

Louisiana’s Coastwide Reference Monitoring System (CRMS) Monitoring and Adaptive Management Activities Implementation Plan (MAIP)

1. Introduction

The Deepwater Horizon (DWH) oil spill settlement in 2016 provides the Natural Resource Damage Assessment (NRDA) Louisiana Trustee Implementation Group (DWH LA TIG) up to \$8.8 billion, distributed over 15 years, to restore natural resources and services injured by the spill. The DWH Trustees selected a comprehensive, integrated ecosystem approach to restoration as outlined in the Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS) (DWH Trustees 2016). The injuries caused by the DWH oil spill affected such a wide array of linked resources over such a large area that the effects constituted an ecosystem-level injury.

The scale of the DWH oil spill and subsequent restoration effort was unprecedented and the Trustees recognized the need for robust Monitoring and Adaptive Management (MAM) to support restoration planning and implementation (DWH, 2017). One of the goals outlined in the PDARP/PEIS is to “Provide for Monitoring, Adaptive Management, and Administrative Oversight to Support Restoration Implementation” to ensure that the portfolio of restoration projects provides long-term benefits to natural resources and services injured by the spill (Appendix 5.E of the PDARP/PEIS).

Since 2006, Louisiana’s Coastwide Reference Monitoring System (CRMS) has been systematically collecting and serving monitoring data from across coastal Louisiana in support of projects constructed through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The availability and ease of access of CRMS data was beneficial to the DWH LA TIG as they began to plan and implement restoration projects in coastal Louisiana. From FY21 forward, the CWPPRA Task Force has capped CRMS funding and has encouraged the state and its federal cost share partner, USGS, to find additional funds from other restoration programs to fully fund CRMS. The CWPPRA Task Force values CRMS but seeks support in funding this publicly available dataset that clearly has value to data users beyond the CWPPRA community. The following request from CPRA on behalf of the CRMS program is for NRDA to fund approximately 22% of the CRMS program from FY24 to FY27. The combined support of CWPPRA’s authorized contribution and NRDA’s additional support will ensure that CRMS data collection continues unimpeded in the near term.

The DWH LA TIG is in the process of implementing restoration projects across Louisiana’s coast with a particular focus on the deltaic plain in Louisiana – the area most impacted by the DWH oil spill. Coastal areas including Breton Sound, Terrebonne, and Barataria Basins saw heavy oiling and remediation efforts caused direct mortality and reduced growth of wetland vegetation and allowed for increased erosion of already fragile and degrading marshes (DWH

Trustees 2016). The DWH LA TIG is also considering restoration projects in the region. The projects being considered would restore connectivity with the Mississippi River, promote deltaic processes, and create and restore marshes (LA TIG 2018; Nixon et al. 2016). The reference network approach of CRMS monitoring provides both baseline data and references for the DWH LA TIG’s restoration efforts (Figure 1).

The scale of funding presented in this request captures the coastwide nature of the DWH LA TIG’s restoration planning interest, the focus on the deltaic plain, and the fact that NRDA benefits from specific CRMS site level hydrology, vegetation, soils and elevation change data. Additional benefits include CRMS programmatic coastal scale data collection efforts including aerial photography acquisition and analysis, elevation surveys, and vegetation classification.

