APPENDIX D: ADAPTIVE MANAGEMENT PLAN

APPENDIX D

ADAPTIVE MANAGEMENT PLAN

Coleman Brackish Marsh Creation Mitigation Project Feature
Environmental Assessment #543

1.0. Introduction

This Adaptive Management (AM) Plan addresses only the Coleman brackish marsh mitigation project feature, the only constructible feature of the Tentatively Selected Plan (TSP) documented in Environmental Assessment #543 (EA #543). The TSP also includes additional mitigation features including the purchase of In Lieu Fee (ILF) and mitigation bank credits. The TSP is designed to mitigate for impacts to intermediate, brackish and saline marsh resulting from construction of the New Orleans to Venice (NOV) Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees (NFL) from Oakville to St. Jude and the NOV Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana (hereinafter NFL NOV). Detailed description of the Coleman brackish marsh mitigation project feature as well as the purchase of ILF and Mitigation Bank credits mitigation features for the NOV NFL are provided in the EA #543 (Figure 1).

2.0. Adaptive Management Planning

The Water Resources Development Act (WRDA) of 2007, Section 2036(a) and U.S Army Corps of Engineers (USACE) implementation guidance for Section 2036(a) (CECW-PC Memorandum dated August 31, 2009: “Implementation Guidance for Section 2036 (a) of the Water Resources Development Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses”) requires AM and monitoring plans be included in all mitigation plans for fish and wildlife habitat and wetland losses.

Adaptive Management is an iterative and structured process which reduces ecological and other uncertainties that could prevent successful project implementation and performance. AM establishes a framework for decision making which utilizes monitoring results and other information, as it becomes available, as a feedback mechanism used to update project knowledge and adjust management and mitigation actions to better achieve project goals and objectives.

Hence, early implementation of AM and monitoring better enables a project to succeed under a wide range of conditions which can be adjusted as necessary. Furthermore, careful monitoring of project outcomes not only helps to adjust project management operations to changing conditions, but also advances scientific understanding as part of an iterative learning process.

AM is warranted when there are consequential decisions to be made, there are high uncertainties, when there is an opportunity to apply learning, when the value of reducing uncertainty is high, and when a monitoring system can be put in place to reduce uncertainty.

