Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

Barataria Basin Ridge and Marsh Creation Project - Spanish Pass Increment

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1 Introduction

The Deepwater Horizon (DWH) Louisiana Trustee Implementation Group (TIG) developed this Monitoring and Adaptive Management Plan (Plan) for the Barataria Basin Ridge and Marsh Creation Project – Spanish Pass Increment (BA-0203) (Spanish Pass Project), which represents one of six projects selected from within the broader Final Restoration Plan #1: Restoration of Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands, and Birds (LA TIG 2017) in January 2017. The purpose of this Monitoring and Adaptive Management (MAM) Plan is to identify monitoring activities that will be conducted to evaluate and document restoration effectiveness, including performance criteria for determining restoration success or need for interim corrective action (15 CFR 990.55(b)(1)(vii)). Where applicable, the MAM Plan identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. It also establishes a decision-making process for making adjustments where needed.

There are three primary purposes for MAM Plans:

1. Identify and document how restoration managers will measure and track progress towards achieving restoration goals and objectives;
2. Increase the likelihood of successful implementation through identification, before a project begins, of potential corrective actions that could be undertaken if the project does not proceed as expected;
3. Ensure the capture, in a systematic way, of lessons learned or new information acquired that can be incorporated into future project selection, design, and implementation.

The MAM Plan is a living document and may be updated as needed to reflect changing conditions and/or new information. For example, the MAM Plan may need to be revised should the project design change, if initial data analysis indicates that the sampling design requires adjustment, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to the MAM Plan will be made publicly available through the Restoration Portal via the following link (https://www.diver.orr.noaa.gov/web/guest/home) and is also accessible through the Deepwater Horizon NRDA Trustees website via the following link: (https://www.gulfspillrestoration.noaa.gov/).

1.1 Project Overview

The Barataria Basin Ridge and Marsh Creation Project – Spanish Pass Increment (BA-0203) is located in Plaquemines Parish, Louisiana beginning west of Venice, LA (**Figure 1**) and extending 7.5 miles westward over degraded marsh and ridge habitat toward Bay Jacques. The project will

restore approximately 1,683 acres of marsh and 132 acres of ridge (**Figure 1**) through strategic placement of dredge material. It is anticipated that the initial elevation of the marsh platform may vary between approximately +1.6 feet and +3.0 feet (NAVD88) whereas the ridge will be approximately +5.0 feet (NAVD88). Sediment for the marsh and ridge may be dredged from the Mississippi River. Upon completion of the project, suitable native shrub/woody vegetation will be planted on the ridge. It is anticipated that herbaceous vegetation will naturally establish within the first few years based on recently constructed restoration projects in the vicinity of the project, i.e., Grand Liard Marsh and Ridge Restoration (BA-0068), Lake Hermitage Marsh Creation (BA-0042 and BA-0141), and Bayou DuPont Marsh and Ridge Creation (BA-0048). However, vegetative plantings on the marsh platform may occur if natural succession does not occur as anticipated (see Section 5 on corrective actions).

