parking lot or access road at the new pirogue launch, unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the intensity and frequency of hurricanes increase in the region, the enhanced beach, new piers and boardwalk, and jetties may not be engineered sufficiently to withstand these natural disasters; therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, swimming, and boating throughout the state park. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public interest and use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the recreational features would attract high rates of public use and better public access to the Cypremort Point State Park. However, anticipated user data for the project were not collected (e.g., boaters and/or fishermen in the area were not polled for anticipated use of the features). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment (NRDA) restoration projects. The sections below outline the Cypremort Point State Park Improvements project's monitoring parameters and the methods for measuring these parameters.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustee's identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goal and project-specific objective for this project are related to increasing and enhancing recreational use in the state park. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fit within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any Recreational Use restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, because the proposed project objectives include building improved access and recreational features (e.g., enhanced beachfront, new marsh boardwalk and fishing piers) to enhance recreation use in the state park, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the Enhance Public Access to Natural Resources for Recreational Use Restoration Approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Because the proposed project includes constructing and updating recreational features throughout the state park, information collected on visitor use may need to occur at several different locations. For example, monitors could be stationed at the new marsh boardwalk, as well as fishing piers. Establishing cameras at state park entrance to record access information may also be used to determine if visitor use and access have increased at the project site. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vessels may be recorded, and the total users and recreational activities being undertaken may need to be estimated. For this project, it is recommended that an on-site monitor(s) be used to gauge the visitor use and access. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the proposed project, the priority areas for counts may need to be located at the beach and park entrance. However, the Louisiana State Park staff may also be stationed at the various fishing piers to determine user numbers. At any of the locations the on-site monitor can count the number of vehicles, boats, or other recreational vessels (e.g., kayaks) and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure and/or routine maintenance activities. Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Piers, beach and/or park entrances	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The construction schedule for this project has not yet been determined because planning and design of the new features are still underway. Once the implementation schedule of the project has been finalized, this MAM plan should be updated to include accurate information regarding monitoring this parameter during construction. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Cypremort Point State Park Improvements project proposes to use standard engineering specifications and tried-and-tested construction methodology for constructing the various features recreational features. No novel restoration approaches would be used for this small-scale, localized project. For example, construction of the approximately 3,000-foot-long trail and wooden boardwalk would likely require some in-water work and involve several phases of construction. First, piles would be driven into the marsh sediments along the proposed boardwalk placement, with a set of two piles installed at approximately a 10-foot interval. Each of these piles would be driven past the engineering-set minimum depth into the substrate. These piles would be approximately 6 to 8 feet long to allow for adequate penetration into the marsh sediments, varying water depths, height of water, and vegetation. Construction methods for the boardwalk would be similar to that of other boardwalks and include the use of marine-grade and pressure-treated large timber members and stainless steel fasteners. For additional information regarding the planned construction methodology of the proposed project, see Section 3.3.13 of the RP/EA (LA TIG 2018).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct the boardwalk and enhance the rock jetties, beach front, roadways and breakwater system. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project's goals and objectives:

- Improved visitation rates are taking place following implementation of the restoration elements and services.
- The Cypremort Point State Park Improvements restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with new recreational features. Or, it may be possible to compare the number of users at the project site to other comparable state parks along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and marketing for the project (e.g., news articles or signage promoting the new recreational features at the state park).
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements	Work with the construction contractor to ensure that all contract terms and permit requirements are met.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Descriptions of the data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vessels [e.g., kayaks]), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	Various locations throughout the project area. 72 observation sessions, each lasting 4 hours, would be conducted during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Louisiana Office of State Parks can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for Louisiana Office of State Parks to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Louisiana Office of State Parks is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, the Louisiana Office of State Parks, is responsible for all maintenance activities and costs related to the new and enhanced recreational features, including any repairs needed over the life of the features.

10 REFERENCES

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C17

Draft Monitoring and Adaptive Management Plan

The Wetlands Center

1 INTRODUCTION

The Wetlands Center is a multi-phased project, located in Jefferson Parish, Lafitte, Louisiana, in Section 15, Township 15 South, Range 23 East (Figure 1). Phase 1, which is complete, consisted of an elevated wooden trail through a cypress swamp, referred to as the “Nature Study Trail,” and a Multipurpose Resource Facility with a library, theater for educational films, and a museum depicting the lifestyle and heritage of the Town of Jean Lafitte.

The Town of Jean Lafitte is proposing Phase 2 of the Wetlands Center project, the creation of the Louisiana Wetlands Education Center itself. The proposed project involves the development of a theater and exhibits inside of the Wetlands Center, as well as a portion of the funding for the Wetlands Center’s construction. The proposed project would serve as an education asset to the region, providing classroom/meeting rooms, exhibits, and observation areas, along with other features to promote preservation, conservation, and adaptation related to wetland ecosystems.

To accomplish these public education goals, the Wetlands Center proposes construction of the three-level Wetlands Education Center building that would serve as an orientation to the wetland ecosystems of Louisiana prior to visitors’ exploration of the Nature Study Trail. The building would be designed to house a 4D theater for educational videos, as well as space for numerous interactive exhibits such as a Mississippi River 3D Projection Map, a model of a Gulf of Mexico oil rig, artifacts of Louisiana’s swamp culture in exhibit cases, interactive wetland loss and restoration exhibits, and wildlife interaction exhibits.

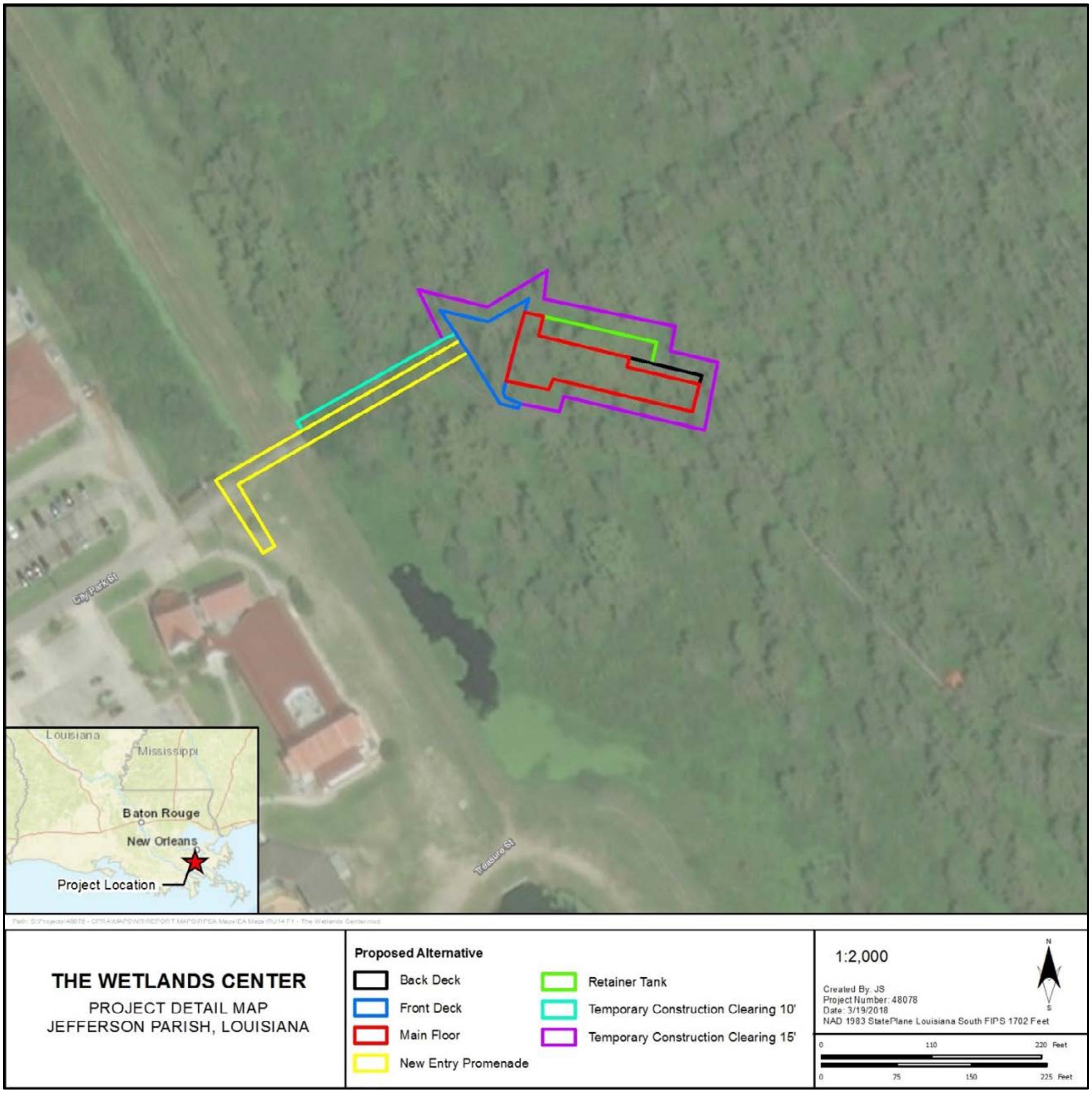

Figure 1. Location of the proposed Wetlands Center project.

The project would provide funding for a variety of museum-quality exhibits, interactive elements, meeting spaces, and digital media features at the Center, including:

- reception area;
- combination classroom and film viewing theater with seating for approximately 80 students;
- small meeting rooms for private research;
- restoration and preservation of wetlands displays;
- interactive exhibit galleries;
- static exhibit galleries;
- live interactive exhibits;

- large observation windows on all elevations;
- outdoor observation decks;
- observation tower;
- gift shop with snacks and drinks;
- first aid station; and
- restrooms.

The project would also provide funding for construction of the three-level Center and entry promenade. The promenade would be approximately 30 feet wide, with approximately 100 linear feet of promenade leading from the existing Multipurpose Resource Facility to the levee at City Park Drive, and approximately 300 linear feet of promenade crossing over the levee and remaining elevated on 8-inch-diameter treated wooden piers, spaced 16 feet across on center, until its connection to the existing trailhead of the elevated Nature Study Trail.

Conceptual designs for the 3,500-square-foot lower level of the Center proposes the building on raised piers. As the project proceeds into more detailed designs, the exact floor level height would be determined and confirmed in close collaboration with all involved agencies to address flood water levels. Parallel to the northern and eastern sides of the lower level, a clear, polyacrylic wall would be built 20 feet from the building, from just above water level to the water bottom. This polyacrylic wall would serve as a 3,000-square-foot retainer tank for aquatic wildlife viewing.

The 7,300-square-foot main level of the Center would be supported in part by the 3,500-square-foot lower level. Areas of the main level that are not directly above the lower level would be supported by 18-inch-diameter concrete piles. A 4,000-square-foot deck, supported by 8-inch-diameter treated wooden piles, would connect the entry promenade to the main level of the Center and the existing Nature Study Trail. An additional wooden deck would be added on the northeastern corner of the building. Additional viewing opportunities would be provided by a small third-level “lookout tower” above the main level.

The project would be constructed at the trailhead of the Town of Jean Lafitte’s Nature Study Trail, adjacent to Lafitte’s Barataria Museum at 4917 City Park Drive, Jean Lafitte, Louisiana 70067. Similar exhibit developments typically take approximately 12 to 24 months from start to finish. If construction of the Wetlands Center is included in natural resource damage assessment (NRDA) funds, timeframes could be longer, subject to approval of permits and environmental review.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to “provide and enhance recreational opportunities” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type “provide and enhance recreational opportunities.” The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the second restoration type goal: to provide education and outreach to promote engagement in the restoration and stewardship of natural resources by designing and potentially constructing the Louisiana Wetlands Education Center. The project would meet the restoration goals outlined in the PDARP/PEIS (DWH Trustees 2016) by creating natural resources–related education facilities and programs as a restoration technique.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. As discussed in the Final PDARP/PEIS, residents and visitors depend on Gulf Coast resources for varied recreation activities, including boating, fishing, and beach-going. An estimated 17 million boating, fishing, and other shoreline activity user days were lost throughout the five affected states as a result of the spill, with the losses occurring across multiple years (DWH Trustees 2016). Educational activities provide additional recreational opportunities that improve the connectedness of the public to the environment. These opportunities enhance the community's stewardship of coastal Gulf resources that were injured and, therefore, inaccessible during the DWH Oil Spill and response activities (DWH Trustees 2016). The proposed Wetlands Center project would address losses through education and engagement of Louisiana residents in the restoration and stewardship of coastal resources.