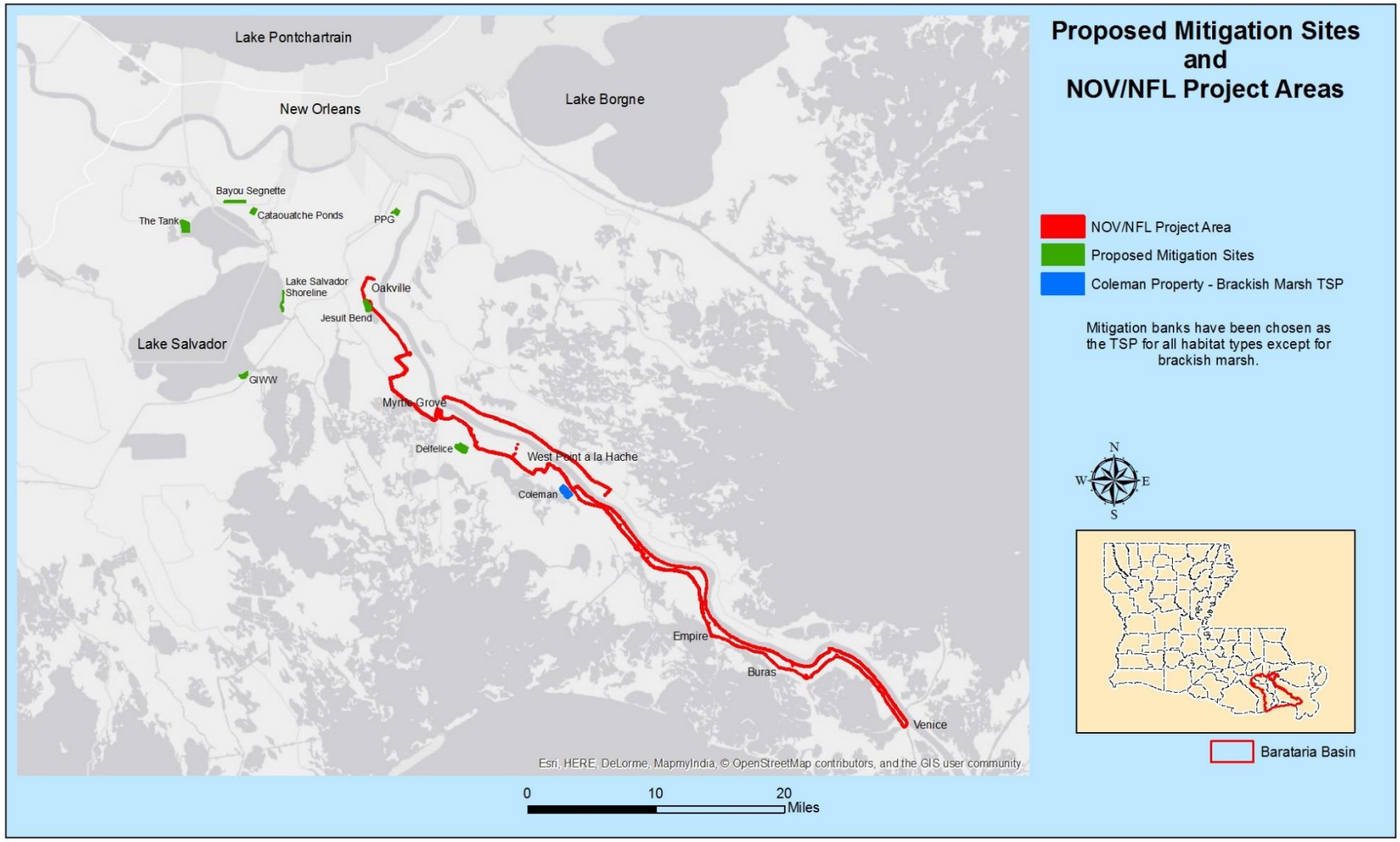

Figure 1. The Tentatively Selected Plan includes the Coleman brackish marsh project and purchase of ILF and Mitigation Bank Credits.

In cases where AM is not warranted, the project would still develop an AM Plan but the plan would clearly describe the rationale as to why AM actions would not be warranted. A project where AM is not warranted would still contain a Monitoring Plan to measure project success.

Adaptive management planning was incorporated into the project planning process and development and selection of the Tentatively Selected Plan (TSP) as documented in EA #543. Adaptive management planning elements include:

1. development of a Conceptual Ecological Model (CEM),
2. identification of key project uncertainties and associated risks,
3. evaluation of mitigation projects as a candidate for adaptive management, and
4. identification of potential adaptive management actions (contingency plan) to better ensure the mitigation project meets identified success criteria.

The AM Plan is a living document and will be refined as necessary. Adaptive Management planning was conducted by using the AM program framework structure developed by the CEMVN that includes both a Set-up Phase (Figure 2) and an Implementation Phase (Figure 3).