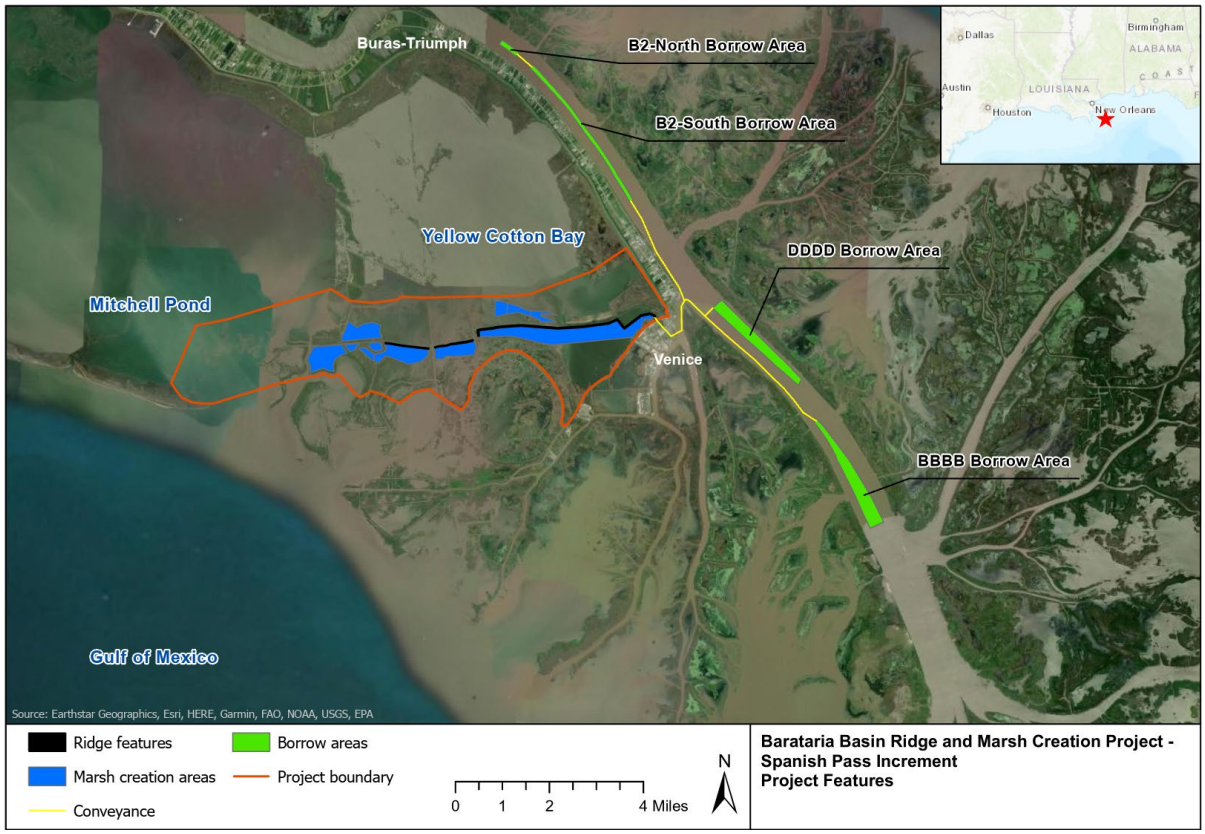

Figure 1. Spanish Pass Ridge and Marsh Creation Project.

This project is being implemented as restoration for the *Deepwater Horizon* oil spill Natural Resource Damage Assessment (NRDA), consistent with the PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees. 2016). Per the PDARP/PEIS, the project falls into the following restoration categories:

- **Programmatic Goal:** Restore and Conserve Habitat

- **Restoration Type:** Wetlands, Coastal, and Nearshore Habitats
- **Restoration Approach:** Create, Restore, and Enhance Coastal Wetlands
- **Restoration Technique:** Create or enhance coastal wetlands through placement of dredged material
- **Trustee Implementation Group:** LA TIG
- **Restoration Plan:** Louisiana Trustee Implementation Group Final Restoration Plan #1.2: Barataria Basin Ridge and Marsh Creation Project Spanish Pass Increment and Lake Borgne Marsh Creation Project Increment One

The implementing state trustee is the Coastal Protection and Restoration Authority (CPRA) of Louisiana. The implementing federal trustee is the United States Department of Interior, represented by the U. S. Fish and Wildlife Service (USFWS).

1.2 Restoration Type Goals and Project Restoration Objectives

The goal for the project is to create and restore wetlands, coastal and nearshore habitats in the Louisiana Restoration area (LA TIG, 2017) specifically along Spanish Pass. This area has been degraded due to eustatic sea level rise, high subsidence rates, diminished sediment supply, and extreme storm events. In restoring these coastal habitats, the Trustees envision that the project will compensate, in part, for wetlands, coastal and nearshore habitat losses associated with the spill.

1.2.1 Restoration Type Goals

As summarized in the PDARP/PEIS, Chapter 5, the restoration goals for injuries to coastal habitats are as follows:

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

1.2.2 Project Restoration Objectives

To help meet the restoration goals for injuries to coastal habitats, the project restoration objective is to create and nourish 132 acres of historic ridge and 1,683 acres of marsh that have been degraded due to sea-level rise, high subsidence rates, diminished sediment supply, and

extreme storm events. The degree to which this restoration objective is met will be evaluated via measurements of the following parameters:

- Parameter #1: Spatial Extent (acres) of marsh and ridge creation
- Parameter #2: Elevation of marsh and ridge areas
- Parameter #3: Vegetative Cover
- Parameter #4: Invasive Species Cover
- Parameter #5: Soil Samples

These parameters will be monitored according to the monitoring schedule summarized in Section 2.