The overall objectives of this project are to provide educational opportunities that promote engagement in restoration and stewardship of the natural environment by constructing an educational facility that includes classrooms, interactive and static exhibits, and observation opportunities. Specific objectives include the following:

- Increase visitor use and access to environmental education, resources, and outreach opportunities at the existing Jean Lafitte Wetlands Center (which currently includes the Nature Study Trail and a Multipurpose Resource Facility)
- Improving the availability of educational resources and opportunities provided at the existing Jean Lafitte Wetlands Center.
- Educate visitors about natural resources and restoration by designing and potentially implementing Phase 2 of the Louisiana Wetlands Education Center.
- Increase public interest in and understanding of the natural science and environment of the Gulf coastal region by designing and potentially building relevant exhibits, hosting classes, and conducting interactive activities at the Wetlands Center.

The objectives of this project must be refined upon completion of the engineering and design (E&D) phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be impacted during construction of the facilities included in the project unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both terrestrial and adjacent aquatic habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Lack of understanding of the natural science, resources, and environment of the Gulf coastal region
- Human attachment to or interest in the environment
- Public opinion of environmental issues
- Time and resources (e.g., income, transportation) available to take advantage of educational or recreational opportunities
- Public acceptance and use
- State of the economy
- Interest or need in the educational facilities and programs.

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of this project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. It is likely that the Wetlands Center would attract visitors from nearby New Orleans, including tourists from various parts of the country. If the state of the economy is affecting tourist travel to New Orleans, it is possible that the proposed project would be unable to achieve the restoration goal of education and outreach to promote engagement in the stewardship of natural resources. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for this project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public interest and use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)
- Optimum location of outreach materials or opportunities to maximize public access or participation
- Optimum medium to communicate information (e.g., visual, written, oral materials, information)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new facilitates at the Wetlands Center would attract public interest and use of the area. However, anticipated user data for the project were not collected (e.g., traffic counts and visitor use data at the existing nature trail and Multipurpose Resource Facility was not collected). Therefore, the ability of the proposed project to educate the public on natural resource stewardship in the area is unknown. Likewise, the potential impacts to the ecosystems as a result of increased use of the area, with installation of the facilities, is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH NRDA restoration projects. The sections below outline the Louisiana Wetlands Education Center project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustee's identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

Two core performance monitoring parameters have been identified for the project:

- Visitor use
- Nature and extent of educational materials produced and distributed

In addition, several project-specific objectives have been identified for the proposed project. The monitoring parameters associated with the project-specific objectives outlined in Table 1 would be collected in addition to the core performance monitoring parameters listed above.

Table 1. Project-Specific Objectives and Performance Monitoring Parameters for the Louisiana Wetlands Education Center

Project-Specific Objective	Objective-Specific Performance Monitoring Parameters
Increase visitor use of the educational and recreational facilities at the existing Wetlands Center (e.g., wildlife viewing along the nature trail and use of the multipurpose facility) by planning and potentially implementing additional educational facilities.	The nature and extent of recreational and educational activities used by the public (i.e., visitor use)
Improve visitor satisfaction of the recreational and educational facilities at the Wetlands Center	The nature and extent of recreational activities used by the public (i.e., visitor use)
Enhancement of natural resource education through the planning and installation of additional educational facilities at the Wetlands Center	Infrastructure constructed and completed as designed
Increasing the public's interest and understanding of the natural resources through planning and implementation of new educational facilities at the Wetlands Center	Visitor satisfaction of the nature and distribution of educational materials

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for this project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the entrance to the Wetlands Center, or in the parking lot. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For guidance and methodologies of how to measure visitor use/access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For this project, the priority area for counts should be at the newly constructed Wetlands Education Center facilities. By establishing the monitoring location(s) at the new recreational facilities, the on-site monitor can count the number of vehicles and recreational users that access and use the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly visiting the Center, or if users are also participating wildlife viewing and nature hiking). However, because the proposed project is primarily focused on planning as well as on E&D, the exact monitoring locations should be selected once the planning process is complete.

Data collection should be conducted post-implementation at the facilities and throughout various times of the year. As noted above, it is understood that at this time, the proposed project primarily includes planning as well as E&D. Therefore, this MAM plan should be updated once the planning phase is over to include information regarding the appropriate frequency and duration of monitoring efforts, in addition to the exact monitoring locations. However, recreational user counts should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible. At this time, it is recommended that monitoring for visitor use at the constructed Phase 2 of the Wetlands Center occur for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities are low, corrective actions may be taken. Potential corrective actions could include public outreach and marketing for the project (e.g., news articles or signage promoting the new educational facilities). Promoting the new additions to the Wetlands Center may increase the user attendance at the project site. Table 2 provides a sample methodology outlining the preferred monitoring location, duration, frequency, and sample size for the proposed project. This methodology must be updated in collaboration with the LA TIG as additional information becomes available, and before construction of the Wetlands Center.

Table 2. Monitoring Parameter 1 Sample Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	To be determined, but located at the newly constructed project facilities	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Nature and Distribution of Educational Materials

The recommended methodology for monitoring this parameter is similar to those outlined in Parameters 3, below. In order to gauge if the nature and distribution of educational materials (in this case the various educational and recreational facilities proposed) are achieving the goal of education to promote engagement in the stewardship of natural resources, an on-site monitor should be present after the project is constructed. The on-site monitor would survey the Wetlands Education Center visitors in order to determine if the information being presented at the Center is appropriate for the users, and if the facilities are located in an area that reaches the maximum users. In addition, the on-site monitor should determine if the facilities are constructed appropriately to the specifications outlined in the engineered drawings.

The recommended methodology for monitoring this parameter includes using social indicator monitoring systems. These systems measure the nature and distribution of educational materials within restoration project areas and monitor response behavior toward restoration activities. A social indicator system that is typically employed on these types of restoration projects are user surveys. User surveys should be administered at the project site and include questions that are geared toward education. Because the methodology of the first parameter includes an on-site monitor, it is recommended that the same on-site monitor be used to gauge the nature and distribution of educational materials at the proposed project. On-site surveys would be conducted at the same locations as the user counts (i.e., to-be-determined locations at the newly constructed education and recreation facilities). Visitor educational outcomes may be influenced by an array of outside drivers. Consideration of the following factors during the survey can help interpret survey responses (DWH Trustees 2017:Section E.9):

- Visitor characteristics, especially motives and levels of experience with both the places visited and activities participated in, and cultural background
- Visitors’ perceptions of the quality of the educational opportunities
- Interactions with other people
- Perceived quality of the service provided
- Perceived quality of the facilities and built infrastructure

Educational outcome surveys could also be designed to collect information on visitor impact on the landscape. This information would help guide decisions made during adaptive management (if necessary) for protection or restoration of the natural environment. Sampling strategies for determining impacts within the project site, or any associated and linkages (e.g., trails), are well developed and have been extensively reviewed (e.g., Monz [2000], and others) and applied (Monz and Leung 2006). The National Park Service *Visitor Impact Phase 1 and 2 Reports* can provide additional guidance on monitoring methods (Monz and Leung 2003a, 2003b).

The proposed project focuses on completing the planning and design process; therefore, exact location, methodology, frequency, and duration of monitoring this parameter cannot be determined at this time.

However, suggestions on these variables are discussed below. Once the planning process is complete, this MAM plan should be updated to include project-specific information related to each of these monitoring parameters.

It is recommended that the selection of survey respondents should be random and can be chosen using a systematic random sampling procedure. Randomization is intended to weed out bias and ensure that the respondents have an equal probability of being asked to participate. In addition, by using a random sampling method, the choice of target respondents would be determined by the sampling system, and not by the surveyors. The survey should be conducted post-implementation of the facilities and throughout various times of the year. To accurately determine if recreational users have beneficial educational outcomes at the new facilities at the project site, the surveys should be conducted during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed survey results may occur (e.g.., more people recreating on holidays versus a normal weekday). The surveys should be conducted on-site whenever possible, for at least 1 year after project implementation. Off-site regional telephone surveys may also be used to supplement the on-site monitoring.

It is also recommended that the surveys be conducted in a manner that offers six survey sessions per month (two randomized weekend survey sessions and four randomized weekday survey sessions). These monthly observation survey sessions should capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, educational outcomes are insufficient, then corrective actions may be taken. Potential corrective actions could include modifying exhibits and education materials based on user feedback or demographics (e.g., tailoring exhibits to match the age range and education level of the average recreational user) and/or routine maintenance activities (e.g., cleaning and updating equipment and exhibits).

2.2.3 Parameter 3: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted in order to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. Similar exhibit developments typically take approximately 12 to 24 months from start to finish. However, the project would focus primarily on planning and E&D of the Phase 2 of the Wetlands Center. If construction of the Wetlands Center is included in NRDA funds, timeframes could be longer, subject to approval of permits and environmental review. If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Wetlands Center project proposes to use standard engineering specifications and tried-and-tested construction methodology for installation of the proposed facilities. No novel restoration approaches would be used for this small-scale, localized project. In addition, this project is proposed to occur over a 12- to 24-month period (at least for the planning and design stage, potentially longer for project construction), which is a standard and realistic timeframe. Because this project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct educational facilities at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are based on the project's goals and objectives:

- Improved visitation rates are occurring following implementation of the restoration elements and services at the Jean Lafitte Wetlands Center.
- The Wetlands Center restoration project is designed, constructed, and implemented according to plans and permitting requirements.
- Increase in the public's interest and understanding of the natural resources of coastal Louisiana is taking place through the implementation of the new educational facilities at the Jean Lafitte Wetlands Center.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate that users are not satisfied by the educational information presented at the Center, then the project is not achieving its restoration goal. Or, it may be possible to compare the number of users at the project site to other comparable educational facilities along the coast of Louisiana, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the proposed project (Table 3). Additional corrective actions may be identified during project implementation, as well as during post-implementation, as appropriate. If additional corrective actions are identified, then this section of the MAM would be updated to reflect changes throughout project implementation.

Table 3. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use	Improved visitation rates are occurring following implementation of the restoration elements and services.	Improve project infrastructure (e.g., making all of the facilities ADA accessible) Conduct routine maintenance activities (e.g., ensuring educational exhibits are clean and readable).
Nature and distribution of educational Materials	Nature of educational materials at the Wetlands Education Center is appropriate for visitors, and the locations of project facilities are reaching a high number of visitors.	Change information in exhibits, classes, or films to better connect with the Wetlands Center visitors Potentially move some project exhibits or displays in order to reach higher numbers of visitors
Infrastructure completed as designed	Project is designed, constructed, and implemented according to plans and permitting requirements.	Work with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 4, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 4. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction	Construction	Post-construction
Visitor use and access			X
Nature and distribution of educational materials			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

A description of the data to be collected as part of this MAM plan is described in Table 5, below.

