



State of Louisiana

**Coastal Protection and Restoration Authority
of Louisiana**

Monitoring Plan

for

**Bayou Dupont Marsh and Ridge Creation
(BA-0048)**

State Project Number BA-0048
Priority Project List 17

August 2017



Prepared by
Danielle C. Richardi

Coastal Protection and Restoration Authority of Louisiana
New Orleans Regional Office
CERM, Suite 309
2045 Lakeshore Drive
New Orleans, LA 70122

Monitoring Plan for Bayou Dupont Marsh and Ridge Creation (BA-0048)

Priority Project List 17

The Coastal Protection and Restoration Authority of Louisiana (CPRA) and the National Marine Fisheries Service (NMFS) agree to carry out the terms of this monitoring plan for the Bayou Dupont Marsh and Ridge Creation project (BA-0048). As outlined in this plan, monitoring data will be collected using standardized data collection techniques and will be analyzed to determine whether the project is achieving the anticipated benefits. Operations, Maintenance and Monitoring (OM&M) reports will be written to document the condition of the project features, present and interpret monitoring data, and if needed, make recommendations for adaptive management of the project. This monitoring plan, forthcoming OM&M reports, and additional documents pertaining to BA-0048, can be accessed through CPRA's Coastal Information Management System (CIMS) website at <http://cims.coastal.louisiana.gov>.

Construction of the Bayou Dupont Marsh and Ridge Creation project was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning and Restoration Act (CWPPRA) enacted on November 29, 1990, as amended.

1. **PROJECT DESCRIPTION, PURPOSE, GOALS, and FEATURES**

Description

The Bayou Dupont Marsh and Ridge Creation project (BA-0048) utilized sediment hydraulically dredged from the Alliance Anchorage and Wills Point Anchorage borrow sites in the Mississippi River to redefine a maritime ridge and create a marsh platform along the southwestern shore of Bayou Dupont (Figure 1). The Long Distance Sediment Pipeline (BA-0043 EB) was used to transfer the sediment from the river to the BA-0048 project area. The pipeline is supported with Coastal Impact Assistance Program and state funds and is sponsored by local governments and CPRA. The BA-0048 project was constructed concurrently with the Grand Liard Marsh and Ridge Restoration project (BA-0068), which is also sponsored by NMFS. These are the first CPRA projects funded through CWPPRA to incorporate ridge restoration into their goals; therefore, monitoring is particularly important to gauge project success and inform the development of future ridge restoration projects.

Location

The BA-0048 project area is located in the Barataria Basin, on the west bank of the Mississippi River in Jefferson Parish, approximately 5.5 miles southeast of the town of Lafitte, Louisiana (Figure 1). The 390-acre project area is just southeast of The Pen (a failed agricultural impoundment) and extends diagonally from northwest to southeast along Bayou Dupont for approximately 1.3 miles. The neighboring area has been an active site for coastal restoration, with hydrologic restoration (BA-0003), outfall management (BA-0003c), shoreline protection (BA-0026, BA-0041), marsh creation (BA-0039, BA-0039 Increment 2, BA-0043 EB, BA-0164) and terracing (BA-0164) projects all occurring within a few-mile radius (Figure 1).