Throughout the design process, project team members, including but not limited to CPRA and the USFWS will have the opportunity to refine design parameters as additional information becomes available. Performance criteria will be identified/implemented to determine restoration success or the need for corrective action in accordance with 15 CFR 990.55(b)(1)(vii). In Section 5.0, specific, measurable performance criteria and potential corrective actions are defined for each of the monitoring parameters.

1.3 Conceptual Setting

The Spanish Pass Project is located in Plaquemines Parish, Louisiana west of Venice, LA, and follows an historical distributary of the Mississippi River approximately 7.5 miles westward over degraded marsh and ridge habitat toward Bay Jacques. Coastal erosion and sea level have caused significant degradation of these ridge and marsh habitats. Marsh creation projects like the one proposed here could help to build and maintain these habitats through time. The conceptual setting for the Spanish Pass project is summarized in Section 2.2.2 of the *Louisiana Trustee Implementation Group Final Restoration Plan #1* (LA TIG 2017) and is incorporated here by reference.

1.3.1 Potential Sources of Uncertainty

Although the likelihood of project success is evaluated under the OPA regulations (15 CFR § 990.54(a)(3)), uncertainties may exist regarding how to best implement projects to achieve the greatest benefits for the injured resources. These uncertainties may arise from an incomplete understanding of the current conceptual setting; from unknown conditions in the future; or from project elements that do not perform as anticipated (e.g., sediment compaction or vegetation success). For the Spanish Pass Project, the uncertainties summarized in **Table 1** could affect project success and could therefore be key drivers of corrective actions or adaptive management decisions. Sections 2-3 summarize project monitoring data and describe how this information will be used to inform adaptive management to address these uncertainties.

Potential uncertainties are defined as those that may affect the ability to achieve stated project restoration objective(s). To aid in the identification of uncertainties, Trustees utilized a variety of sources, including but not limited to PDARP/PEIS Restoration Type MAM sections (Deepwater Horizon Natural Resource Damage Assessment Trustees. 2016), Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0 (*Deepwater Horizon* (DWH) Natural Resource Damage Assessment Trustees. 2017), and other documents. Select monitoring activities can then be implemented to inform these uncertainties and to select appropriate corrective actions in the event the project is not meeting its performance criteria (**Table 1**).

Table 1. Key Uncertainties.

Reference Number	Key Uncertainty	Description on How the Uncertainty Could Impact Project Success and/or Decision-Making
1	Sea level rise, subsidence, sediment compaction	Increased flooding of the marsh platform would reduce the growth and cover of herbaceous plant species and increase the coverage of submerged aquatic species or increase the open-water area. Increased flooding on the ridge feature would prevent shrub/woody establishment or cause the habitat to convert to herbaceous marsh.
2	Soil composition for ridge feature	The borrow area material may be high in sand content because the borrow source is the Mississippi River. A high sand content may present difficulties for woody species to become established due to the lack of water-holding capacity and nutrients.
3	Success of vegetation establishment/plantings	Lack of vegetation establishment/planting success would limit or delay the creation of the desired habitat.
4	Herbivory	Young tender plants, either through natural succession or vegetative plantings, are desired by some species as a source of food. Herbivory may cause the increase of planting efforts by requiring devices to reduce plant consumption. Also, would delay the establishment of vegetation and habitat creation.

2 Project Monitoring

The MAM Plan was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed, for the first 5 years after the project's construction. The data collected during this 5-year period will also be used to predict the project's performance

during the remaining 15-years of the project's 20-year design life. This section summarizes the project monitoring parameters that will be used to evaluate performance through time. For each of the identified monitoring parameters, information is provided as to its intended purpose (e.g., to monitor progress toward meeting one or more of the restoration objectives or to support adaptive management of the project), monitoring methods, timing and frequency, duration, sample size, and sites. Further, these parameters will be monitored to demonstrate how the restoration project is trending toward the performance criteria and to inform the need for corrective actions (see Section 5, Project-Level Decisions).