Table 5. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation (2 randomized weekend and 4 randomized weekday counts) for 1 year	To be determined, but located at the newly constructed project facilities 72 surveys would be collected during the 1-year period
Nature and distribution of educational materials	Visitor surveys	Personal survey conducted in-person and on-site via randomization method	Six surveys per month, post-project implementation (2 randomized weekend surveys and 4 randomized weekday surveys) for 1 year	To be determined, but located at the newly constructed project facilities 72 surveys would be collected during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets and photographs confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring or survey forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that the Town of Jean Lafitte can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for the Town of Jean Lafitte to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1 year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, the Town of Jean Lafitte is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, the Town of Jean Lafitte, is responsible for all maintenance activities and costs related to the Wetlands Center project, including any repairs needed over the life of the facility.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C18

Draft Monitoring and Adaptive Management Plan

Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit

1 INTRODUCTION

The Barataria Preserve was one of the original sites within the Jean Lafitte National Historical Park when the park was established in 1978. The preserve's 22,000-plus acres of bottomland hardwood forest, cypress-tupelo swamp, and fresh to intermediate marsh provide representative examples of coastal Louisiana natural and cultural resources. The preserve is approximately 12 miles from downtown New Orleans and allows urban residents and visitors from all over the world to experience and appreciate those resources. The preserve is the park's leading site based on visitation. Recreational visitation at the preserve was approximately 229,000 people in 2017, which was approximately 50% of the total visitation for the park that year. Preserve access is by boat and by vehicle along Louisiana Highway 45. Road access connects to five parking lots and 8.5 miles of walking trails (2.7 miles of wooden boardwalks and 5.8 miles of dirt trails).

High-use areas in the preserve include the Bayou Coquille/Marsh Overlook Trails and the Visitor Center (VC) Trail. These trails currently have waysides and interpretive signage, though they are more than 30 years old and in need of updating and replacement. The VC Trail requires improvement as a result of flooding and safety concerns. Also, improvements are needed to be fully compliant with the Americans with Disabilities Act (ADA). Subsidence in the preserve has resulted in sections of the trail being regularly flooded. This not only discourages trail use but it is also makes the trail unsafe as it introduces slip hazards and guides trail users too close to waters that may have alligators, snakes, and other wildlife.

Current wayside exhibits are old and deteriorating, describe only very basic site history and ecology, and do not reflect the critical challenges facing coastal Louisiana in the twenty-first century, including loss of wetlands, impacts of non-native species, recent ecological catastrophes such the Deepwater Horizon (DWH) Oil Spill and Hurricanes Katrina and Rita, or the interplay between culture and nature.

To address management needs and increase visitor experience, the National Park Service (NPS) is proposing multiple improvements (project) within the preserve (Figure 1) to increase the recreational use experience, including the following:

- Replacing the wooden VC Trail within the preserve. Improvements to the boardwalk trail would include removing the existing structure and reconstructing it so that it is wider and elevated. The new boardwalk trail would be 5 to 6 feet wide, approximately 1,707 feet long, and approximately 8,535 to 10,242 square feet. Replacing the trail would require removing the current wooden pilings and wooden substructure and decking and replacing them in the same general location with new railings and materials that are more resilient to the ambient conditions. The VC Trail would be ADA compliant, resilient to regular flooding, sustainable, and safer. All VC Trail improvements would be developed within the existing corridor of the VC Trail.
- Procuring a Wayside Design Plan for approximately 30 to 35 new wayside exhibits for all of the Barataria boardwalk and dirt trails.
- Fabricating and installing approximately seven new wayside signs on the improved VC Trail only.

Once National Environmental Policy Act compliance is complete, the trail engineering and design (E&D) and 404 permitting process should take approximately 12 months, trail construction approximately 12 months, Wayside Design Plan approximately 12 months, wayside fabrication approximately 6 months, and wayside installation approximately 4 months. Since the Wayside Design Plan and wayside fabrication can be done concurrently with trail E&D and trail construction, the total project time frame should be approximately 2.5 years.

Figure 1. Location of the Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the DWH Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (PDARP/PEIS) is to “provide and enhance recreational opportunities” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the Provide and Enhance Recreational Opportunities restoration type. The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within both restoration type goals. The project would meet the restoration goals outlined in the PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure, and creating natural resource-related education materials as restoration techniques to increasing the recreational access and recreational opportunities for visitors in the Barataria Preserve Unit.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public’s lost recreational fishing and access to shoreline uses during the DWH Oil Spill. As discussed in the Final PDARP/PEIS, residents and visitors depend on Gulf Coast resources for varied recreation activities, including boating, fishing, wildlife viewing, and beach-going. An estimated 17 million boating, fishing, and other shoreline activity user days were lost throughout the five affected states as a result of the spill, with the losses occurring across multiple years (DWH Trustees 2016). Improving the existing boardwalk at the Barataria Preserve Unit would promote recreational use and wildlife viewing within the park. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of hunting, lost days on the water, and loss of wildlife viewing and shoreline access).

In addition, educational activities provide additional recreational opportunities that improve the connectedness of the public to the environment. These opportunities enhance the community’s stewardship of coastal Gulf resources that were injured and, therefore, inaccessible during the DWH Oil Spill and response activities (DWH Trustees 2016). The proposed project would address losses through education and engagement of Louisiana residents in the restoration and stewardship of natural resources, as well as enhance recreational experiences and wildlife viewing within the park. Visitors accessing the boardwalk and the educational materials are the same user population that the DWH Oil Spill affected and that would benefit from the proposed project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Increase visitor use and access of the VC Trail
- Improve visitor satisfaction of the VC Trail and associated wayside exhibits
- Properly design, construct, fabricate, and install a new VC Trail and approximately seven wayside exhibits on and near it

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be impacted during construction of the facilities included in the project unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both terrestrial and adjacent aquatic habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this Monitoring and Adaptive Management (MAM) plan as more project information is available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating the proposed project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Human attachment to or interest in recreational activities
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need
- Time and resources (e.g., income, transportation) available to participate in recreational activities
- Lack of understanding of the natural sciences, resources, and environment of the Gulf coastal region
- Human attachment to or interest in the environment
- Public opinion of environmental issues
- State of the economy

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the state of the economy changes, and the region was to experience a recession or depression, the public many not be able to afford traveling to and visiting the site. It is likely that the new recreational resources of the park would attract visitors from nearby New Orleans, including tourists from various parts of the country. If the state of the economy is affecting tourist travel to New Orleans, it is possible that the proposed project would be unable to achieve the restoration goal of education and outreach to promote engagement in the stewardship of natural resources. Likewise, if the public's interest in outdoor recreational activities wanes, visitor use of the project site would decrease. Therefore, the project could no longer achieve the restoration goal of increasing recreational opportunities at the park. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Optimum location of outreach materials or opportunities to maximize public access or participation
- Optimum medium to communicate information (e.g., visual, written, oral materials)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improvements to the park facilities would attract increased public use to the Barataria Preserve Unit. However, anticipated user data for the project were not collected (e.g., recreational users in the area were not polled for anticipated use of the new facilities). Therefore, the ability of the proposed project to increase recreation use in the area is unknown. Likewise, the potential project impacts on the local environment based on anticipated user numbers is not fully known at this time. Impacts to the environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental impacts of the project are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH NRDA restoration projects. The sections below outline the proposed project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

Five "core performance" monitoring parameters have been identified for the project that are consistent with the Monitoring and Adaptive Management Procedures and Guidelines Manual (Table 1; DWH Trustees 2017). Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).

Table 1. Project-specific Objectives and Performance Monitoring Parameters for the Barataria Preserve Unit Project

Project-specific Objective	Objective-specific Performance Monitoring Parameters
Increase visitor use and access of the Visitor Center (VC) Trail	• Visitor Use and Access: Number of visitors using/accessing the trail before and after replacement • Right of Entry: The number of days the trail is open and closed to the public
Improve visitor satisfaction of the VC Trail and associated wayside exhibits	• Visitor Satisfaction: Visitor feedback on their level of satisfaction with the trail and wayside exhibits • Educational Materials: Type and number of educational materials (i.e., wayside signs), as well as a summary of the information presented in the educational materials
Properly design, construct, fabricate, and install a new VC Trail and approximately seven wayside exhibits on and near it	• Infrastructure Completed as Designed: Confirmation from the project manager and/or contracting officer's representative that contractual obligations for these items have been met by the contractors

Section 2.2 outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use monitoring guidance in the MAM Manual (DWH Trustees 2017) to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Automated counting devices should be used to note the number of visitors using the trail. A counter near the entrance of the VC Trail would be used to determine if visitor use and access have increased post-project. Counts of vehicles entering the VC parking area may also be used to look at visitor use numbers of that general VC area versus the VC Trail specifically to help separate out what is happening on the trail from larger visitation trends. For this project, it is recommended that a counter be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Leggett (2015, 2017).

For the proposed project, the priority area for counts should be located near the VC Trail entrance. By establishing the monitoring location here, there is an ability to count the number of recreational users that access the project site.

The use/access counts should be conducted both pre- and post-construction of the improved boardwalk and signage to establish a baseline and assess any change. To determine the number of users accessing the project site, counts should be conducted for a predetermined number of months (e.g., four to six) during different times of the year, one year before the project and one year after. The months each year should be the same and should capture the range of visitation there, including the peaks. Since the counter is an automated device, it can run all day every day so that morning, afternoon, evening, weekday, weekend, and holiday visitation are all captured. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday or in the morning versus midday). The exact timing and frequency of monitoring would be determined later, prior to the beginning of data collection.

If 1 year after the project is complete, the number of recreational visitors is low, corrective actions should be used to increase recreational use at the project site. Potential corrective actions could include public outreach and “marketing” for the project (e.g., press releases promoting the improvements at the park). Promoting the improved and new boardwalk features may increase the user attendance at the project site. If necessary, another 6 to 12 months of monitoring could occur after the corrective actions have been implemented in order to determine if those actions increased user participation at the project site.

2.2.2 Parameter 2: Right of Entry

The project point of contact would document the number of days the trail is open and closed, information on restrictions in place due to severe weather, or other similar information that may restrict access to the area. This information would help inform visitor rates as well as visitor satisfaction of the restoration project.

2.2.3 Parameter 3: Educational Materials

The nature and distribution of educational materials (i.e., wayside exhibits) would be determined in the design phase. During that time, NPS would engage the public and solicit input to ensure materials are relevant, meaningful, and accepted by stakeholders. This would proactively increase the likelihood of visitor satisfaction with the educational materials. Visitor satisfaction surveys, as described below, could also inform future design and/or installation of signs elsewhere in the park.

2.2.4 Parameter 4: Visitor Satisfaction

The recommended methodology for monitoring visitor satisfaction with the VC Trail and the educational materials involves visitor survey cards.

The user surveys should be administered before and after the project at the project site and include questions that determine level of satisfaction. Survey cards can be made available at 1) the Visitor Center where park staff encourage visitors to fill out the card, and/or at 2) the entrance to the VC Trail. Survey respondents would self-select for filling out the cards. Visitor survey cards are commonly and extensively used by NPS to determine the experience and satisfaction level of park visitors.

The surveys could correspond to the same months that the visitor use counts are being collected at the trail. If needed (e.g., there are not enough respondents), the survey could be made available in additional months as well. If this methodology is not used, skewed survey results may occur (e.g., more people recreating on holidays versus a normal weekday). The surveys should be conducted on-site whenever possible, for at least 1 year before and after project implementation.

If after 1 year of post-project monitoring, visitor satisfaction is low, then corrective actions may be taken. Potential corrective actions would most likely include making changes to the Wayside Design Plan so that the other 25 or so wayside exhibits that would eventually be fabricated and installed along the other trails in this area have the best possible content and are optimally located.

2.2.5 Parameter 5: Infrastructure Completed as Designed

In order to ensure the infrastructure (trail and signage) is completed as designed, NPS would consult with the onsite project manager (PM) and/or contracting officer's representative (COR) (often the same person). It is the PM/COR's responsibility to ensure that all contracted activities are completed as designed. The PM/COR should be consulted at project milestones along the way. The project monitor (i.e., park employee in charge of coordinating monitoring) can get a project schedule and any other project information from the PM/COR in order to determine when he/she should check in with the PM/COR on project progress.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Barataria Preserve Unit project proposes to use standard engineering specifications and tried-and-tested construction methodology for re-building the boardwalk and interpretive signage. No novel restoration approaches would be used for this small-scale, localized project. In addition, all project features would be constructed within a reasonable timeframe (approximately 2.5 years from planning and design to final construction).

Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct boardwalk and signage. For these reasons, adaptive management would not be used for this project. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used (Table 2). Monitoring may also inform future project decisions, such as the design and installation of future educational wayside signs.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor Use and Access: Number of visitors using/accessing the trail before and after replacement	Higher visitation rates are occurring following implementation of the restoration elements and services.	Implement public outreach and "marketing" for the project (e.g., press releases or announcements promoting the new features at the Barataria Preserve Unit Preserve).
Visitor Satisfaction: Visitor feedback on their level of satisfaction with the trail and wayside exhibits	Visitors are more satisfied with the new trail and wayside exhibits (i.e., educational materials). Nature of educational materials presented in the interpretive signage is appropriate for visitors.	Make changes to the Wayside Design Plan so that the other 25 or so wayside exhibits that would eventually be fabricated and installed along the other trails in this area have the best content they can and are optimally located.
Infrastructure Completed as Designed: Confirmation from the project manager (PM) and/or contracting officer's representative (COR) that contractual obligations for these items have been met by the contractors	Project is designed, constructed, and implemented according to plans and permitting requirements.	Work with the PM/COR to ensure that all contract terms and permit requirements are met.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, all of which are both quantitative and qualitative and based on the project's goals and objectives:

- Higher improved visitation rates are taking place following implementation of the restoration elements and services.
- High user satisfaction is taking place following implementation of the restoration elements and services.
- The Barataria Preserve Unit restoration project is designed, constructed, and implemented according to plans and permitting requirements.

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met could include the following:

- Summarizing visitor use rates before and after implementation of the restoration implementation, including an evaluation of patterns in use such as peak and dormant seasons. This would also take into consideration the time in which the trail is closed (e.g., due to flooding) and other outside factors that may influence visitor rates in the area.
- Review visitor survey cards, tabulate responses, identify differences between "before" and "after" responses, summarize conclusions. Capture all of this in short monitoring reports.
- All other data/information (e.g., confirmation that infrastructure is completed as designed, that the final wayside designs are developed, etc.) can be captured in memoranda to the file.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for three monitoring parameters for the project (see Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (2018–2019)	**Construction (2019–2020)**	**Post-construction (2020)**
Visitor Use and Access: Number of visitors using/accessing the trail before and after replacement	X		X
Right of Entry: the number of days the trail is open and closed to the public	X		X
Educational Materials: type and number of educational materials (i.e., wayside signs), as well as a summary of the information presented in the educational materials	X		
Visitor Satisfaction: Visitor feedback on their level of satisfaction with the trail and wayside exhibits	X		X
Infrastructure Completed as Designed: Confirmation from the project manager and/or contracting officer's representative that contractual obligations for these items have been met by the contractors		X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

A description of the data to be collected as part of this MAM plan is described in Table 4. These are approximations, exact data description information would be determined before monitoring begins.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor Use and Access: Number of visitors using/accessing the trail before and after replacement	Total counts of users	Automated counting device	4 to 6 months per year during park hours for 1 year before and after construction	Near entrance to Visitor Center (VC) Trail Approximately 120–180 days of data
Right of Entry: the number of days the trail is open and closed to the public	Count of days closed	Observe as occurring	Every day for approximately 1 year before and after construction. Park records may allow going back more than 1 year	Desktop exercise Continuous
Educational Materials: type and number of educational materials (i.e., wayside signs), as well as a summary of the information presented in the educational materials	Communication with public during design phase	Online and possibly public meeting	Online comments for up to 1 month or so; up to two public meetings	See previous
Visitor Satisfaction: Visitor feedback on their level of satisfaction with the trail and wayside exhibits	Visitor survey cards	Cards made available to visitors who wish to complete them	4 to 6 months per year for 1 year before and after construction. Possibly more months if more responses are needed	Inside Barataria Visitor Center and/or at entrance to VC Trail Respondents would self-select for participation so the quantity is unknown
Infrastructure Completed as Designed: Confirmation from the project manager (PM) and/or contracting officer's representative (COR) that contractual obligations for these items have been met by the contractors	Verbal communication with PM/COR and contract-related documents	Verbal communication and/or email with the PM/COR. Memorandum to file.	As project milestones dictate or more often if the project monitor wishes	Over telephone, email, or in person As project milestones dictate or more often if the project monitor wishes

All data would be collected either by hand, on monitoring or survey forms, by tablet on electronic forms, using an automated counting device, in person, over the phone, or via email. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that NPS can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for NPS to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016:Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016:Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016:Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.

3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the one-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes reviewing and approving MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communicating regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, NPS is responsible for developing the MAM plan, conducting all monitoring activities, evaluating project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, NPS, is responsible for all maintenance activities and costs related to the new and improved features proposed at the Barataria Preserve Unit, including any repairs needed over the life of the boardwalk or signage.

10 REFERENCES

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	February 9, 2018	Draft MAM Plan	N/A
2	March 19, 2018	Revisions provided by DOI	Simplification and reorganization of objectives and monitoring methods

APPENDIX C19

Draft Monitoring and Adaptive Management Plan

Des Allemands Boat Launch

1 INTRODUCTION

St. Charles Parish is proposing to construct a new boat launch facility with four 12-foot-wide boat launch ramps and adjacent fishing piers, also known as the Des Allemands Boat Launch project. The proposed project site is an undeveloped 15-acre parcel of private land located in St. Charles Parish, approximately 0.85 mile south of Des Allemands, Louisiana (Figure 1). The property was previously under agricultural production; no public recreational use has been recorded for this property. In 2012, St. Charles Parish adopted Ordinance No. 12-6-1, which approved an agreement to make an irrevocable donation with the landowner for approximately 3 acres of property. This agreement has since expired; therefore, the parish is exploring options with the landowner to renew the previous agreement and acquire approximately 15 acres of property for public recreational use.

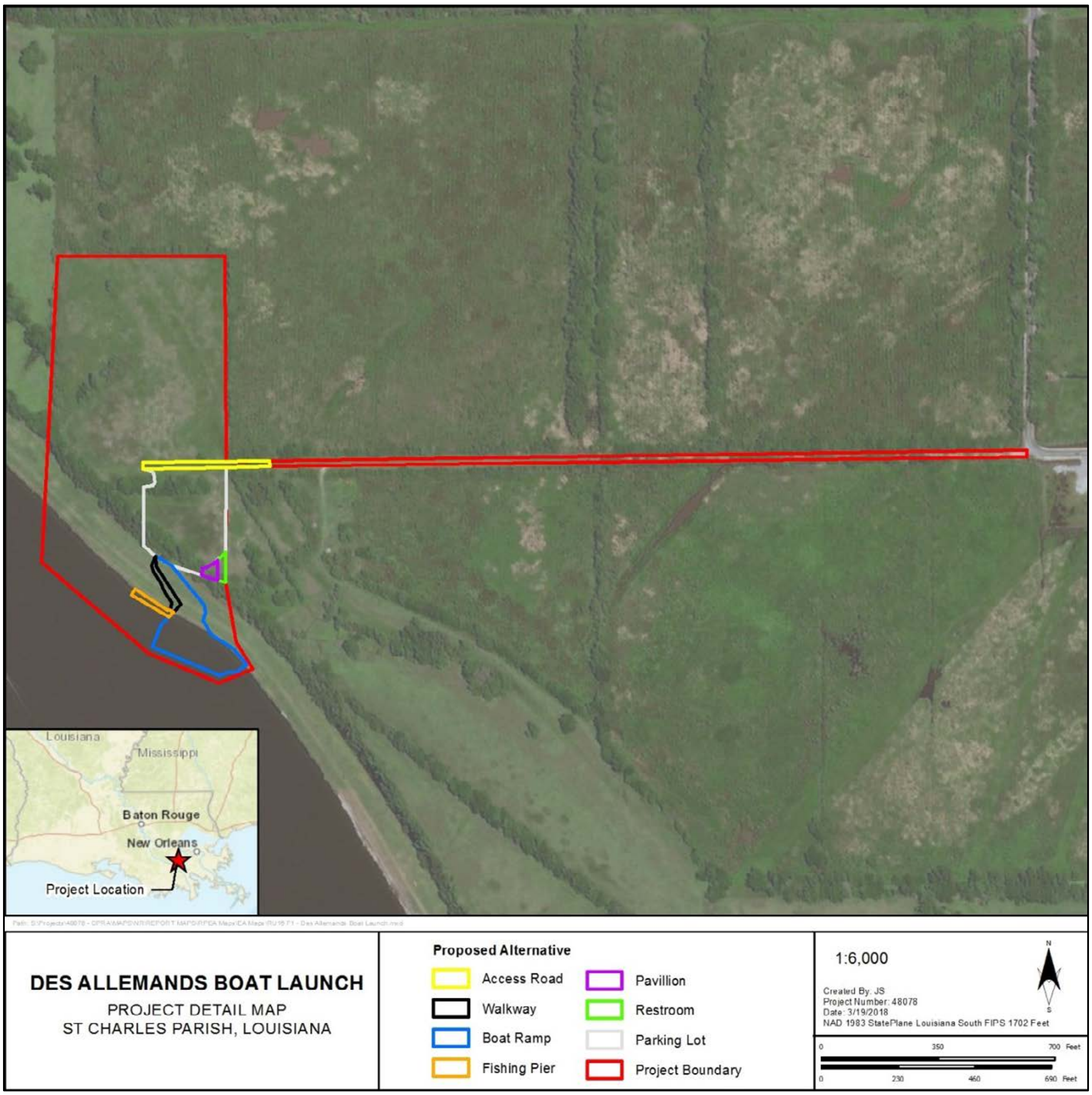

Figure 1. Location of the proposed Des Allemands Boat Launch project.

The proposed project would provide public access to the surrounding waterways for various recreational activities such as fishing, hunting, trapping, frogging, trawling, skiing, recreational boating, swimming, and sightseeing. This new public boat launch would replace the existing, single ramp launch located approximately 2 miles to the north under the Highway 90 Bridge crossing. The existing launch has a single ramp with limited parking and unsafe access that requires blocking of public streets to back onto the ramp. Additionally, the existing ramp becomes blocked and unusable by emergency personnel during storm surge events.

The proposed project would include construction of a new boat launch on the east bank of the Bayou Des Allemands. The new boat launch would accommodate parking for up to 60 vehicles hitched to trailers at a time, as well as on-site parking for an additional eight single cars without trailers. In addition, the proposed project would include signage, lighting, fishing piers, bulkheads, and an access road from Louisiana Highway 632. Additional recreation enhancements would include a restroom building, sewage treatment facility, pavilion, and additional parking, depending on available budget.