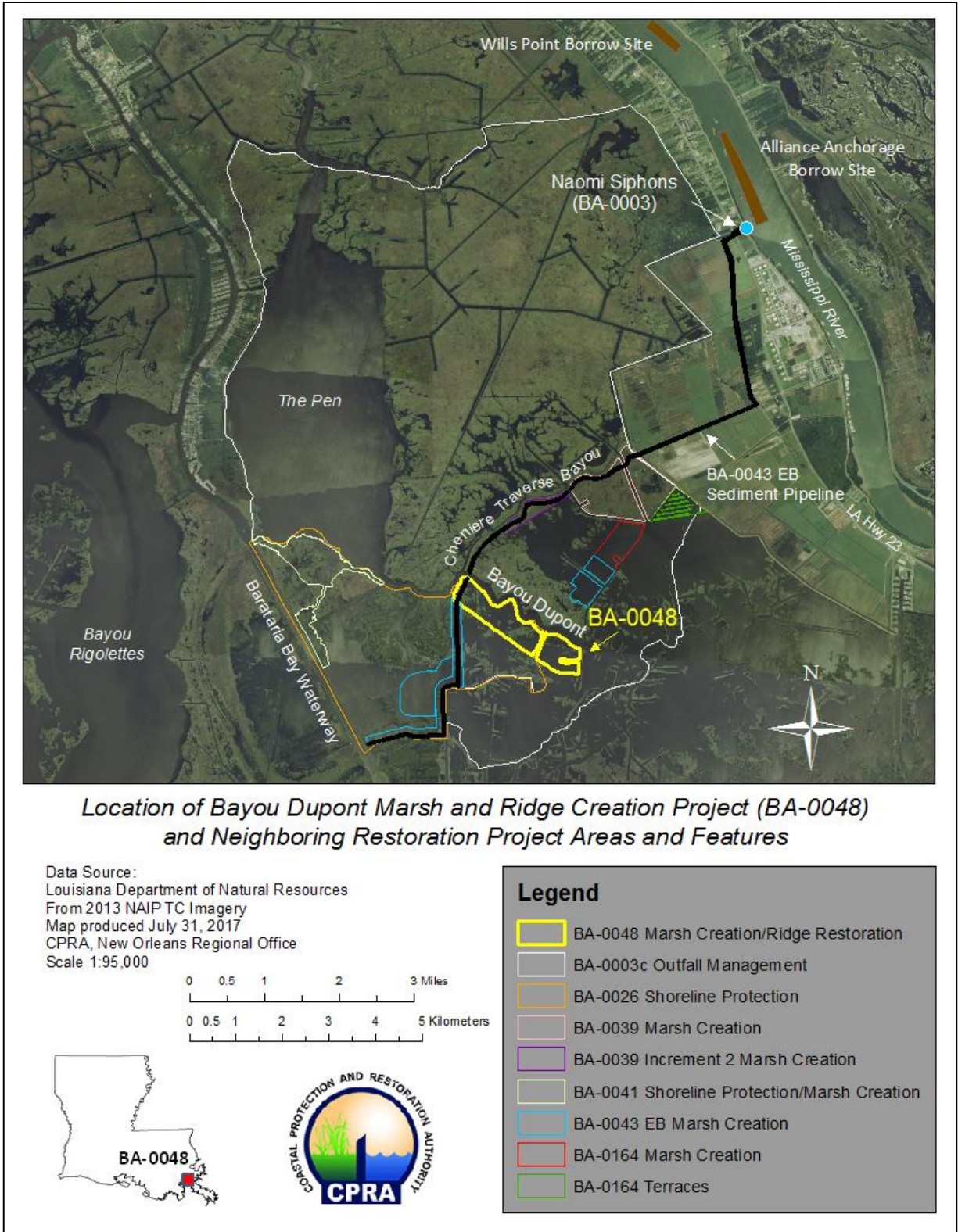


Figure 1. Location of the Bayou Dupont Marsh and Ridge Creation project (BA-0048) and neighboring restoration project boundaries and types. BA-0164 and BA-0043 EB marsh creation were constructed after the completion of BA-0048.

Need

Prior to project construction, the natural ridge that ran along the southwestern shore of Bayou Dupont was highly degraded and in some locations completely eroded away. The surrounding marsh habitat was likewise significantly degraded, with an estimated 96 acres of marsh remaining in the project area as of 2009 (NMFS 2010). The Barataria basin lost approximately 155 mi² of land between 1985 and 2010, at a rate of 4.76 ± 0.97 m²/yr (Couvillion et al. 2011). The deteriorated condition of ridge and marsh habitat in the basin is due to a combination of factors including, but not limited to, subsidence, lack of riverine sediment input from leveeing of the Mississippi River (Gagliano et al. 1981), the alteration of hydrology resulting from the dredging of oil and gas canals (Day et al. 2000), and relative sea level rise (Day and Templet 1989).