The *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (*Deepwater Horizon* (DWH) Natural Resource Damage Assessment Trustees. 2017) recommends project-level monitoring be conducted at reference or control sites. The CPRA currently maintains a monitoring program that provides ecological data and research to support the planning, design, construction, evaluation, and adaptive management of Louisiana's wetland restoration projects (Folse et al. 2018). This Coast-wide Reference Monitoring System-Wetlands (CRMS) was developed and implemented to improve the monitoring program's effectiveness in evaluating individual restoration projects, as well as the combined effects of multiple projects by providing a network of reference sites where data are collected on a regular basis (Steyer et al. 2003). In conjunction with CRMS, several coastal restoration projects have been constructed recently in the vicinity of the Project. Data on vegetation, water level, salinity, elevation, and/or habitat mapping or land-water analysis, from these projects will provide information regarding performance. Data for the project will be collected similarly for comparison, and data results from the projects will be used to compare project performances. The projects that have been constructed are Grand Liard Marsh and Ridge Restoration (BA-0068), Lake Hermitage Marsh Creation (BA-0042 and BA-0142), and Bayou DuPont Marsh and Ridge Restoration (BA-0068).

Though additional measures may be implemented to more fully characterize the project's effectiveness, the LA TIG proposes the continued implementation of proven and established monitoring methodologies to monitor project success:

- Parameter #1: Spatial Extent (acres) of marsh and ridge creation
  a) Purpose: To determine how many acres of marsh and ridge were created
  b) Method: Acquire and orthorectify high-resolution, near-vertical aerial imagery
  c) Timing, Frequency, and Duration: Immediate post-construction/as-built – will occur soon after construction activities conclude; Years (YRs) 3 and 5 post-construction - will occur during the Fall of the respective years
  d) Sample Size: Aerial imagery will be acquired for the entire project area and some surrounding areas
  e) Sites: Project area

- Parameter #2: Elevation of marsh and ridge areas
  a) Purpose: To determine that the average elevation is achieved per the design specifications for construction and to verify the elevation of the sediment is as expected per the design curves in the final design report at YRs 3 and 5 post-construction.
  b) Method: LiDAR and/or RTK topographic surveys
  c) Timing, Frequency, and Duration: Surveys will be conducted during construction (before and after sediment placement) and at YRs 0, 3, and 5 post-construction.
  d) Sample Size: Construction surveys will be conducted on transects spaced every 250 feet apart or as specified in the construction documents. YR0 would utilize LiDAR and/or RTK as little to no vegetation is expected. YRs 3 and 5 transects may be spaced 500, 750, and/or 1,000 feet apart, but have yet to be determined.
  e) Sites: Throughout the project area

- Parameter #3: Vegetative Cover
  a) Purpose: To determine the herbaceous percent cover in the marsh and to determine the shrub/woody percent cover on the ridge
  b) Method:
     1. Ridge: Ocular estimates (Folse et al., 2018) using 6 meter by 6 meter plots randomly placed along transects throughout the project area
     2. Marsh: Ocular estimates (Folse et al., 2018) using 2 meter by 2 meter plots randomly placed along transects throughout the project area. Includes cover and species present.
  c) Timing, Frequency, and Duration:
     1. Ridge: First growing season after planting and YRs 3 and 5 post-construction. Sampling will occur between mid-August and mid-November with the target being September/October.
     2. Marsh: First growing season after planting and YRs 3 and 5 post-construction. Sampling will occur between mid-August and mid-November with the target being September/October.
  d) Sample Size: To be determined
  e) Sites: Project area; CRMS sites and restoration projects having similar habitats will be used as references

- Parameter #4: Invasive Species Cover
  a) Purpose: To determine invasive species percent cover in the marsh and ridge
  b) Method:

1. Ridge: Ocular estimates (Folse et al., 2018) using 6 meter by 6 meter plots randomly placed along transects through the project area; same plots as parameter #3: vegetation cover
2. Marsh: Ocular estimates (Folse et al., 2018) using 2 meter by 2 meter plots randomly placed along transects through the project area; same plots as parameter #3: vegetative cover

c) Timing, Frequency, and Duration:
   1. Ridge: Same as Parameter #3: Vegetative Cover
   2. Marsh: Same as Parameter #3: Vegetative Cover

d) Sample Size: To be determined

e) Sites: Project area; CRMS sites and restoration projects having similar habitats will be used as references

- Parameter #5: Soil Samples

  This parameter may be collected but will not be used as a performance criterion. Field observations of vegetative establishment and growth will determine when and if soil samples will be collected. CPRA has not constructed many coastal restoration projects with a ridge component, and the few that have been constructed have been constructed relatively recently. Therefore, there is little to no available data for this parameter or component performance.