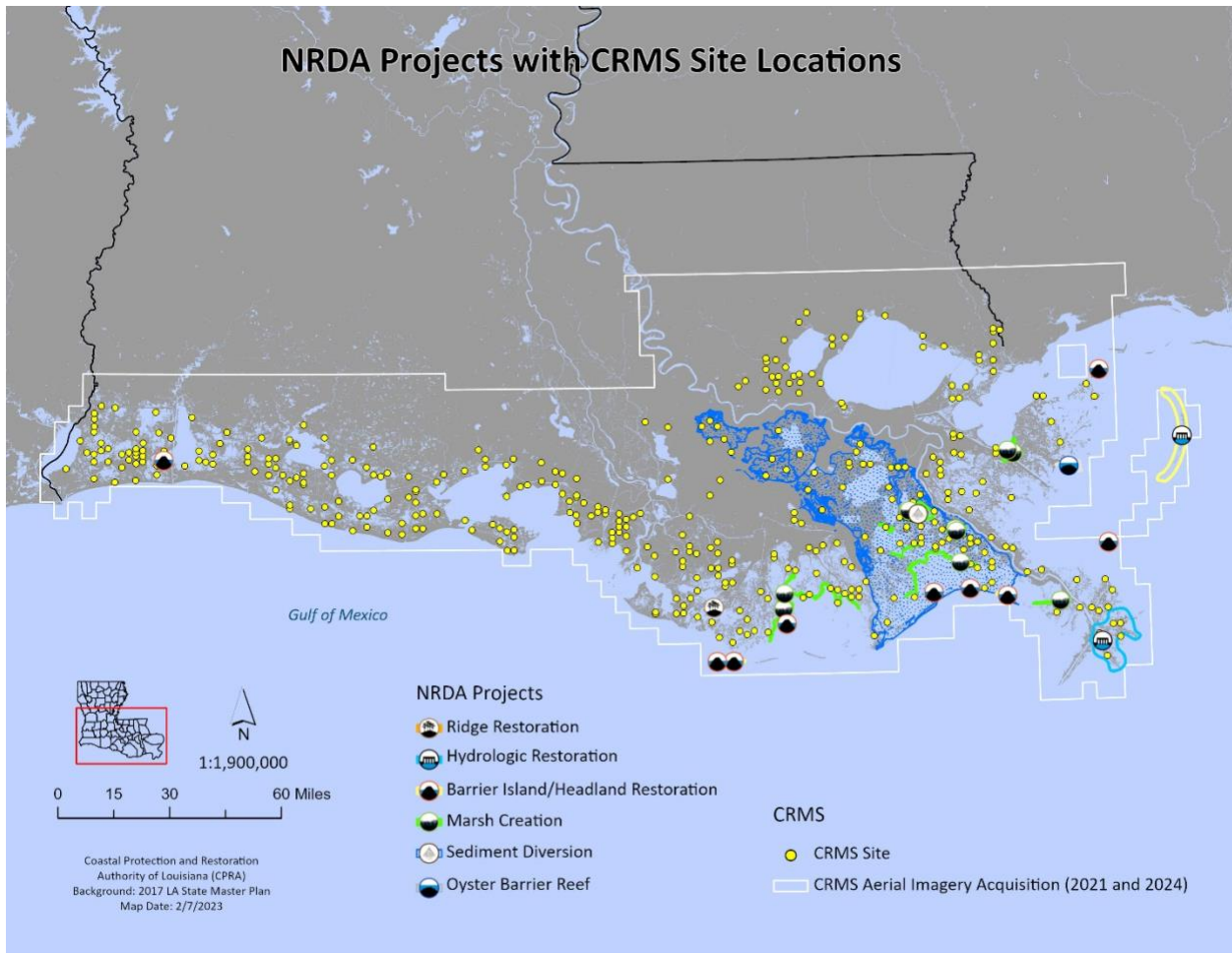


Figure 1. CRMS site locations and planned DWH NRDA restoration projects.

2. Purpose of this document

This MAM Activities Implementation Plan (MAIP) describes the MAM activity, “*Coastwide Reference Monitoring System*” to address restoration priorities described in the PDARP/PEIS.

This MAM activity is intended to support evaluation of regional restoration outcomes within the Louisiana Restoration Area; perform data aggregation and data management; inform restoration decision-making; and perform monitoring to inform the design, implementation and adaptive management of existing and future restoration projects. This document provides information about the activities to be implemented; describes their applicability to the PDARP/PEIS and describes their consistency with the programmatic alternative selected by the DWH Trustees in the PDARP/PEIS.

In 2021, the DWH LA TIG published a Restoration Monitoring and Adaptive Management Strategy (DWH 2021). The MAM strategy is intended to help guide future decisions about data types to be collected and their application. Stated needs in the MAM strategy document include “information to support restoration planning and implementation, ecosystem evaluation, and programmatic evaluation and management”. The CRMS network provides data necessary to support planning, implementation, and project evaluation for all projects in Louisiana’s coastal zone including NRDA projects.