Construction

Hydraulic pumping of sediment began in November 2014 and was completed in March 2015. Earthen containment dikes were constructed around both marsh creation areas using sediment dredged from within the project area. The dikes were designed to an elevation of + 4.0 ft \pm 0.5 ft NAVD88 (Geoid99), with a crown width of 6.0 ft and side slopes of 1(V):4(H) (Coco 2010). The marsh creation areas were then filled with sediment dredged from the Mississippi River. The targeted constructed fill elevation was + 3.0 ft \pm 0.5 ft NAVD88 (Geoid99), with a predicted settlement at year 20 to approximately + 0.5 ft NAVD88. After construction, it was discovered that the marsh platform was constructed using Geoid09, rather than Geoid99. This shift in geoids resulted in the project being constructed to a fill elevation of + 3.68 ft \pm 0.5 ft NAVD88 (Geoid99), which is 0.68 ft higher than the designed construction elevation.

The earthen ridge was constructed by amending the containment dike along Bayou Dupont using sediment dredged from the river. A thin layer of in situ sediment was pumped on top of the ridge to enhance the organic content and growing environment for vegetation. The ridge was designed for a constructed height of + 4.5 ft \pm 0.5 ft NAVD88 (Geoid99), with a crown width of 30 ft and side slopes of 1(V):4(H). Due to the previously-mentioned shift in geoids, the ridge was constructed to a higher elevation of + 5.18 ft \pm 0.5 ft NAVD88 (Geoid99). A wedge with a slope of 1(V):5(H) was constructed on the inland side of the ridge to transition down to marsh elevation.

Vegetative Plantings

Four years after construction (winter 2019), a variety of locally-sourced and grown seedlings will be planted along the ridge. The species being planted include *Callicarpa americana* (American beautyberry), *Celtis laevigata* (sugarberry), *Diospyros virginiana* (common persimmon), *Ilex vomitoria* (yaupon), *Morella cerifera* (wax myrtle), *Morus rubra* (red mulberry), and *Quercus virginiana* (live oak). All seedlings will be protected with nutria exclusion devices. Additionally, the ridge will be assessed for the presence of the invasive tree *Triadica sebifera* (Chinese tallow). If the species is present, it will be eradicated through the use of chemical spray and manual removal.