The new launch facility would include construction of the following:

- One 2,415-foot-long × 22-foot-wide asphalt access road with adjacent drainage improvements for boat ramp traffic from Louisiana Highway 632 to the paved parking lot
- One paved parking lot with up to 60 spaces (34 initial and 26 additional as budget allows) large enough to accommodate a vehicle with a trailer as well as eight single car spaces, two of which would be ADA compliant
- One 242-foot-long × 24-foot-wide paved boat ramp from the paved parking lot to the four launch ramps at Bayou Des Allemands
- Four 70-foot-long × 12-foot-wide concrete boat launch ramps with an adjacent approximately 13,500-square-foot maneuvering area
- Three 70-foot-long × 8-foot-wide (560-square-foot each) wooden docks constructed of treated wood
- One 140-foot-long × 7-foot-wide fishing pier constructed of treated wood
- Approximately 385 linear feet of coated steel bulkhead
- One 375-square-foot covered pavilion, as budget allows
- One 250-square-foot, pre-fabricated restroom facility with associated Delta 500 sewer treatment plant, as budget allows
- One 300-foot-long × 5-foot-wide concrete walkway for foot traffic from the pavilion to the parking area, with one additional 350-foot-long × 5-foot-wide timber walkway over the levee to the fishing pier

Implementation of the proposed project is expected to take approximately 12 months, including final engineering and design, permitting, contracting, and construction, subject to approval of permits. A conceptual design has already been developed, and preliminary planning has been completed. Final engineering and design, permitting, and mitigation are anticipated to take approximately 4 months. Contracting and pre-construction activities are anticipated to take approximately 2 months. Construction is anticipated to take approximately 6 months.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal, as it is designed to enhance recreational such as fishing, hunting, trapping, frogging, trawling, water skiing, recreational boating, swimming, camping, and sightseeing both by increasing visitation and enhancing the quality of future recreational visits to the area. The proposed project would meet the restoration goals outlined in the PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique, to increase the recreational opportunities in numerous water bodies, including the Lake Des Allemands, Petit Lake Des Allemands, Bayou Gauche, Lake Salvador, Lake Cataouatche, and other Barataria Basin waterways.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) And Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the boat launch and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of the project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development by improving an existing boat launch facility with two 12-foot-wide boat launch ramps and a staging slip.
- Enhance public access by improving the availability of recreational opportunities by building a parking lot and access road at the boat launch, as well as boardwalks and staging slips, as budget allows.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of the parking lot, access road, pavilion, restroom, or concrete walkway unless erosion control measures are implemented. Post-construction, hydrology at and around these facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating this boat launch project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the land use at the proposed boat launch is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, beach-going, camping, and boating. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Ability of St. Charles Parish to obtain the 15-acre parcel
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new recreational facilities would attract public use to Bayou Des Allemands based on the project's proximity to the larger surrounding towns of Des Allemands, Bayou Gauche, and Paradis. However, anticipated user data for the project were not collected (e.g., boaters and/or anglers in the area were not polled for anticipated use of the new boat launch facility). Therefore, the ability of the new launch to increase recreation use in the area is unknown. Likewise, the potential project impacts on the local community of Des Allemands, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the community and environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental and socioeconomic impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment NRDA restoration projects. The sections below outline the Des Allemands Boat Launch project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goals and project-specific objectives are related to increasing and enhancing recreational use in the Bayou Des Allemands area. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any recreational use restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, as the Des Allemands Boat Launch project objectives include building facilities to increase recreation use in the area, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The preferred methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the boat launch gate. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the project, the priority areas for counts would be at the boat launch itself. By establishing the monitoring location at the boat launch, the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.). Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing lights at the launch) and/or routine maintenance activities (e.g., re-paving the launch walkways if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameters 1 and 2 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a 1-year time frame (planning, engineering and design, and pre-construction work is anticipated to take approximately 6 months; construction approximately 6 months). If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Des Allemands Boat Launch project proposes to utilize standard engineering specifications and tried-and-tested construction methodology for standard boat launches. No novel restoration approaches would be used for this small-scale, localized project. In addition, this project is proposed to occur over a 12-month period, which is a standard and realistic timeframe. As this project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct a boat launch at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project’s goals and objectives:

- Improved visitation rates following implementation of the restoration elements and services
- The Des Allemands Boat Launch project is designed, constructed, and implemented according to plans and permitting requirements

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.

- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the project facilities. Or, it may be possible to compare the number of users at the project site to other boat launch facilities in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates following implementation of the restoration elements and services	Public outreach and marketing for the project (e.g., news articles or signage promoting the new recreational facilities)
Infrastructure completed as designed	Project designed, constructed, and implemented according to plans and permitting requirements	Working with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (6 months)	Construction (6 months)	Post-construction (1 year)
Visitor Use and Access			X
Infrastructure Completed as Designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Descriptions of the data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the boat launch 72 monitoring sessions would be completed during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that St. Charles Parish can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for St. Charles Parish to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
    a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
    a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
    a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, St. Charles Parish is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, St. Charles Parish, is responsible for all maintenance activities and costs related to the new boat launch and associated structures, including any repairs needed over the life of the facility.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C20

Draft Monitoring and Adaptive Management Plan

Middle Pearl

1 INTRODUCTION

The Pearl River State Wildlife Management Area (WMA) is managed by the Louisiana Department of Wildlife and Fisheries (LDWF) in St. Tammany Parish, to the east of Slidell, Louisiana. Located within the WMA is an existing boat launch facility on the south side of Louisiana Highway 90 (Chef Menteur Highway), and to the west of the Middle Pearl River. The existing site consists of an unimproved ramp approximately 50 feet in width, an approximately 18-foot-wide × 150-foot-long access road, an approximately 23,000-square-foot parking area, and an approximately 40 × 150-foot staging area that has silted in over the past 5 years. The existing site has been used by the public for water access over the past 60 years. The existing launch is deteriorating and in need of stabilization for continued safe use.

LDWF is proposing the Middle Pearl project, which would involve improvement of an existing boat launch facility with two boat launch ramps and a staging slip. The project would provide a safe boat launch to access numerous water bodies, including the Middle Pearl River, tributaries to the Pearl River, Little Lake, Lake Pontchartrain, and Lake Borgne in southeast Louisiana. Additional project elements would include three floating mooring piers, lighting, signage, upgraded parking, and a boardwalk/dock along the river, depending on available budget. The proposed project is located within the Pearl River State WMA in St. Tammany Parish, to the east of Slidell, Louisiana (Figure 1). The proposed project would provide public access to the surrounding waterways and the Pearl River WMA for various recreational activities such as fishing, hunting, trapping, frogging, trawling, skiing, recreational boating, and sightseeing.

The proposed project would include improvement of the existing boat launch on the west bank of the Middle Pearl River. The proposed project would accommodate parking for approximately 20 vehicles hitched to trailers, as well as on-site parking for a few additional single cars without trailers. In addition, the project would include signage, lighting, boardwalks/docks around the perimeter of the parking area, and an access road from Louisiana Highway 90. Potential additional project elements include increased parking area, a boardwalk/dock on the river frontage, and dredging of the staging slip as budget allows. For planning purposes, it is assumed that the proposed project would permanently impact the entire 1-acre site.

The new launch facility would include construction of the following:

- One approximately 200-foot-long × 20-foot-wide access road for boat ramp traffic from Louisiana Highway 90 to the parking lot
- One crushed limestone parking area with up to 20 spaces large enough to accommodate a vehicle with a trailer as well as additional single car spaces
- One 65-foot-long × 45-foot-wide concrete boat launch ramp with room for two lanes
- Three 60-foot-long × 6-foot-wide (1,080-square-foot total) floating docks constructed of treated wood
- One 150-foot-long × 40-foot-wide staging slip, as budget allows
- One 200-foot-long × 6-foot-wide (1,200-square-foot) boardwalk constructed of treated wood to access the staging slip, as budget allows
- One 100-foot-long × 6-foot-wide boardwalk along the riverfront, as budget allows
- Dredging of staging slip, as budget allows

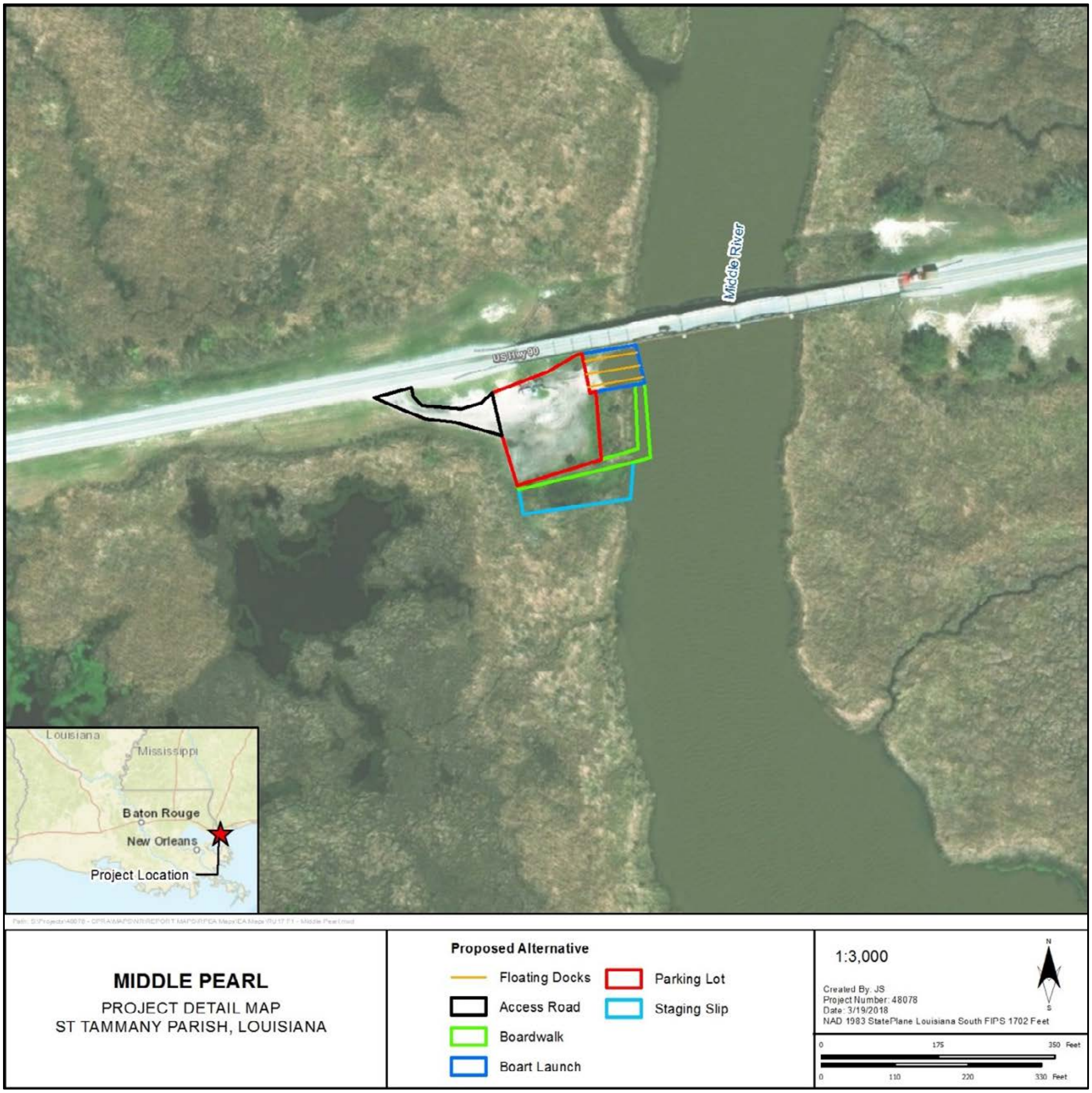

Figure 1. Location of the proposed Middle Pearl project.

The proposed project is expected to take approximately 12 months from start to finish, subject to approval of permits and environmental review. A conceptual design has already been developed. Preliminary planning and project commencement activities are anticipated to take approximately 3 months. Engineering and design are anticipated to take approximately 5 months. Contracting and pre-construction activities are anticipated to take approximately 3 months, and construction is anticipated to take approximately 2 months.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational uses such as fishing, hunting, trapping, frogging, water skiing, recreational boating, and sightseeing both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique to increase the recreational opportunities in numerous water bodies, including the Middle Pearl River, tributaries to the Pearl River, Little Lake, Lake Pontchartrain, and Lake Borgne in southeast Louisiana

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the boat launch and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of the project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development by enhancing an aging launch facility; enhancements would include an updated boat launch and three floating docks.
- Enhance public access by improving the availability of recreational opportunities by building a parking lot and access road at the boat launch, as well as boardwalks and staging slip, as budget allows.