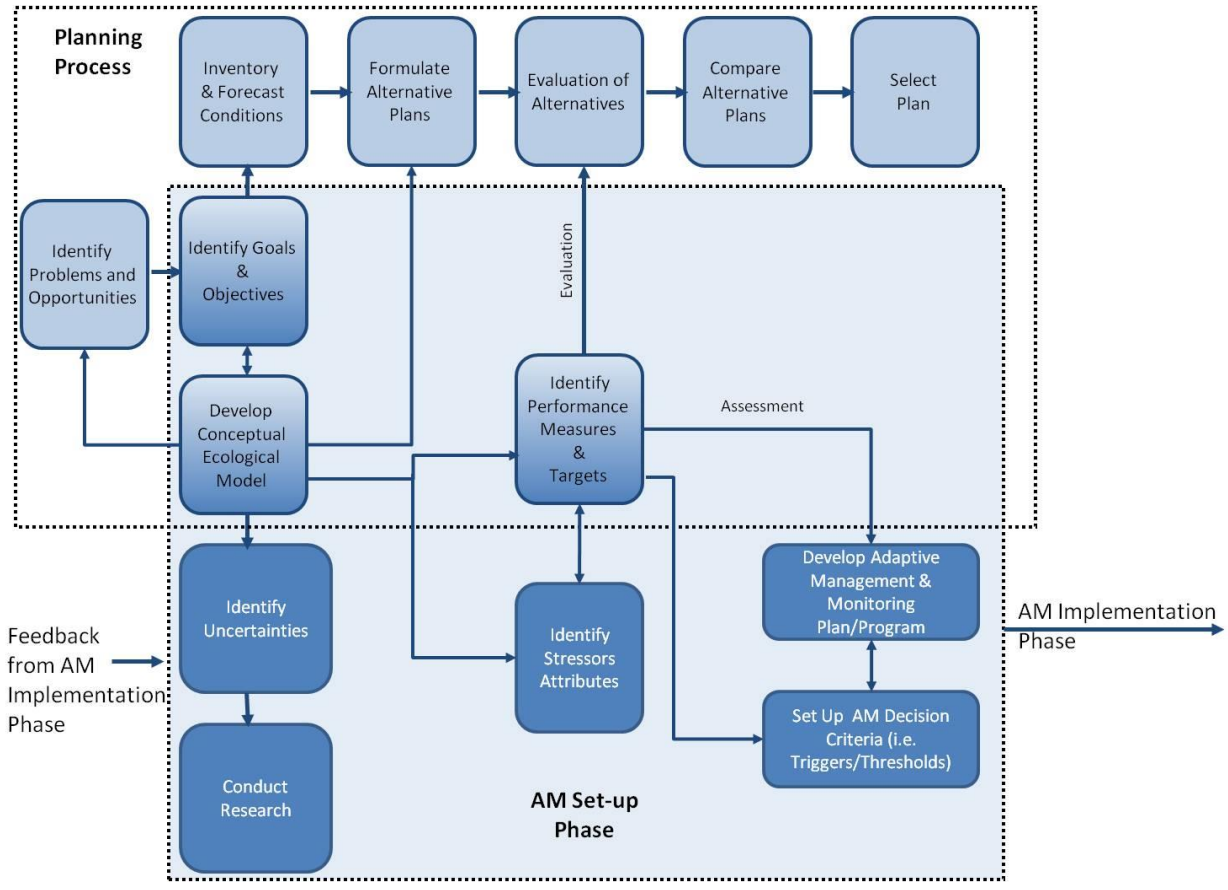

Figure 2. Set-up Phase of Adaptive Management Framework.