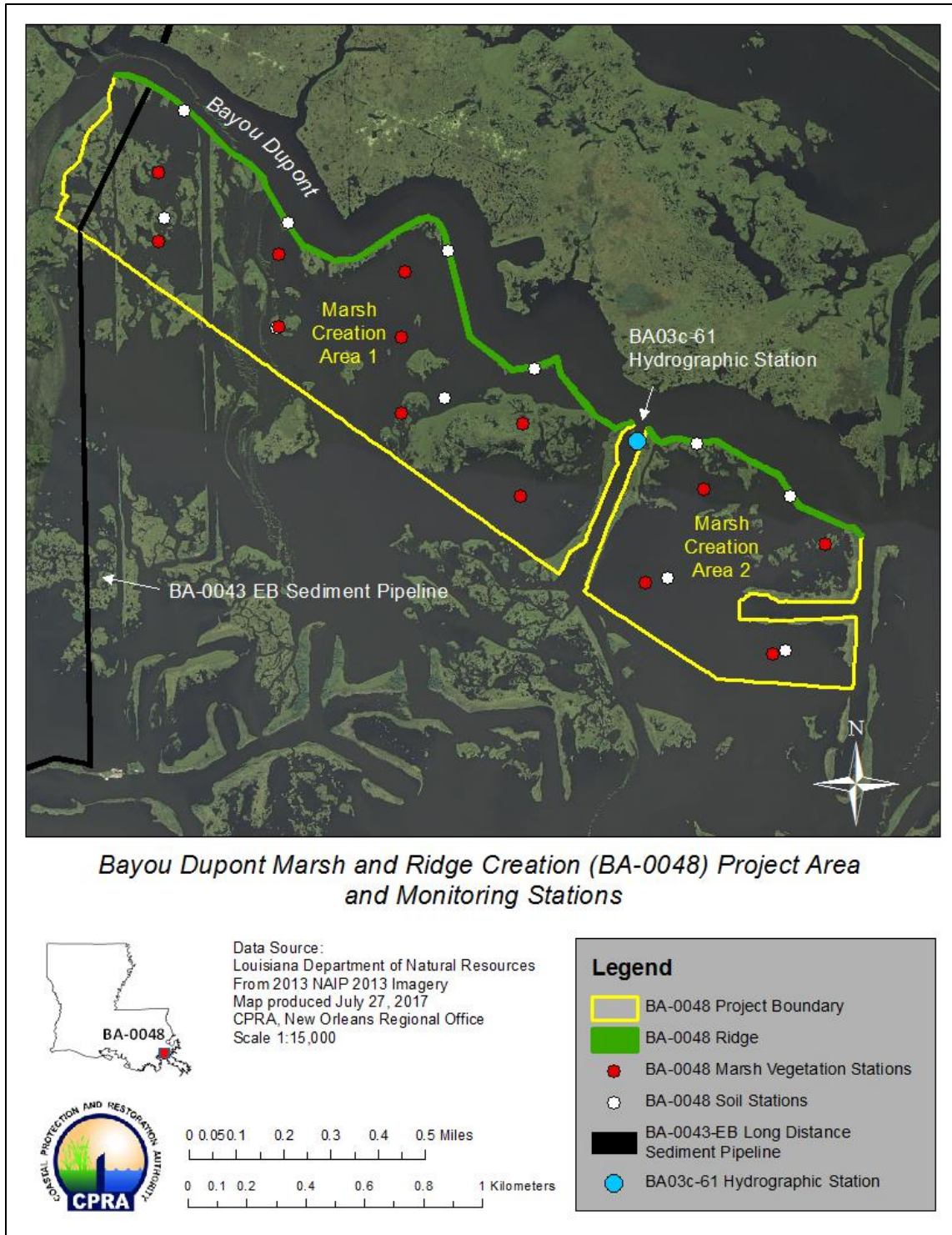


Figure 2. Bayou Dupont Marsh and Ridge Creation (BA-0048) project area and monitoring stations. The ridge vegetation stations are not represented on this map because they are yet to be established. The approximate center of Marsh Creation Area (MCA) 1 is located at 29°37'37"N and 90°02'30"W, and the approximate center of MCA 2 is located at 29°37'13"N and 90°01'41"W. Hydrographic station BA03c-61 is managed as part of the Naomi Outfall Management project (BA-0003c).

Purpose

The purpose of the BA-0048 project is to support the coastal restoration objectives of CWPPRA by redefining a natural ridge of Bayou Dupont and re-establishing adjacent marshes using renewable sediment from the Mississippi River (NMFS, 2011).

Goals

The goals of BA-0048 are to create and nourish marsh through pipeline sediment delivery from the Mississippi River and to create a ridge along a portion of the southwestern shoreline of Bayou Dupont (NMFS, 2011). The introduction and placement of sediment through the use of dedicated dredging is consistent with the Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2012), specifically, the Barataria Marsh Creation Component.

Objectives

- Create approximately 277 acres of brackish marsh
- Nourish approximately 93 acres of brackish marsh
- Create approximately 20 acres of maritime ridge habitat

Features

The Bayou Dupont Marsh and Ridge Creation (BA-0048) project is composed of two neighboring fill areas, Marsh Creation Area (MCA) 1 and MCA 2. The sediment fill totaled 409 acres for the project, with 275 acres for MCA 1 and 134 acres for MCA 2.