This MAM Activities Implementation Plan (MAIP) describes the MAM Activity, CRMS, to address the following priorities of various restoration types described in the PDARP/PEIS: Wetlands, Coastal, and Nearshore (Section 5.5.2 in PDARP/PEIS)

❖ Goals Addressed:

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

❖ Rationale

- Since 2006, CRMS has been the largest source of baseline ecological and hydrologic habitat monitoring data for all restoration projects in Louisiana including marsh creation and freshwater/sediment diversions.
- As such, CRMS data are incorporated into restoration project planning, large- and small- scale ecological models, and restoration assessments at multiple spatial scales.
- Aerial photography, collected by the CRMS program every 3 years since 2005, is a key data source. The imagery is classified into land/water and habitat composition and compared to historic classifications. As such, NRDA project evaluations are dependent on habitat assessments which originate within the CRMS programmatic data collection.

- The coastwide elevation surveys provide data in a common vertical datum (ft. NAVD88, Geoid12a) for both ecological assessments and project engineering throughout the coastal zone.
- Historic and future coastal-scale vegetation type delineations (i.e., Fresh, Intermediate, Brackish, Saline, Swamp) are key sources of baseline condition data and future project assessments as river diversions will influence hydrology and vegetation at the basin scale.
- CRMS is focused in Louisiana where most of the DWH injury occurred.
- Habitat Projects on Federally Managed Lands (Section 5.5.3 in PDARP/PEIS)
 - ❖ Goals Addressed:
 - Restore federally managed habitats that were affected by the oil spill and response actions through an integrated portfolio of restoration approaches across a variety of habitats.
 - Restore for injuries to federally managed lands by targeting restoration on federal lands where the injuries occurred, while considering approaches that provide resiliency and sustainability.
 - ❖ Rationale
 - CRMS sites have been collecting data on 7 National Wildlife Refuges and 1 National Park and Preserve since 2006
 - Impacts and changes to marsh vegetation, soils, and marsh edge has been well documented through CRMS
 - CRMS informs science-based operation plans, particularly water management regimes on federal lands
- Monitoring and Adaptive Management (Section 5.5.15 in PDARP/PEIS)
 - ❖ Goals Addressed:
 - Increase the likelihood of successful restoration
 - Provide feed-back for management decisions
 - ❖ Rationale
 - CRMS is the primary wetland monitoring program in Louisiana and was designed to provide data at the coastwide scale to inform adaptive management activities regardless of the funding used for restoration project construction.
 - CRMS data would be used as baseline monitoring for any future sediment diversion projects and would continue after diversions are in operation in order to assess project impacts (both positive and negative) on vegetation and salinity and will allow for adaptive management decisions about diversion operations.
 - CRMS data serve as baseline and post- project monitoring for other coastal restoration project types in the Louisiana Coastal Master Plan (CPRA 2017), including marsh creation, ridge restoration, and barrier island restoration.

Type of project: Foundational Activity

Restoration Type: Wetland Coastal and Nearshore Habitat (WCNH) and Cross Restoration Type (CRT)

Fundamental Objectives:

WCNH Objective 1. Contribute to reduction in net marsh loss in coastal Louisiana
WCNH Objective 2. Maintain elevational landscape sufficient to support wetland vegetation
WCNH Objective 3. Restore habitats injured by the spill in a range of salinity zones (fresh, intermediate, brackish, saline)
WCNH Objective 7. Provide benefits to estuarine dependent fish and invertebrates (nekton and benthic) at a variety of life stages through habitat restoration.
CRT Objective 1. Maximize the combined benefits of the various Restoration Types and approaches across the overall restoration portfolio
CRT Objective 4. Provide for equivalent pre-spill baseline ecosystem communities and productivity

MAM SMART Objective: The proposed activity will partially satisfy the MAM need to develop SMART objectives through data collection, storage, and synthesis to support:

Wetland Coastal and Nearshore Habitat:

1a-Quantify and assess historic, current, and future predicted emergent vegetated wetland habitat area in coastal Louisiana and determine appropriate quantification for implemented and long term land area and from DWN NRDA restoration
2a-Synthesize available data and/or quantify appropriate land elevation and different marsh vegetation types and develop approach for assessment and reporting on DWH NRDA projects to sustain a diversity of emergent marsh vegetation over the life of the restored marshes
3a-Quantify and assess historic, current, and predicted emergent vegetated wetland habitat area in coastal Louisiana and determine appropriate quantification for implemented and long term vegetated marsh salinity community types from DWH NRDA restoration

Cross Restoration Type:

1a-Evaluate the efficacy of various strategies in land creation/restoration (diversions, marsh platform creations, barrier island restoration, ridge restoration)
4a-Develop approach to understand and assess how the DWH NRDA restoration portfolio can maximize support to ecosystem communities primary and secondary productivity
CRMS data types were originally selected because they provided information about coastal landloss and the processes that contribute to coastal landloss. At every CRMS site, information about changes in vegetation, elevation, inundation, and salinity is collected consistently and at regular intervals so that coastal landloss can be understood and addressed. The reference network design and the fact that CRMS sites are distributed throughout Louisiana's wetland types and coastal basins provides necessary insight into how the coast is changing and allows for quality coastal restoration planning and evaluation of restoration project and program success within the framework of Louisiana's changing coast.

This activity will collect and compile vegetation, soils, hydrology, and spatial data within wetlands throughout coastal Louisiana to support multiple programmatic goals in the PDARP/PEIS, (1) Restore and conserve habitat; and (2) Provide for monitoring, adaptive management, and administrative oversight to support restoration implementation.

3. Monitoring and Adaptive Management: Coastwide Reference Monitoring System Program

3.1. MAM Activity Description

3.1.1. Background

The CRMS program provides valuable data for the nearshore habitats and resources targeted for NRDA restoration, including coastal wetlands and habitats on Federally Managed Lands. CRMS data are available and useful to the DWH LA TIG to plan and evaluate habitat restoration projects in and across hydrologic basins over time, allowing for assessment of the comprehensive, integrated portfolio of restoration projects at a coastwide or regional-scale within the Gulf of Mexico (GOM) and relative to other drivers and long-term trends in the basins. Since its creation, CRMS has been a major component of wetland monitoring and restoration planning and assessment in Louisiana. From 2003 to 2020, the development and maintenance of CRMS network has been primarily funded by CWPPRA and the State of Louisiana. CWPPRA established a state/federal partnership involving Louisiana's Coastal Protection and Restoration Authority (CPRA), the US Department of Interior (Fish and Wildlife Service), US Department of Commerce (National Marine Fisheries Service), US Environmental Protection Agency, US Department of Agriculture (Natural Resources Conservation Service), and US Army (Corps of Engineers).

CWPPRA of 1990 was enacted to restore, create, enhance and protect coastal wetlands. Since inception, the CWPPRA program has authorized more than 200 coastal restoration and protection projects. Project types vary by location including marsh creation, shoreline protection, vegetative plantings, terracing, barrier island restoration, hydrologic restoration and diversions. The CRMS network was designed to provide a long-term reference network to replace the paired project and reference site monitoring approach implemented in the 1990s. The CRMS network was intentionally designed to monitor the effectiveness of restoration activities at multiple spatial scales, from site to coastwide, because planned restoration and protection activities were intended to influence the entire coastal zone of Louisiana (Steyer et al. 2003). The CRMS program uses standardized data acquisition, data quality assurance and quality control, and data collection frequency protocols so that the monitoring program can provide data to characterize baseline conditions of Louisiana's extensive coastal wetlands and support landscape-scale ecological modeling (CPRA 2017). There are approximately 390 CRMS sites representing fresh, intermediate, brackish, and saline wetland types and forested wetlands. The DWH LA TIG has used CRMS data collection protocols and CRMS data for project planning and evaluation. Additionally, CRMS standardized data collection schedules have been adopted in NRDA restoration monitoring and adaptive management plans.

CWPPRA fully funded CRMS from inception of the program through federal FY20. In 2017, the CWPPRA Task Force pledged to continue to fund CRMS for an additional twenty years (from FY20 to FY39) but capped CWPPRA’s contribution to CRMS at \$10M/yr from federal FY21 to FY39 with the intent that other funding sources be solicited to meet projected shortfalls (Table 1). DWH NRDA is benefiting from the systematic, standardized data collection.

CRMS data collection is accomplished with three-year data collection contracts administered by CPRA. This request is intended to fund the portion of the CRMS budget during the next contract period which includes federal FY24 through FY27. The level of effort varies by year and totals \$11.2 M for federal FY24 through federal FY27. Funding request details are provided in Section 3.3.