The objectives of this project must be refined upon completion of the engineering and design phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of other facilities, such as the parking lot, unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around constructed facilities could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating this boat launch project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of this project. For example, if the land use at the proposed boat launch is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, hunting, trapping, frogging, water skiing, recreational boating, and sightseeing. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for this project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Availability of funds for all project components
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash, etc.)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improved recreational facilities would attract public use to the Middle Pearl River and the numerous surrounding water bodies due to its proximity to the larger surrounding towns of Slidell, Eden Isle, Wimbledon Estates, and Alton, along with nearby Pearlington, Mississippi. However, anticipated user data for the project was not collected (e.g., boaters and/or anglers in the area were not polled for anticipated use of the improved boat launch facility compared to existing conditions). Therefore, the ability of the improved launch to increase recreation use in the area is an unknown. Likewise, the potential project impacts on the local community and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the community and environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental and socioeconomic impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment NRDA restoration projects. The sections below outline the Middle Pearl project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goals and project-specific objectives are related to increasing and enhancing recreational use in the Pearl River and its tributaries. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any recreational use restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, as the Middle Pearl project objectives include building facilities to increase recreation use in the area, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The recommended methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the boat launch gate. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the project, the priority areas for counts would be at the boat launch itself. By establishing the monitoring location at the boat launch, the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing lights at the launch) and/or routine maintenance activities (e.g., re-paving the launch lot if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameter 1 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon) Total counts can be obtained from mandatory self-clearing permit station for launch use.	Cursorial survey	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a 1-year time frame (planning and design are anticipated to take approximately 8 months; construction approximately 4 months). If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Middle Pearl project proposes to utilize standard engineering specifications and tried-and-tested construction methodology for standard boat launches. No novel restoration approaches would be used for this small-scale, localized project. In addition, this project is proposed to occur over a 12-month period, which is a standard and realistic timeframe. As this project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct a boat launch at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project's goals and objectives:

- Improved visitation rates following implementation of the restoration elements and services
- The Middle Pearl project is designed, constructed, and implemented according to plans and permitting requirements

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the project facilities. Or, it may be possible to compare the number of users at the project site to other boat launch facilities in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates following implementation of the restoration elements and services	Public outreach and marketing for the project (e.g., news articles or signage promoting the new boat launch facilities)
Infrastructure completed as designed	Project designed, constructed, and implemented according to plans and permitting requirements	Working with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (11 months)	Construction (2 months)	Post-construction (1 year)
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Descriptions of the data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing & Frequency	Location & Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users.	Direct observation conducted in-person and on-site.	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the boat launch 72 monitoring sessions would be completed during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets and photographs confirming construction is completed to the engineering specifications and permit requirements.	Direct observation conducted in-person and on-site. Or Counts of mandatory self-clearing permits deposited in check-out box.	During project implementation, daily Once after project is constructed.	On-site. The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that LDWF can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for LDWF to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project’s progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project’s progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for “addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group” (DWH Trustees 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, LDWF is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, LDWF, is responsible for all maintenance activities and costs related to the new boat launch facility, including any repairs needed over the life of the project elements.

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11 MAM PLAN REVISION HISTORY

Version No.	Date Updated	Reason for Update	Summary of Changes
1	March 21, 2018	Draft MAM Plan	N/A

APPENDIX C21

Draft Monitoring and Adaptive Management Plan

Improvements to Grand Avoille Boat Launch

1 INTRODUCTION

St. Mary Parish is proposing the Improvements to Grand Avoille Boat Launch project to replace the existing boat launch (which is deteriorating), provide enhancements to the access road and parking area, and provide mooring piers. The project would provide a safe boat launch facility to access numerous water bodies, including Grand Avoille Cove, the Charenton Drainage and Navigation Canal, Bayou Teche, Lake Fausse Pointe, West Cote Blanche Bay, the Atchafalaya River Basin, and the Gulf of Mexico. The project is located in St. Mary Parish, to the north of Charenton, Louisiana (Figure 1). The project is on the eastern side of the Charenton Drainage and Navigation Canal and on the western side of the West Atchafalaya Basin Spillway Levee Road.

Figure 1. Location of the proposed Improvements to Grand Avoille Boat Launch project.

The existing site is owned by the State of Louisiana and has been used by the public for individual camps and water access over the past 60 years. The state originally created three lots, Campsite Lots 8, 9, and 10, to lease for individual campsites. St. Mary Parish leased Campsite Lot 9 and constructed the boat launch to give the public access to the water. An approximately 190 × 90-foot parking area was made available on the lot when the boat launch was constructed. The parking area can accommodate up to 20 vehicles with trailers, assuming a 10-foot-wide space per vehicle. After many years of use, the boat launch is deteriorating and is in need of repair.

The project would include replacement of the existing boat launch on the 0.54-acre lot. The parking area would be improved by adding 8 inches of crushed limestone, and the access road would be resurfaced with 6 to 8 inches of aggregate. Two timber mooring docks would be constructed to provide enhanced public access to the water for recreational use, including fishing, swimming, boat mooring, and wildlife viewing. For planning purposes, it is assumed that the project would permanently impact the entire 0.54-acre site. Although the project is primarily enhancement of an existing facility and no vegetation is anticipated to be removed, the 0.54-acre site is considered the development envelope.

The new launch facility would include construction of the following:

- One approximately 190 × 90-foot parking lot with enough room to accommodate up to 20 vehicles with trailers. The existing 13,856-square-foot parking lot would be topped with 8 inches of compacted limestone.
- One 45-foot-long × 30-foot-wide aggregate covered access road for boat ramp traffic from the West Atchafalaya Basin Spillway Levee Road to the parking lot
- One 20-foot-long × 31-foot-wide concrete boat ramp from the parking lot to the boat launch ramp
- One 20-foot-long × 25-foot-wide boat launch ramp to the Charenton Drainage and Navigation Canal
- Two 24-foot-long × 8-foot-wide wooden docks constructed of treated wood. Six timber piles would be installed per dock.

The project is expected to take approximately 12 to 13 months for final engineering and design (E&D), permitting, contracting, and construction. A conceptual design has already been developed. Preliminary planning and project commencement activities are anticipated to take approximately 3 months. E&D are anticipated to take approximately 5 months. Contracting and pre-construction activities are anticipated to take approximately 3 months. Construction is anticipated to take approximately 2 months.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to "provide and enhance recreational opportunities" across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type "provide and enhance recreational opportunities." The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique to increase the recreational opportunities in the Atchafalaya River Basin area.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public's lost recreational fishing and access to shoreline uses during the DWH Oil Spill. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the boat launch and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of this project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development by improving a publicly accessible boat launch on the east side of the Charenton Drainage and Navigation Canal.
- Enhance public access by improving the availability of recreational opportunities by improving a parking lot at the boat launch that accommodates up to 20 vehicles with trailers.

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of the parking lot or access road unless erosion control measures are implemented. Disturbed areas, such as those that would be cleared during construction, could create an opportunity for invasive plant species to establish and spread unless monitoring and maintenance activities are conducted to ensure the success of restored temporary impact areas. Post-construction, hydrology at and around the parking lot and access road could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating this boat launch project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the land use at the proposed boat launch is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, beach-going, camping, and boating. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project’s goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the new recreational facilities would attract public use to Atchafalaya River Basin area based on the project's proximity to the larger surrounding towns of Charenton, Jeanerette, Baldwin, Franklin, and New Iberia. However, anticipated user data for the project was not collected (e.g., boaters and/or anglers in the area were not polled for anticipated use of the new boat launch facility). Therefore, the ability of the improved launch to increase recreation use in the area is an unknown. Likewise, the potential project impacts on the local community of Charenton, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the community and environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental and socioeconomic impacts of the project are also outlined in the Final PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented and ongoing success monitoring is conducted, project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for the project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment NRDA restoration projects. The sections below outline the Improvements to Grand Avoille Boat Launch project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each Restoration Type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goals and project-specific objectives are related to increasing and enhancing recreational use in the Atchafalaya River Basin area. The project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second objective-specific monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any recreational use restoration project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the Final PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, as the Improvements to Grand Avoille Boat Launch project objectives include building facilities to increase recreation use in the area, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The preferred methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the boat launch gate. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the project, the priority areas for counts would be at the boat launch itself. By establishing the monitoring location at the boat launch, the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing lights at the launch) and/or routine maintenance activities (e.g., re-paving the launch lot if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameters 1 and 2 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

For the project, it is recommended that monitoring occur for at least 1 year after project implementation.

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a one-year time frame (planning and design are anticipated to take approximately 10 months; construction approximately 2 months). If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5).

Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Improvements to Grand Avoille Boat Launch project proposes to utilize standard engineering specifications and tried-and-tested construction methodology for standard boat launches. No novel restoration approaches would be used for this small-scale, localized project. In addition, this project is proposed to occur over a 12-month period, which is a standard and realistic timeframe. As this project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct a boat launch at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project's goals and objectives:

- Improved visitation rates following implementation of the restoration elements and services
- The Improvements to Grand Avoille Boat Launch project is designed, constructed, and implemented according to plans and permitting requirements

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the project facilities. Or, it may be possible to compare the number of users at the project site to other boat launch facilities in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates following implementation of the restoration elements and services	Public outreach and marketing for the project (e.g., news articles or signage promoting the improved boat launch)
Infrastructure completed as designed	Project designed, constructed, and implemented according to plans and permitting requirements	Working with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (10 months)	Construction (2 months)	Post-construction (1 year)
Visitor use and access			X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Descriptions of the data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	**Collection Method**	**Timing and Frequency**	**Location and Quantity**
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	At the boat launch 72 monitoring sessions would be completed during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	During project implementation, daily Once after project is constructed	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. <u>Data verification</u>: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. <u>Data procurement</u>: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. <u>Data validation and final QA/QC</u>: Ensure that St. Mary Parish can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. <u>Information package creation</u>: Guidance for St. Mary Parish to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.
2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the Final PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, St. Mary Parish is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, St. Mary Parish, is responsible for all maintenance activities and costs related to the boat launch, including any repairs needed over the life of the facility.

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11 MAM PLAN REVISION HISTORY

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1	March 21, 2018	Draft MAM Plan	N/A

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APPENDIX C22

Draft Monitoring and Adaptive Management Plan

Belle Chasse

1 INTRODUCTION

Plaquemines Parish is proposing the Belle Chasse project, also known as the Walker Road Boat Launch, which is located approximately 3 miles southwest of Belle Chasse, Louisiana, on the northern side of the Hero Canal and on the southern side of Walker Road (Figure 1). The proposed project would involve construction of a new boat launch on the site of what is currently an unimproved public boat launch. The existing site is owned by Plaquemines Parish and has been used by the public for water access for many years. Existing parking on the property is accomplished by parking on the side of a dirt road. The parking area can accommodate approximately six vehicles with trailers, assuming a 40-foot-long space per vehicle. After many years of use, the existing boat launch is in need of repair.

Figure 1. Proposed Belle Chasse project location.

The proposed project would include installing a pre-cast concrete ramp at the existing boat launch on Walker Road. The currently informal parking area would also be formally designated and constructed, by adding 6 to 8 inches of crushed limestone over the existing surface. The proposed project would provide a safe boat launch facility to access numerous water bodies, including Hero Canal, the Gulf Intracoastal Waterway, Barataria Bay, and the Grand Isle area. The boat launch would provide enhanced public access to the water for recreational use, including fishing and boating. The new facility is anticipated to have an average of 3,500 users per year. The estimated cost of the proposed project is $250,000 and is expected to take approximately 12 months from start to finish, subject to approval of permits and environmental review. A conceptual design has already been developed. Preliminary planning and project commencement activities are anticipated to take approximately 3 months. Engineering and design (E&D) are anticipated to take approximately 3 months. Contracting and pre-construction activities are anticipated to take approximately 3 months, and construction is anticipated to take approximately 3 months.