Marsh Creation

- Approximately 2.15 million cubic yards of fill dredged from Mississippi River
- Constructed elevation: + 3.0 ft ± 0.5 ft NAVD88 (Geoid09), + 3.68 ft ± 0.5 ft NAVD88 (Geoid99).

Ridge

- Approximately 11,117 linear feet of earthen ridge constructed with a core of in situ sediment (as containment dike), augmented to ridge dimensions with river sediment, and topped with a thin layer of in situ material
- Constructed elevation: + 4.5 ft ± 0.5 ft NAVD88 (Geoid09), + 5.18 ft ± 0.5 ft NAVD88 (Geoid99).
- Crown width: 30 ft
- Side slopes: 1(V):4(H)
- Wedge slope: 1(V):5(H)

Containment Dikes

- Approximately 33,720 linear feet of earthen containment dikes constructed with in situ sediment
- Constructed elevation: + 4.0 ft ± 0.5 ft NAVD88 (Geoid09), + 4.68 ft ± 0.5 ft NAVD88 (Geoid99).
- Crown width: 6.0 ft
- Side slopes: 1(V):4(H)

2. ITEMS REQUIRING MONITORING

The following monitoring elements will provide data to evaluate the success of BA-0048, as based on the project's goals and objectives. Data collected from BA-0048 project-specific stations and Coast-wide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) stations surrounding the project area will be used to compare characteristics between the created marsh and local, natural marsh. Operations, Maintenance and Monitoring (OM&M) reports will be written in 2020, 2026 and 2035. Modifications to the monitoring timeline and procedures are subject to CPRA and NMFS approval.

A. Vegetation

Marsh

Vegetation data are used to assess the colonization and transition of vegetation on the marsh platform, to compare the vegetation in the created marsh to local, natural marsh, and to gauge the quality and stability of the vegetative community. Vegetation surveys are conducted at 13 monitoring stations (2 m x 2 m) in the marsh creation areas. Surveys of vegetation follow CRMS methodology and include an assessment of total cover, species present, percent cover of each species, average height of each vegetation layer, and the depth of water on the marsh surface. The salinity, specific conductivity and temperature of the soil porewater at 10 cm and 30 cm depth are also collected in coordination with the vegetation surveys at each marsh plot (Folse et al. 2014). The first vegetation survey was conducted in 2016 and future surveys are scheduled for 2019, 2025, 2030 and 2034.

Ridge

Herbaceous vegetation surveys will be conducted at 10 monitoring stations (2 m x 2 m) along the ridge, following the protocol described in the above "Marsh" section. Ten additional monitoring stations (6 m x 6 m) will be established on the ridge to document the development of the understory and overstory communities. These surveys will follow general CRMS methodology (Folse et al. 2014), with adaptations to account for the dimensions of the ridge and the plantings. Ten seedling survivorship transects will be established along the crown of the ridge to assess the survivorship and growth of the planted species throughout the life of the

project. Ridge surveys are planned for 2019, 2020, 2022, 2025, 2030 and 2034. Station establishment may be modified based on the as-built planting design.

B. Sediment Properties

Sediment data are used to monitor changes in sediment properties over time and to compare soil properties of the created marsh and ridge to that of local, natural marsh and ridge habitats. Additionally, ridge sediment data are collected to ensure that the sediment characteristics will be amenable to the survival of the planted seedlings. Individual soil cores are collected at 11 monitoring stations, 6 on the ridge and five in the marsh, following CRMS methodology (Folse et al. 2014). Soil properties analyzed include percent organic matter, soil pH, salinity (EC), bulk density, moisture, and wet/dry volume. Soil analysis was conducted in 2016 and future analyses are scheduled for 2017 (ridge only), 2019, 2025, and 2034.