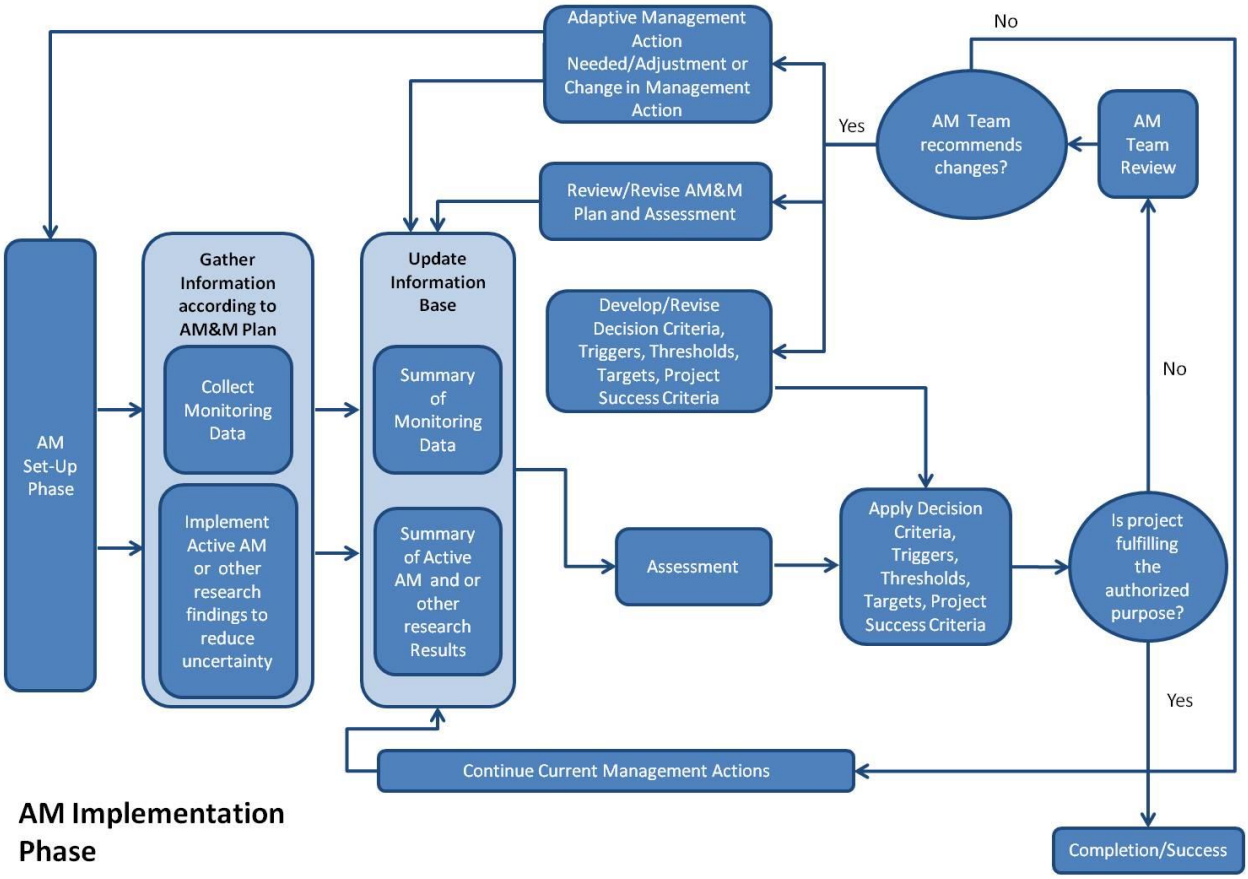

Figure 3. Implementation Phase of the Adaptive Management Framework.

Consistent with the AM Set-up Phase, Adaptive Management and Monitoring Plans were developed concurrently during the alternative plan formulation process. During the Implementation Phase, Adaptive Management and Monitoring Plans will be put into action. The overall goal of the AM process is to design, construct, monitor and assess the responses of the ecological system to implementation of the project relative to stated targets, goals, objectives and project success criteria.

2.1. Conceptual Ecological Model

A CEM was developed to identify the major stressors and drivers affecting the proposed mitigation project in the EA (table 1). The CEM does not attempt to explain all possible relationships of potential factors influencing the mitigation site; rather, the CEM presents only those relationships and factors deemed most relevant to obtaining the required acres/average annual habitat units (AAHU). Furthermore, this CEM represents the current understanding of these factors and would be updated and modified, as necessary, as new information becomes available. Stressors and Drivers identified in the CEM were identified during the Alternative Evaluation Process (AEP) process to evaluate relative risks associated with each alternative mitigation alternative.

Table 1. Conceptual Ecological Model

Alternative Project /Issues/Drivers	Flood Side Brackish Marsh	Flood Side Intermediate Marsh	Flood Side Saline Marsh
Subsidence	-	-	-
Sea Level Rise	-	-	-
Runoff	-	-	-
Storm Induced	+/-	+/-	+/-
Salinity Impacts	+/-	+/-	+/-
Wave Action	-	-	-
Storm Surge	-	-	-
Vegetative Invasive Species	-	-	-
Herbivory	-	-	-
Hydrology	+/-	+/-	+/-
Topography (elevation)	+/-	+/-	+/-

Key to Cell Codes: - = Negative Impact/Decrease
+ = Positive Impact/Increase
+/- = Duration Dependent

2.2. Sources of Uncertainty and Associated Risks

A fundamental tenet underlying adaptive management is decision making and achieving desired project outcomes in the face of uncertainties. There are many uncertainties associated with restoration of the coastal systems. The alternatives considered were evaluated and ranked to select the TSP with minimal risk and uncertainty. The project delivery team (PDT) identified the following uncertainties during the planning process.

A. Climate change, such as relative sea level rise, drought conditions, and variability of tropical storm frequency, intensity, and timing
B. Subsidence and water level trends at the mitigation sites
C. Uncertainty Relative to Achieving Ecological Success:
    a. Water, sediment, and nutrient requirements for marsh
    b. Magnitude and duration of wet/dry cycles for marsh
    c. Nutrients required for desired productivity for marsh
    d. Growth curves based on hydroperiod and nutrient application for marsh
    e. Marsh litter production based on nutrient and water levels for marsh
    f. Marsh propagation in relation to management/regulation of hydroperiod for marsh
D. Loss rate of vegetative plantings due to herbivory
E. Long-term sustainability of Project benefits

Issues such as climate change and relative sea level change (i.e., combination of eustatic sea level change and regional subsidence) are significant scientific uncertainties for all coastal Louisiana ecosystem restoration and mitigation projects. These uncertainties were incorporated into the AEP. Specifically, relative sea level rise (RSLR) USACE EC-1165-2-212 provides an 18-step process for developing a "low", "intermediate", and "high" future relative sea level rise scenario and provides guidance to incorporate these potential effects into project management, planning, engineering, design, construction, operation and maintenance. The PDT, in accordance with EC-1165-65-2-212, evaluated the final array of alternatives under three potential future RSLR scenarios.