1.1 Restoration Type Goals and Project Restoration Objectives

One of the five programmatic goals for restoration, as outlined by the Deepwater Horizon (DWH) Oil Spill Trustees (DWH Trustees) in the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) is to “provide and enhance recreational opportunities” across the Gulf Coast (DWH Trustees 2016:Section 1.5.3). Through the restoration planning process, the DWH Trustees then identified 13 distinct restoration types that pertain to the five programmatic goals and further identified specific goals for each restoration type. The project fits within the restoration type “provide and enhance recreational opportunities.” The goals of this restoration type are as follows (DWH Trustees 2016:Section 5.5.14.1):

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
- Use education and outreach to promote engagement in restoration and stewardship of natural resources, which could include education programs, social media, and print materials.

The proposed project falls within the first restoration type goal because it is designed to enhance recreational fishing experiences both by increasing visitation and enhancing the quality of future recreational visits to the area. The project would meet the restoration goals outlined in the Final PDARP/PEIS (DWH Trustees 2016) by constructing infrastructure as a restoration technique to increase the recreational opportunities in Hero Canal and the surrounding waterways.

As described in Chapter 3 of the *Louisiana Trustee Implementation Group Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (Louisiana Trustee Implementation Group [LA TIG] 2018), hereafter referred to as the RP/EA, the proposed project would meet the Oil Pollution Act (OPA) criteria for the trustee restoration goals and objectives because the project has a strong nexus to the public’s lost recreational fishing and access to shoreline uses during the DWH Oil Spill. The recreational opportunities that would be created by the project are the same shoreline uses that were lost as a result of the DWH Oil Spill (e.g., lost user-days of fishing, lost days on the water, and loss of wildlife viewing and shoreline access). Visitors to the boat launch and shoreline area are the same user population that the DWH Oil Spill affected and that would benefit from the project. Therefore, the project represents in-place, in-kind restoration.

The overall objective of the project is to provide and enhance public access to natural resources through recreational use. Specific objectives include the following:

- Enhance public access through infrastructure development by building a publicly accessible boat launch on the northern bank of the Hero Canal.
- Enhance public access by improving the availability of recreational opportunities through the enhancement the existing parking (adding 6 to 8 inches of crushed limestone over the existing parking surface).

The objectives of this project must be refined upon completion of the E&D phase of project development as more project information is developed.

1.2 Conceptual Setting

The conceptual setting for any restoration project is the interaction and linkages between the project and the environment in which it is implemented. It is important to understand how the ecological system may affect the project and how the project may affect the ecological system. This understanding allows the project proponent to identify potential issues that may arise during the implementation and monitoring phases, as well as any long-term maintenance issues that could occur. Information on the existing environmental conditions and potential environmental impacts of the project can be found in the RP/EA in Sections 4.1 and 4.6, respectively (LA TIG 2018).

As noted and approved of in the *Monitoring and Adaptive Management* [MAM] *Procedures and Guidelines Manual Version 1.0* (MAM Manual) (DWH Trustees 2017), the LA TIG has chosen not to include some conceptual setting elements for this type of restoration project. Because this is a Provide and Enhance Recreational Opportunities restoration type, the information necessary to describe the conceptual setting of the project is not as in-depth as some other restoration types. For example, if the project were a Wetlands, Coastal, and Nearshore Habitats restoration type, chemical and biological attributes of the project would need to be considered as part of the conceptual setting. In addition, the critical thresholds of ecological processes and how those thresholds would be affected by the proposed project would also need to be considered.

Some aspects of the ecological system that may be affected include water quality, habitat, and rates of erosion. Water quality may be temporarily degraded during in-water construction activities when soil is disturbed, which could increase turbidity or distribute other pollutants into the water column. Water quality may also be impacted during construction of the parking lot unless erosion control measures are implemented. Post-construction, hydrology at and around the parking lot could be altered, and monitoring would ensure that any resulting erosion issues are identified and resolved as early as possible. Disturbance of both aquatic and terrestrial habitat could increase after construction due to increased recreational opportunities that attract a greater number of recreational users. Additional information about the conceptual setting and impacts to the ecological system should be evaluated and incorporated into this MAM plan as more project information becomes available. The following sections discuss how the project-specific attributes would interact with the environment, and vice versa, as well as what the major drivers are that may influence the outcomes of the project.

1.2.1 Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project (DWH Trustees 2017:Section E.6.3). Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al. 2016). When evaluating this boat launch project, the following outside drivers and stressors were considered:

- Development and changes in land use
- Public acceptance and use
- Sea level rise
- Frequency and intensity of hurricanes
- Public interest or need

This list should not be considered exhaustive; additional drivers may be identified as the project is implemented and/or monitored. These drivers may affect the achievement of the restoration goals and objectives of the project. For example, if the land use at the proposed boat launch is rezoned for commercial, then the project could no longer achieve the restoration goal of increasing recreational opportunities such as fishing, beach-going, camping, and boating. If any drivers are negatively impacting the project, adaptive management may be necessary to ensure the project's goals and objectives are being achieved. The adaptive management strategy for the project is outlined in Section 3 of this plan.

1.2.2 Potential Sources of Uncertainty

Project uncertainties, or information gaps, have the potential to affect adaptive management decisions for restoration projects, such as how to improve the likelihood of achieving the goals and objectives of the project, or identifying corrective actions if the project is not performing as intended. When evaluating this recreational use project, the following uncertainties were considered:

- Ability to attract public use of the area
- Potential impacts to the ecosystem as a result of increased use of the area (e.g., impacts to species and habitat)
- Potential need for ecological restoration (e.g., as a result of increased use of the area)
- Potential impact on local community (e.g., noise related to having too many visitors, trash)

This list should not be considered exhaustive; additional uncertainties may be identified as the project is implemented and/or monitored. During the planning phase of the project, it was assumed that the improved recreational facilities would attract public use to the Mississippi River Basin area based on the project's proximity to the larger surrounding towns of Belle Chasse, Timberlane, and the greater New Orleans area. However, anticipated user data for the project was not collected (e.g., boaters and/or anglers in the area were not polled for anticipated use of the enhanced boat launch facility). Therefore, the ability of the new launch to increase recreation use in the area is an unknown. Likewise, the potential project impacts on the local community of Belle Chasse, Louisiana, and the local environment based on anticipated user numbers is not fully known at this time. Impacts to the community and environment are considered in the RP/EA (LA TIG 2018). Best management practices to mitigate the potential environmental and socioeconomic impacts of the project are also outlined in the PDARP/PEIS (DWH Trustees 2016) and the RP/EA (LA TIG 2018).

As the project is implemented, and on-going success monitoring is conducted, these project uncertainties may become apparent. If negative impacts from the project occur, or if the project is unable to attract recreational users, adaptive management may be necessary to ensure the project's goals and objectives are achieved. The focus for adaptive management is on identifying and, where possible, reducing those uncertainties that affect the decisions within the scope of the project. If not addressed, uncertainties may delay the time it takes to achieve the restoration objectives or hinder the project's ability to fully achieve its objectives. The adaptive management strategy for this project is outlined in Section 3 of this plan.

2 PROJECT MONITORING

Monitoring is necessary to determine if the project achieves the restoration goals and objectives outlined by the LA TIG. To conduct successful project monitoring, parameters need to be established to evaluate progress toward the restoration goals. The monitoring parameters that may be considered should be geared toward resolving project uncertainties, explaining outside drivers, optimizing project implementation, supporting adaptive management and decisions about corrective actions, and informing the planning of future DWH natural resource damage assessment NRDA restoration projects. The sections below outline the Belle Chasse project's monitoring parameters and the methods for measuring these parameters.

Before implementation of this MAM plan, the project team must revisit the monitoring parameters and methods outlined below with the LA TIG to ensure they have been sufficiently updated to incorporate new project information.

2.1 Monitoring Parameters

As identified in the MAM Manual, the DWH Trustees identified two types of monitoring parameters under the "Enhance Public Access to Natural Resources for Recreational Use Restoration Approach" (DWH Trustees 2017):

1. Core performance monitoring parameters applicable to recreational use projects. Core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each restoration type (DWH Trustees 2016:Appendix 5.E.4).
2. Objective-specific performance monitoring parameters that are only applicable to a project based on a particular restoration objective

The restoration goals and project-specific objectives are related to increasing and enhancing recreational use in the Mississippi River Basin area. the project would collect the core performance monitoring parameter of visitor use and access. Visitor use and access, is defined as the "public access to the natural resources or project area and/or the number of visitors using the recreational area" (DWH Trustees 2017:Section E.9.34.1). A second monitoring parameter for the project is specific to the project objective of enhancing recreational access through infrastructure. This second parameter—infrastructure completed as designed—relies on project-specific information, such as engineering drawings, permit requirements, and project schedule to determine if the project is achieving its objectives.

The first parameter fits within the "core performance" monitoring type because it can be used consistently across projects for the Provide and Enhance Recreational Opportunities restoration type; establishing increased visitor use at any recreational use project site can help determine if the project is successful at meeting the restoration type objectives as outlined in the PDARP/PEIS (DWH Trustees 2016:Section 5.5.14.1). Likewise, as the Belle Chasse project objectives include building enhanced facilities to increase recreation use in the area, monitoring for increased visitor use would help determine if the project meets the objectives outlined in Section 1.1 of this MAM plan.

Section 2.2, below, outlines the measurement unit(s) and monitoring methods for each parameter. All methods have been cross-referenced to the recreational use restoration approach for the project to ensure the methods are appropriate.

2.2 Monitoring Methods

The monitoring methods for each parameter are outlined below, along with guidance on how, when, and where to conduct monitoring.

2.2.1 Parameter 1: Visitor Use and Access

The preferred methodology for monitoring this parameter is direct observation. Direct observation includes staging monitoring on-site to count and record the recreational users at the proposed project site. Hand counters and data recording forms should be used to note the number of vehicles, boats, and users at the project site. Establishing a camera on-site to record this information may also be used to determine if visitor use and access has increased at the project site. Other methods for sensing the amount of recreational use at the proposed project site includes use of remote sensing tools such as pressure pads at the boat launch gate. The information generated from remote sensing would not be as accurate as an on-site monitor because only a single pass count of vehicles would be recorded, and the total users and recreational activities being undertaken would need to be estimated. For this project, it is recommended that an on-site monitor be used to gauge the visitor use and access at the proposed project. For guidance and methodologies of how to measure visitor use and access, see Cessford and Muhar (2003), Horsch et al. (2017), Leggett (2015, 2017), Moscardo and Ormsby (2004), and U.S. Fish and Wildlife Service (2005).

Because visitor use patterns may vary depending on the activity, the number of individuals engaged, and the areas these activities take place, the counting locations should be identified at strategic locations that are representative of the whole recreational use area. For the project, the priority areas for counts would be at the boat launch itself. By establishing the monitoring location at the boat launch, the on-site monitor can count the number of vehicles, boats, and recreational users that access the project site. In addition, the monitor can record the types of recreational activities the users are engaged in (such as strictly boating, fishing, etc.).

Data collection should be conducted post-implementation of the facilities and throughout various times of the year; the data collected should be representative of as full a range of site conditions as possible, taking into account varying times of the day, week, or year; seasonal variations; weather variation; and special use occasions such as holidays or community events (DWH Trustees 2017:Section E.9). To accurately determine the number of recreational users at the project site accessing the new facilities, data should be collected during different seasons and on weekdays, weekends, and holidays. If this methodology is not used, skewed results may occur (e.g., more people recreating on holidays versus a normal weekday). Data should be collected on-site whenever possible, for at least 1 year after project implementation.

Data collection would be conducted in a manner that offers six monitoring sessions per month (two weekend sessions and four weekday sessions). These monthly monitoring sessions would capture recreational usage at varying times of day (morning, mid-day, afternoon/evening) to quantify varying usage rates. The total number of 72 survey sessions would be conducted during the 1-year monitoring period. If after 1 year of monitoring, visitor usage and access to the new facilities is low, then corrective actions may be taken. Potential corrective actions could include improving the project infrastructure (e.g., installing lights at the launch) and/or routine maintenance activities (e.g., re-paving the launch lot if ruts/potholes occur). Table 1 outlines the preferred monitoring location, duration, frequency, and sample size for the proposed project.