Prior to the ridge planting, additional ridge sediment samples are being collected and analyzed every six months. These analyses are supported with NMFS funds, follow different protocols, and are supplemental to the monitoring included in this plan.

C. Land Water Analyses

Land-water analysis of aerial photography is used in conjunction with topographic surveys of the project area to evaluate the project's success of creating a sustainable marsh platform and ridge. Land-to-water ratios in the project area are determined using CRMS aerial photography (Z/I Imaging digital mapping camera) with 1-meter resolution. Aerial photography was collected in fall 2016 and is tentatively scheduled for 2024 and 2033, dependent on the scheduling of CRMS coast-wide flights (1-year offset in the monitoring budget (Appendix I) is due to the time frame of the federal fiscal year).

D. Topographic Surveys

Data from topographic surveys are compared over time to measure if the dredged material is settling at the predicted rate and if the marsh platform and ridge are retaining elevations that promote healthy marsh and ridge habitat. Post-construction real-time kinematic (RTK) topographic surveys are planned for 2017, 2019, 2024 and 2028. These surveys will be performed along the same transects as the as-built survey. Settlement plates installed during construction and surveyed periodically throughout the construction phase will also be surveyed in conjunction with the topographic surveys. The cost for these surveys is included in the Operations and Maintenance budget.

3. MONITORING BUDGET

The cost associated with monitoring BA-0048 for its twenty-year project life, as outlined in Section 2, is summarized in Appendix 1.

4. **RESPONSIBILITIES**

A. CPRA will:

1. Coordinate and oversee all scientific data collection.
2. Ensure that all data go through quality control procedures and that land-water analysis, sediment and vegetation data are entered into the public database.
3. Summarize and analyze project data and publish OM&M reports according to the schedule included in this monitoring plan. If the data indicate that the project is not meeting its goals and objectives, adaptive management recommendations will be made to improve the response.
4. Review the monitoring plan and budget annually with the NMFS to determine that the data being collected adequately evaluate the project and that funding is suitable to fulfill monitoring requirements.

B. NMFS will:

1. Review the monitoring plan and budget annually with CPRA to determine that the data being collected adequately evaluate the project and that funding is suitable to fulfill monitoring requirements.
2. Review OM&M reports.



5. REFERENCES

- Coco, P. 2010. Draft 95% Design Report-Bayou Dupont Marsh and Ridge Creation (BA-0048). Louisiana Office of Coastal Protection and Restoration. Baton Rouge, Louisiana. 27 p.
- Couvillion, B.R., J.A. Barras, G.D. Steyer, W. Sleavin, M. Fischer, H. Beck, N. Trahan, B. Griffin, and D. Heckman. 2011. Land area change in coastal Louisiana from 1932 to 2010: U.S. Geological Survey Scientific Investigations Map 3164, scale 1:265,000, 12 p. pamphlet.
- Day, J.W., L.D. Britsch, S.R. Hawes, G.P. Shaffer, D.J. Reed, and D. Cahoon. 2000. Pattern and process of land loss in the Mississippi Delta: A spatial and temporal analysis of wetland habitat change. *Estuaries* 23(4):425–438.
- Day, J.W. Jr. and P.H. Templet. 1989. Consequences of sea level rise: Implications from the Mississippi Delta. *Coastal Management* 17:241–257.
- Folse, T.M., L.A. Sharp, J.L. West, M.K. Hymel, J.P. Troutman, T. McGinnis, D. Weifenbach, L.B. Rodrigue, W.M Boshart, D.C. Richardi, W.B. Wood, and M. Miller. 2008, revised 2014. A Standard Operating Procedures Manual for the Coastwide Reference Monitoring System-Wetlands: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control. Louisiana Coastal Protection and Restoration Authority, Office of Coastal Protection and Restoration. Baton Rouge, LA. 228 pp.
- Gagliano, S.M., K.J. Meyer-Arendt, and K.M. Wicker. 1981. Land loss in the Mississippi River Deltaic Plain. *Transactions-Gulf Coast Association of Geological Societies*. 31:295–300.
- National Marine Fisheries Service (NMFS). 2011. Bayou Dupont Marsh and Ridge Creation CWPPRA Project Fed No. BA-0048-Environmental Assessment. 16 p.
- National Marine Fisheries Service (NMFS). 2010. Bayou Dupont Marsh and Ridge Creation-Final Project Information Sheet for Wetland Value Assessment (WVA). Baton Rouge, Louisiana. 22 p.