  a) Purpose: To determine soil pH, soil salinity, bulk density, soil moisture, percent organic matter, wet/dry volume, and potentially percent sand, silt and clay of ridge soils if woody/shrub species are not becoming established, are dying, or are not increasing in total vegetative cover.

  b) Method:
     1. Collection: The collection of soils will follow the Coast-wide Reference Monitoring System-Wetland (Folse et al. 2018), except soil cores may be sliced in different intervals.
     2. Analytical: Samples will be sent off to a certified laboratory for testing. Appropriate tests will be conducted for each variable.

  c) Timing, Frequency, and Duration:
     1. If collected, samples will be collected in August – November at the time of the ridge vegetation data collection effort.

  d) Sample Size: To be determined

  e) Sites: Project area

3 Adaptive Management

Monitoring information collected at the project-level can also inform adaptive management (a form of structured decision-making applied to the management of natural resources in the face

of uncertainty of that individual project) (Pastorok et al. 1997; Williams 2011). Within the LA TIG, an adaptive management framework has been developed that identifies and characterizes the four main phases and is illustrated within a representative management cycle (**Figure 2**).

1. Objective-Setting Phase: Problem is identified or defined, and project goals and objectives are established based on multiple sources, including lessons learned, data and associated synthesis, and applied research from previous projects and from the knowledge base as a whole. For the Spanish Pass project, the goal setting phase is already complete – the problem of marsh loss has been defined through the PDARP/PEIS as well as through Louisiana's Coastal Master Plan process, and the goals and objectives of restoration are as described in the restoration plan that accompanies this MAM plan.
2. Design and Construct Phase: Project advances through select steps, including model development or refinement, identification and prioritization of uncertainties, plan formulation, engineering, design, and project construction. For the Spanish Pass project, the elements of a preliminary design have already been described within the Restoration Plan, incorporating available data on water depths, intertidal range for nearby marsh, and local subsidence rates. As the project advances to more advanced phases, the design may be modified as needed to incorporate any new information that could affect the preliminary design.
3. Operate and Monitor Phase: Project's operations, maintenance, and monitoring plans are developed, and project assessment and evaluation criteria are identified. Note that for this and other marsh creation projects, the opportunities for adaptive management post-construction may in some cases be limited. For example, if the marsh platform does not achieve the proper elevation post-settlement, re-mobilizing a dredge to modify the marsh platform elevation is generally cost-prohibitive. However, supplemental vegetative plantings can be used to improve vegetative cover if the marsh platform is already at the proper elevation.
4. Adaptive Management Coordination Phase: Encompasses steps for recommending and approving project revisions so that revisions can achieve one or both of the following:
    - Result in alterations and redesign of project elements or changes to project operation
    - Provide input to either the understanding of the overall problem statements or the refinement of attainable or realistic goals and objectives for future projects