Table 1. Monitoring Parameters 1 and 2 Methodology

Monitoring Parameter	Location	Frequency	Monitoring Session Length	Sample Size	Duration
Visitor use and access	Boat launch	72 monitoring sessions: 6 sessions per month, 4 weekday sessions (at least 1 in the morning, 1 in the afternoon, and 1 in the evening), 2 weekend sessions (1 in the morning and 1 in the afternoon)	4 hours	Vehicles, vessels, and user counts within 4-hour periods	1 year

2.2.2 Parameter 2: Infrastructure Completed as Designed

The recommended methodology for this monitoring parameter is direct review of project documents and on-site comparison. Reviewing design plans, contractor reports, and permitting and planning documents (such as the RP/EA) would equip the project monitor with all of the relevant information needed to make a decision on whether the project has been implemented properly. On-site inspections during and after project implementation would need to be conducted to accurately compare the as-built project to the specifications outlined in the engineering drawings, project planning documents, and permits. Monitoring would occur during all design stages and construction activities from start to completion. The project is expected to be implemented within a 1-year time frame (planning and design are anticipated to take approximately 8 months; construction approximately 4 months). If the project is not being constructed as designed, planned, and permitted, then the on-site monitor would work with the construction contractor to ensure that all contract terms and permit requirements are met.

3 ADAPTIVE MANAGEMENT

As outlined in the MAM Manual, it is not appropriate for all projects to have an adaptive management plan. Adaptive management is appropriate for large-scale, complicated projects that propose novel restoration techniques or that have high-levels of uncertainty (DWH Trustees 2017:Section 2.4.5). Adaptive management should not be used for projects where learning is unlikely, where decisions are irreversible, or where no opportunity exists to revise or reevaluate decisions based on new information (Doremus et al. 2011).

The Belle Chasse project proposes to use standard engineering specifications and tried-and-tested construction methodology for standard boat launches. No novel restoration approaches would be used for this small-scale, localized project. In addition, the project is proposed to occur over a 12-month period, which is a standard and realistic timeframe. Because the project proposes to establish physical infrastructure, the decision to implement the project is mostly irreversible, as is the opportunity to revise or reevaluate the decision to construct a boat launch at this location. For these reasons, an adaptive management plan is not included in this MAM plan. However, if monitoring determines that the project is not meeting its goals and objectives, then corrective actions should be used. Suggested corrective actions are described in Section 2 and 5 of this document.

4 EVALUATION

The project would be considered successful if it meets the restoration goals and project-specific objectives as outlined in this document. Project performance would be assessed against the following performance criteria, which are qualitative and based on the project’s goals and objectives:

- Improved visitation rates following implementation of the restoration elements and services
- The Belle Chasse project designed, constructed, and implemented according to plans and permitting requirements

Methods for analyzing, evaluating, and interpreting the monitoring data collected for the project to determine if the performance criteria are being met, could include the following:

- Data summarization and characterization: This analysis would include calculation of the basic statistics of the monitoring data (e.g., how many users recreate at the site on a monthly basis). This information would form the basis for more compressive analysis (if needed). Data from this analysis can be presented in both graphical and tabular formats.
- Status determination: This evaluation would help determine if the project is meeting the performance criteria. Observed values from the monitoring efforts would be compared to the performance criteria and perhaps to observed historical values. For example, if the monitoring results indicate there is decreased usage amongst recreational users, there may be an issue with the project facilities. Or, it may be possible to compare the number of users at the project site to other boat launch facilities in the area, to see if project is attracting a comparable number of recreational users. This evaluation methodology would involve both expert interpretation and statistical analysis.
- Trends evaluation: This evaluation methodology can be used to address whether there is a change in the number of recreational users, over time. This analysis can inform how trends form, and if those trends are randomly occurring.

Data evaluation would be refined at a later date when additional project information becomes available.

5 PROJECT-LEVEL DECISIONS: PERFORMANCE CRITERIA AND POTENTIAL CORRECTIVE ACTIONS

Performance criteria and potential corrective actions have been developed for each monitoring parameter for the project (Table 2). Additional corrective actions may be identified post-implementation, as appropriate. This section would be updated to reflect changes throughout project implementation.

Table 2. Performance Criteria and Potential Corrective Actions by Monitoring Parameter

Monitoring Parameter	Final Performance Criteria	Potential Corrective Actions
Visitor use and access	Improved visitation rates following implementation of the restoration elements and services	Public outreach and marketing for the project (e.g., news articles or signage promoting the improved boat launch)
Infrastructure completed as designed	Project designed, constructed, and implemented according to plans and permitting requirements	Working with the construction contractor to ensure that all contract terms and permit requirements are met

6 MONITORING SCHEDULE

The schedule for the project monitoring is shown in Table 3, separated by monitoring activity. The duration of monitoring would be determined prior to implementation of this MAM plan. This information would be added and revised as needed whenever monitoring methods are refined or revised.

Table 3. Project Monitoring Schedule

Monitoring Parameter	Monitoring Timeframe		
	Pre-construction (9 months)	Construction (3 months)	Post-construction (1 year)
Visitor use and access	X		X
Infrastructure completed as designed	X	X	X

7 DATA MANAGEMENT

Qualitative and quantitative data would be collected as part of this MAM plan. The type of data to be collected, as well as how those data would be collected, processed, reviewed, stored, and shared, is outlined below. Section 3 of the MAM Manual (DWH Trustees 2017) provides detailed guidance on data collection, review, storage, and accessibility, and should be followed, along with this MAM plan.

7.1 Data Description

Descriptions of the data to be collected as part of this MAM plan are described in Table 4.

Table 4. Project Data

Monitoring Parameter	Data Description			
	Type of Data	Collection Method	Timing and Frequency	Location and Quantity
Visitor use and access	Total counts of vehicles, boats (or other recreational vehicles), and users	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation 2 randomized weekend surveys and 4 randomized weekday surveys) for 1 year	At the boat launch 72 monitoring sessions would be completed during the 1-year period.
Infrastructure completed as designed	Monitoring datasheets confirming construction is completed to the engineering specifications and permit requirements	Direct observation conducted in-person and on-site	Six counts per month, post-project implementation: 2 weekend monitoring sessions and 4 weekday sessions) for 1 year	On-site The quantity would depend on the construction schedule.

All data would be collected either by hand on monitoring forms or by tablet on electronic forms. If data are recorded on hardcopy field datasheets, these entries would be scanned to a Portable Document Format (PDF) file, and archived, along with the hardcopy. All photographs, datasheets, notebooks, and revised data files would be retained. If data are collected electronically, metadata would be developed for consistency. All electronic files would be stored in a secure location in such a way that the LA TIG would have guaranteed access to all versions of the data.

All data would be collected following the standard guidelines that were developed during early restoration, as discussed in the MAM Manual (DWH Trustees 2017:Section 3.2).

7.2 Data Review

A quality assurance project plan (QAPP) would be required by the LA TIG prior to project implementation. This QAPP would outline the appropriate quality assurance/quality control (QA/QC) process in accordance with the data management section of the MAM Manual (DWH Trustees 2017). The plan should include, at minimum, information and guidance on the following QA/QC procedures:

1. Data verification: Ensure the data were collected correctly, errors are identified and addressed appropriately, and that any metadata are in standard format. In addition, if transcription of data is required, then the QAPP should include a process to verify that the transcription process is completely accurately.
2. Data procurement: Ensure that the submittal of data to the DWH Trustees via the online portal, Data Integration Visualization Exploration and Reporting (DRIVER), is done correctly.
3. Data validation and final QA/QC: Ensure that Plaquemines Parish can adequately conduct a final QA/QC check for non-data entry errors (date/time, latitude/longitude, units, expected value range, etc.).
4. Information package creation: Guidance for Plaquemines Parish to create a public information package.

7.3 Data Storage and Accessibility

MAM data would be stored in the DIVER Restoration Portal or a similar outside data platform. Data would be submitted as soon as possible, but no more than 1 year from when the data were collected. Data would be submitted yearly. Data storage and accessibility would be consistent with the guidelines in Section 3.1.3 of the MAM Manual (DWH Trustees 2017).

7.4 Data Sharing

The LA TIG would ensure that data sharing follows standards and protocols set forth in the Open Data Policy (Trustee Council 2016: Section 10.6.6). No data release can occur if it is contrary to federal or state laws (Trustee Council 2016: Section 10.6.4). The DWH Trustees would provide notification to the Cross-TIG MAM work group when new data and information packages have been uploaded to DIVER (DWH Trustees 2017). In the event of a public records request related to project data and information that are not already publicly available, the trustee to whom the request is addressed would provide notice to the other LA TIG trustees prior to releasing any project data that are the subject of the request.

As noted in Section 7.3, the project's data would be stored in the DIVER Restoration Portal. These data would be shared with the public by publishing the data to the Trustee Council website (Trustee Council 2016: Section 10.6.6). For further instructions on this process, see the DIVER Restoration Portal Manual (National Oceanic and Atmospheric Administration DWH Data Management Team, Undated).

8 REPORTING

Reporting should follow the guidelines set forth in Section 2.6.3 and Attachment D of the MAM Manual (DWH Trustees 2017). Information to be reported includes the following:

1. An introduction that provides an overview of the project, location, and restoration activities, as well as restoration objectives and performance criteria applicable to the project
   a. This information can be taken from this MAM plan and repeated in all reports.

2. A detailed description of the methods used for implementation of the MAM
   a. This information can be taken from this MAM plan and repeated in all reports.
3. Results from the reporting period, or, in the case of the final report, a comprehensive summary of results from the entire MAM plan implementation period
   a. Results should be presented clearly and show progress that has been made toward performance criteria and/or restoration objectives. Information that can be used to present results includes tables or graphs, site visit summaries, and other datasets that support analysis of the project's progress toward meeting performance standard.
4. A discussion of the results (optional for interim reports, required for final report)
5. Conclusions that summarize the findings, progress toward meeting performance criteria and restoration objectives, and recommendations for corrective actions (optional for interim reports, required for final report)
6. Project highlights showcasing lessons learned to inform future project planning and implementation
7. Transmission of data and meta-data used in the report, as well as a description of all data collected during the reporting period, even if they were not used in the report
8. A complete list of references

Three reports should be submitted, excluding any additional reports deemed necessary as a result of corrective actions that require an extension of the monitoring period. The first report should be submitted after the completion of pre-construction monitoring, the second report should be submitted after the completion of construction monitoring, and the third (final) report should be submitted after completion of the 1-year post-construction monitoring.

The DWH Trustees, as stewards of public resources under OPA, should inform the public on the restoration project's progress and performance. Therefore, the LA TIG should report the process of the proposed project via the DIVER Restoration Portal, as outlined in Chapter 7 of the PDARP/PEIS (DWH Trustees 2016).

9 ROLES AND RESPONSIBILITIES

The LA TIG is responsible for "addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group" (DWH Trustees 2016). This includes review and approval of MAM plans, identifying MAM priorities for the Louisiana Restoration Area, ensuring that MAM implementation is compatible with the MAM Manual guidelines and that data are submitted to the Restoration Portal, aggregating and evaluating MAM data, ensuring quality control of MAM data, and communication regarding implementation status and results of MAMs with the Trustee Council and Cross-TIG MAM work group.

As the implementing trustee, Plaquemines Parish is responsible for development of the MAM plan, conducting all monitoring activities, evaluation of project progress toward restoration objectives using the identified performance criteria, identifying the need for and proposing corrective actions to the LA TIG, and submitting MAM data and project information into the Restoration Portal in accordance with the data management procedures outlined within this MAM (Trustee Council 2016).

The project proponent, Plaquemines Parish, is responsible for all maintenance activities and costs related to the boat launch, including any repairs needed over the life of the facility.

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