2.3. Adaptive Management Evaluation

The TSP mitigation project features were evaluated against the potential need for AM actions. However, prior to AM evaluation, the proposed alternatives were evaluated through the AEP to select a TSP with minimal risk and uncertainty. The AM Team, in coordination with the PDT, determined that uncertainties and risk elements identified for the majority of the TSP mitigation project features had been avoided during the AEP evaluation and project implementation process. To further reduce the remaining uncertainties and diminish potential future risks, a monitoring feedback loop was developed to help determine project success. This feedback loop included contingency actions if criterions were not achieved. The items listed below have already been incorporated into the NFL NOV Mitigation project implementation plan and Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) plan to ensure the plan achieves success.

- Detailed planting guidelines for intermediate, brackish, and saline marsh
- Specified success criteria (i.e., mitigation targets)
- Invasive species control
- Supplementary plantings as necessary (contingency)
- Corrective actions to meet topographic success as required (contingency)

Project features were evaluated against the CEM and sources of uncertainty and risk were identified to determine if there was any need for additional adaptive management actions. Based on the uncertainties and risks associated with the project implementation the following contingency/adaptive management actions have been identified to be implemented, if needed, to ensure the required AAHU are met:

Potential Action #1. Additional vegetative plantings as needed to meet identified success criteria.

Uncertainties addressed: A, B, C, D, E

Potential Action #2. Potential need to adjust the gapping in the permanent dikes in the future to maintain sufficient marsh hydrology and connectivity.

Uncertainties addressed: A, B, C, E

Actions 1 and 2 are not recommended as separate AM actions since they are already built into the mitigation plan and success criteria identified in Appendix C. In the event that monitoring reveals the project does not meet the identified vegetation or topographic success criteria, additional plantings or construction activities would be conducted under the mitigation project.

The need for a planting event could trigger the need for additional mitigation monitoring. Hence, funding for three monitoring and reporting events was included as potential AM actions (i.e., two additional monitoring/reporting events for the one planting event). Costs were also included for invasive or nuisance plant eradication, if necessary. The total cost for the plantings, invasive species eradication, and monitoring/reporting AM operation and maintenance actions is estimated to be approximately $2,011,378 for the Coleman brackish marsh mitigation project feature.

The USACE is responsible for the proposed mitigation construction and monitoring until the initial success criteria are met. Initial construction and monitoring would be funded in accordance with all applicable cost-share agreements with the non-Federal Sponsor (NFS). The USACE would monitor (on a cost-shared basis) the completed mitigation to determine whether additional construction, invasive/nuisance plant species control, and/or plantings would be necessary to achieve initial mitigation success criteria.

Once the USACE determines that the mitigation has met the initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, the USACE would consult with other agencies and the NFS to determine the appropriate management or remedial actions required to achieve ecological success.

The USACE retains the final decision on whether or not the project's required mitigation benefits are being achieved and whether or not remedial actions are required. If structural changes are deemed necessary to achieve ecological success, the USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost-sharing requirements, availability of funding, and current budgetary and other guidance.

Due to the potential adverse impacts of placing additional fill onto the mitigation site once plantings have become established, future sediment lifts are not currently considered as a viable remedial action. Instead, increasing the size of the existing mitigation project or mitigating the outstanding balance of the mitigation requirement elsewhere or through the purchase of mitigation bank/In Lieu Fee (ILF) credits would be options that could be considered through additional coordination with the NFS and the Interagency Team. However, such options would have to undergo further analysis in a supplemental NEPA document.

3.0. Monitoring for Project Success

Independent of AM, an effective Monitoring Program, consistent with WRDA 2007 Section 2036, is required to determine if Project management and mitigation outcomes are consistent with the identified success criteria. The Monitoring Plan, specific to the Coleman brackish marsh mitigation project feature is presented in Appendix C. The monitoring plan identifies success criteria and targets, a schedule for the monitoring events, a monitoring report card, and the specific content for the monitoring reports that document progress towards meeting the success criteria.

The cost associated with implementing the Monitoring Program was estimated based on currently available data and information. The current estimate for set-up and implementing the Monitoring Program for the Coleman brackish marsh mitigation project feature is $316,500. These costs include data collection, data assessment, data management, and development of required reports.