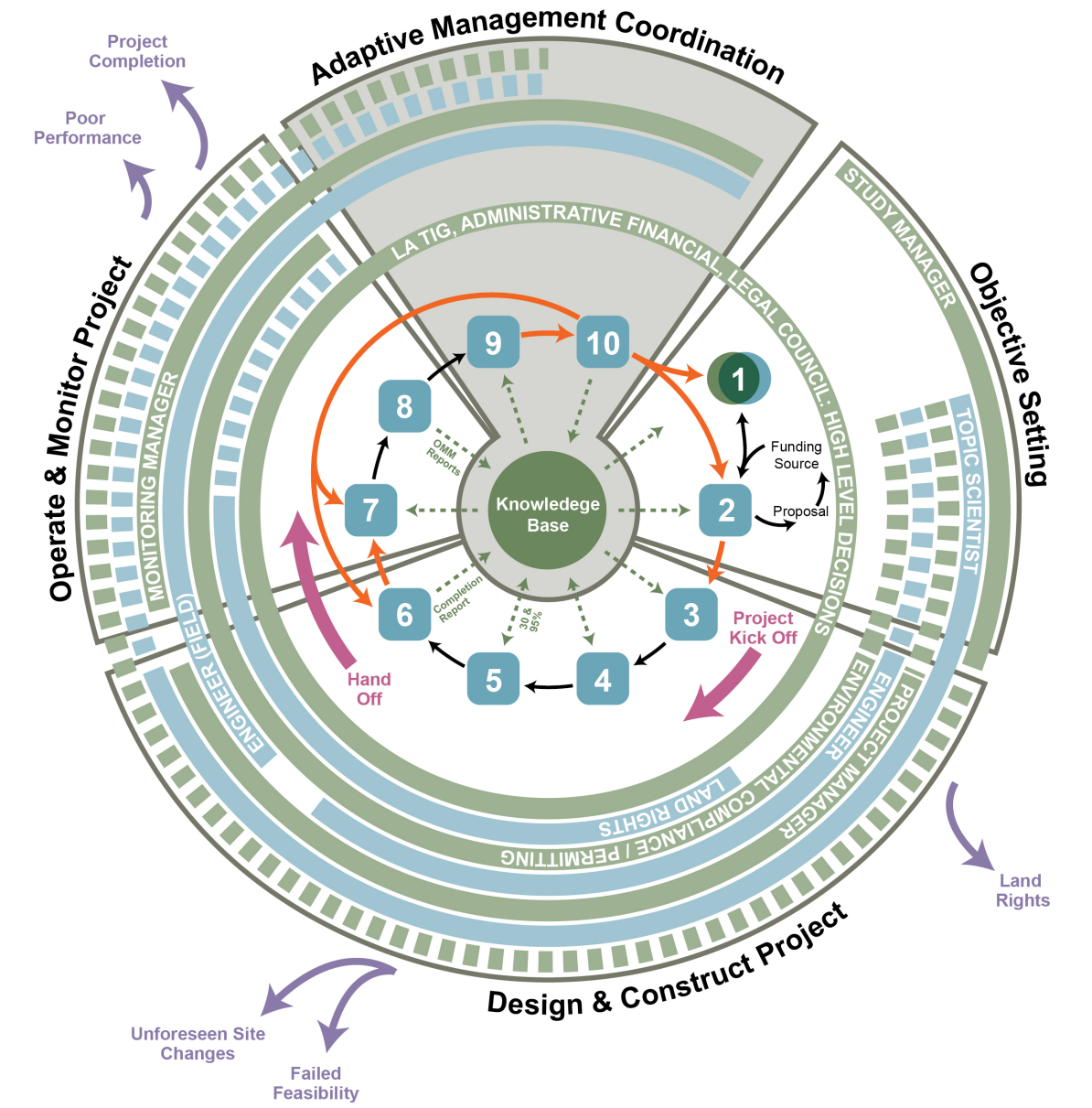

Figure 2. LA TIG Adaptive Management Cycle (Source: The Water Institute of the Gulf, 2019).

4 Evaluation

Evaluation of monitoring data is needed to assess the project implementation and performance in meeting restoration objectives, resolving uncertainties to increase understanding, and determining whether corrective actions are needed.

As part of the larger decision-making context, the evaluation of monitoring data from individual projects could also be compiled and assessed at the restoration type and LA TIG level, and the results would be used to update the knowledge base to inform decisions such as future LA TIG project prioritization and selection, implementation techniques, and the identification of critical uncertainties. Reports, presentations, and/or lesson learned meetings are potential avenues of transferring information to the LA TIG and other agency personnel about project performances.

The results of these analyses would be used to answer the following questions and included within the reports described in Section 8:

- Were the project restoration objectives achieved? If not, is there a reason why they were not met?
- Did the restoration project produce unanticipated effects?
- Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?
- Were any of the uncertainties identified prior to project implementation resolved?
- Were any new uncertainties identified?

Proposed analysis methods are grouped below by monitoring parameters:

<u>Parameter #1: Spatial Extent (acres) of marsh and ridge</u>

Proposed Analysis Method: Aerial imagery, elevation, and/or vegetation data sets collected for the project will be used to determine habitat evolution and acreages. Aerial imagery will be analyzed for land – water composition. Elevation data and vegetation data will be used to determine habitat types.

<u>Parameter #2: Elevation of marsh and ridge areas</u>

Proposed Analysis Method: The project's Final Design Report will establish the desired elevation of each feature in order for appropriate herbaceous or woody specie to colonize and create appropriate habitat. Data will be analyzed for the average elevation in each habitat. Other mapping products such as triangulated irregular network (TIN) models could be generated in Geographical Information System (GIS) software packages along with digital elevation models (DEM) to show the elevation across the project area. Over time, differences amongst the individual models would show elevation changes.