APPENDIX I

Monitoring Budget for Bayou Dupont Marsh and Ridge Creation (BA-0048)

DRAFT



| | | YR1 | YR2 | YR3 | YR4 | YR5 | YR6 | YR7 | YR8 | YR9 | YR10 | YR11 | YR12 | YR13 | YR14 | YR15 | YR16 | YR17 | YR18 | YR19 | YR20 |
|--|--|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
| Bayou Dupont Marsh and Ridge Creation (BA-0048) | | | | | | | | | | | | | | | | | | | | | |
| Federal sponsor: National Marine Fisheries Service (NMFS) | | | | | | | | | | | | | | | | | | | | | |
| CWPPRA PPL 17 | | | | | | | | | | | | | | | | | | | | | |
| Schedule is in federal fiscal years (October 1-September 30) | | | | | | | | | | | | | | | | | | | | | |
| Price level: 2015 | | | | | | | | | | | | | | | | | | | | | |
| | Year | | | | | | | | | | | | | | | | | | | | |
| | Monitoring Items | | | | | | | | | | | | | | | | | | | | |
| | Rates | | | | | | | | | | | | | | | | | | | | |
| | Land/Water Analysis | 20,063 | 20,324 | | | | | | | | 24,122 | | | | | | | | | | 28,829 |
| | Marsh Vegetation Survey | 5,530 | | | 5,904 | | | | | | 6,649 | | | | | 7,341 | | | | | 7,946 |
| | Ridge Vegetation Survey* | 11,060 | | 11,588 | 11,808 | | | 12,531 | | | 13,298 | | | | 14,682 | | | | | | 15,892 |
| | Sediment Analysis | 5,967 | 4,243 | | 6,288 | | | | | | 7,082 | | | | | | | | | | 8,463 |
| | Operations, Maintenance & Monitoring Report (OM&M) | 25,000 | | | | 27,225 | | | | | | 30,660 | | | | | | | | | |
| | Monitoring Administration | 6,240 | 6,422 | 6,538 | 6,662 | 6,795 | 3,466 | 5,656 | 3,606 | 3,678 | 15,005 | 3,826 | 3,903 | 3,981 | 4,061 | 8,283 | 6,759 | 4,309 | 4,395 | 17,933 | 4,573 |
| | Annual Total | 24,211 | 30,989 | 18,126 | 30,663 | 34,020 | 3,466 | 18,187 | 3,606 | 3,678 | 66,156 | 34,486 | 3,903 | 3,981 | 4,061 | 30,306 | 6,759 | 4,309 | 4,395 | 79,063 | 41,214 |
| | Running Total | 24,211 | 55,200 | 73,326 | 103,989 | 138,009 | 141,474 | 159,661 | 163,267 | 166,944 | 233,101 | 267,587 | 271,489 | 275,470 | 279,531 | 309,837 | 316,596 | 320,905 | 325,301 | 404,363 | 445,577 |
| | Fully-Funded Total | | | | | | | | | | | | | | | | | | | | |
| | 445,577 | | | | | | | | | | | | | | | | | | | | |

*The ridge vegetation surveys listed for 2018 and 2019 will occur 1 year later (2019 and 2020) due to the planting schedule for the ridge.