The constructed target elevations for marsh and ridge habitats will be determined using the methodology(ies) in CPRA's Marsh Creation Design Guidelines (2017). These elevations use various data sources such as water elevation, sea-level rise, and subsidence. At YRs 3 and 5, data will be analyzed using the same methods and updated data (current water elevations and habitat elevations) to determine if the habitat is within the optimal marsh inundation ranges for habitat development. The same water level gauges used in the Final Design Report will be used for YRs 3 and 5, if still active.

The average elevation will be determined using YRs 3 and 5 data sets to determine if these elevations are as predicted in the project settlement curves that will be published in the Final Design Report.

Parameter #3: Vegetative Cover

Analysis: General descriptive statistical analyses may include, but are not limited to, averages/means of the overall total cover and total cover by herbaceous species and/or shrubs (marsh) and herbaceous and woody species (ridge); percent cover of species; and/or average height of dominant species. After each data collection effort, all collected and analyzed data will be evaluated to determine existing habitat type. After multiple data collection efforts, comparisons between each time period will be assessed to determine the evolution of the habitat. Data sets from other coastal restoration projects constructed using other funding sources will be analyzed for comparative performance purposes.

Parameter #4: Invasive Species Cover

Proposed Analysis Method: Data sets will be examined for invasive species. If invasive species are identified within the data set, the average percent cover will be calculated.

Parameter #5: Soil Samples

Proposed Analysis Method: Soil sample results will be analyzed for averages as well as examined individually to determine if the soils in some or all locations are the limiting factor for vegetative establishment, growth, and succession.

5 Project-Level Decisions: Performance Criteria and Potential Corrective Actions

The LA TIG describes how updated knowledge gained from the evaluation of monitoring data will be used at the project-level to determine whether the project is considered successful or whether corrective actions are needed. A project may not be achieving its intended objectives because of previously identified key uncertainties, unanticipated consequences, previously unknown conditions, or unanticipated environmental drivers. The decision to implement (or not implement) corrective actions is one type of decision within the larger adaptive management decision-making framework.

Learning through monitoring allows for corrective actions to be made to achieve desired outcomes. **Table 2** identifies performance criteria, monitoring parameters, and potential corrective actions that could be taken if the performance criteria are not met (as defined in NRDA regulations (15 CFR 990.55(b)(1)(vii)). This table should not be considered all encompassing; rather, it represents a listing of potential actions for each individual parameter to be considered if the project is not performing as expected once implemented. Other corrective actions may be identified post-implementation and included in an operations and maintenance (O&M) plan. The decision of whether or not a corrective action should be implemented for the project should consider the overall outcomes of the restoration project (i.e., looking at the combined evaluation of multiple performance criteria) in order to understand why project performance deviates from the predicted or anticipated outcome. Corrective action may not be taken in all cases based on such considerations. The knowledge gained from this process could also inform future restoration decisions such as the selection, design, and implementation of similar projects.

Table 2. List of Project Monitoring Parameters, Performance Criteria, and Potential Corrective Actions.

Notes: [1]The land loss rate of 1.7% was determined from a 12,000-acre polygon that encompasses the project area from 1984 to 2016 (Baird 2019). [2]The project is currently gathering data to make the final determination. The Final Design Report is scheduled for late 2019. [3]Grand Liard Marsh and Ridge Restoration (BA-68) Final (95%) Design Review Update: Project Information Sheet for Wetland Value Assessment (WVA).

Monitoring Parameter	Final Performance Criteria Used to Determine Project Success	Potential Corrective Actions
Spatial Extent	There will be no more than the equivalent of 1.7% annual land loss rate between year 0 and 5 post-construction. (See note 1 above this table)	Planting of appropriate species
Elevation	The target elevations stated in the Final Design Report for marsh and ridge at the time of construction. (See note 2 above this table)	Addition or regrading of sediments
Vegetation Cover - Marsh Platform	Live vegetative cover is equal to or greater than 65% at Year 5	Planting of herbaceous species
Vegetation Cover- Ridge	30% cover of woody species at year 5 or >= to the BA-0068 project at year 5 (See note 3 above this table)	Planting of woody species
Invasive Species Cover	Average live vegetative cover of invasive species is not greater than 25% at Year 5.	Mechanical removal or herbicide application

6 Monitoring Schedule

The project monitoring schedule (**Table 3**) is separated by monitoring activities. Pre-execution monitoring will occur before any project construction activities occur, if applicable. Execution of monitoring will occur when the construction activities have been deemed complete. Performance monitoring will occur in the years following construction (YRs 0-5).

Table 3. Monitoring Schedule (Pre-Execution & As-Built and Ongoing Monitoring Times).
Notes: "X" indicates required data acquisitions; "O" indicates optional data acquisitions; "n/a" indicates not applicable.

Monitoring Parameters	Pre-Execution and As-built Year 0	Ongoing Execution Year 1	Ongoing Execution Year 2	Ongoing Execution Year 3	Ongoing Execution Year 4	Ongoing Execution Year 5
Vegetation Survey (marsh)	n/a	**X**	n/a	**X**	n/a	**X**
Vegetation Survey (ridge)	n/a	**X**	n/a	**X**	n/a	**X**
Elevation Survey	**X**	n/a	n/a	**X**	n/a	**X**
Aerial Imagery Acquisition	**X**	**O**	**O**	**X**	**O**	**X**
Soil Testing	**O**	**O**	**O**	**O**	n/a	**O**

7 Data Management

7.1 Data Description

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hard copy datasheets and notebooks and photographs will be retained by the implementing Trustee.

Relevant project data that are handwritten on hard copy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by

whom and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

All data will have properly documented FGDC/ISO metadata, a data dictionary (defines codes and fields used in the dataset), and/or a ReadMe file as appropriate (e.g., how data were collected, quality assurance/quality control [QA/QC] procedures, and other information about data such as meaning, relationships to other data, origin, usage, and format—can reference different documents).

7.2 Data Review and Clearance

Data will be reviewed for QA/QC in accordance with the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (*Deepwater Horizon* (DWH) Natural Resource Damage Assessment Trustees. 2017), and any errors in transcription will be corrected. Implementing Trustees will verify and validate data and information and will ensure that all data are entered or converted into agreed upon/commonly used digital format and labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with implementing Trustee agency requirements.

After all identified errors are addressed, data are considered to be cleared. The implementing Trustee will give the other LA TIG members time to review the data before making such information publicly available (as described below). Before submitting the monitoring data and information package, co-implementing Trustees shall confirm with one another that the package is approved for submission.

7.3 Data Storage and Accessibility

Once data have been cleared, they will be submitted to the Restoration Portal.

Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than 1 year from when data are collected.

7.4 Data Sharing

Data will be made publicly available in accordance with the Federal Open Data Policy through the DIVER Explorer Interface within 1 year of when the data collection occurred. Also, data will be made available through the Coastal Protection and Restoration Authority's Coastal Information Management System (CIMS) database, which can be accessed at the following link (https://cims.coastal.louisiana.gov/default.aspx). Larger datasets such as LiDAR will be made available through portals appropriate for handling the associated file sizes.

8 Reporting

Based on the project monitoring schedule (Section 6), associated reporting will be submitted in post-construction YRs 2, 4, and 6 which represents one year after data collection efforts in YRs 1, 3, and 5. Each of these reports will primarily focus on answering the questions presented in Section 4, Evaluation. The YR 1 and 3 reports will be more progress related reports; whereas, the YR 5 report will be comprehensive in nature and answer whether or not the project met each of the performance criteria (PC). If the project did not meet a PC, then an explanation will be provided. For each report, if corrective actions are required then a corrective action plan would be generated and variables would continue to be monitored.

The reports will follow the template recommended in the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0* (*Deepwater Horizon* (DWH) Natural Resource Damage Assessment Trustees. 2017), Appendix D. MAM reports and lessons learned from the monitoring activities will be disseminated to the LA TIG through relevant portals, and information will be more broadly disseminated at conferences to reach a larger audience.

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-LA TIG MAM work group. CPRA is the implementing Trustee for the project. The U.S. Department of the Interior will be the lead federal agency for conducting the environmental evaluation review for implementation. The implementing Trustees' roles include:

- Data collection
- Data analysis
- Report composition
- Ensuring corrective action activities are performed, if necessary
- Providing project progress information to the LA TIG

10 Monitoring and Adaptive Management Budget

The overall budget for the project monitoring and adaptive management plan is $1,500,000 and covers the activities identified in Table 3 as well as data analysis, report composition, and project management.

11 References

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12 MAM Plan Revision History

Table 4. MAM Plan Revision History.

Old Version #	Revision Date	Changes Made	Reason for Change	New Version #
N/A	N/A	N/A	N/A	N/A