If additional funds are not secured, modifications to CRMS will be required. CRMS managers (CPRA and USGS) have determined that modifications to the CRMS program will need to be implemented to reduce the annual costs to the approved budget, possibly creating data gaps that would be detrimental to DWH NRDA restoration planning, monitoring and adaptive management. Analyses conducted by CPRA and USGS have shown that CRMS sites are not redundant, so removal of sites or cessation of data collection campaigns would impact all CRMS data users including NRDA.

Table 1. Budget approved by CWPPRA Task Force in 2017

CRMS Budget FY20-27								
Approved by CWPPRA Task Force October 2017								
	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Admin and Supervision	478,507.62	488,077.77	497,839.33	507,796.12	517,952.04	528,311.08	538,877.30	549,654.85
Landrights	51,000.00	52,020.00	53,060.40	1,109.49	1,131.68	1,154.32	1,177.40	1,200.95
Engineering Services			2,122,416.00					2,343,318.76
Equipment	1,020.00	1,040.40	1,061.21	1,082.43	1,104.08	1,126.16	1,148.69	1,171.66
Temporal Data Collection	8,858,700.00	9,295,974.00	9,110,470.68	9,292,680.09	9,478,533.70	9,668,104.37	9,976,335.03	10,058,695.79
Spatial Data Collection and Analysis	606,900.00		240,894.22	644,047.14		255,638.87		
O&M	438,600.00			465,445.83			493,934.84	
Database Management	344,760.00	351,655.20	358,688.30	365,862.07	373,179.31	380,642.90	388,255.76	396,020.87
Analysis and Reporting	372,300.00	379,746.00	387,340.92	395,087.74	402,989.49	411,049.28	419,270.27	427,655.67
USACE Project Management	2,040.00	2,080.80	2,122.42	2,164.86	2,208.16	2,252.32	2,297.37	2,343.32
Annual Total Budget	\$11,953,827.62	\$11,386,594	\$13,606,213	\$12,524,242	\$11,643,044	\$12,131,544	\$12,722,227	\$14,699,010
Budget Approved and Funded by CWPPRA Task Force	\$11,953,827.62	\$10,346,649	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000
CRMS Funding Deficit (Total - CWPPRA Funded)	\$0.00	-\$1,039,946	-\$3,606,213	-\$2,524,242	-\$1,643,044	-\$2,131,544	-\$2,722,227	-\$4,699,010

Linkages between NRDA and CRMS

Louisiana’s Systemwide Assessment and Monitoring Program (SWAMP) is a monitoring and adaptive management program designed to comprehensively monitor coastal habitats and waters. By leveraging established data collection efforts, SWAMP integrates monitoring activities within inland waters and rivers, wetlands, barrier islands and shoreline, and nearshore coastal waters. CRMS provides data to support wetland assessment and modeling, while the Barrier Island Comprehensive Monitoring Program (BICM) plans and monitors restoration

efforts on barrier islands. Both CRMS and BICM are major components of the SWAMP program. CPRA's participation on the DWH LA TIG helps ensure that monitoring associated with DWH NRDA projects is complementary to the SWAMP, CRMS, and BICM programs. In Louisiana, many of the processes, protocols, and data management structures for coastal monitoring were previously developed by CRMS and BICM, enabling the DWH LA TIG to leverage established infrastructure and thereby reducing the "start-up" investment for large scale DWH NRDA restoration efforts after the DWH oil spill. Therefore, Louisiana's DWH NRDA program has already benefited from the investments CWPPRA and the State of Louisiana made in the CRMS program even before the DWH oil spill occurred.

Standardized Data Collection and Long-term Dataset

All CRMS data collection, data processing, and quality assurance and quality control procedures follow a standard operating procedure "A Standard Operating Procedures Manual for The Coastwide Reference Monitoring System-Wetlands: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control" (CRMS SOP, Folse et al. 2020) and data are stored in the publicly available Coastal Information Management System (CIMS, <https://cims.coastal.louisiana.gov/default.aspx>) database. The CIMS public web application portal is backed by a relational database that houses observational and geo-spatial data resulting from coastal restoration activities maintained by the Coastal Protection and Restoration Authority (CPRA).

The original CRMS SOP was established in 2005, as part of CRMS program development, and is revised as appropriate. The CRMS SOP is the foundation for all hydrologic and ecological data collection associated with CRMS wetland monitoring in coastal Louisiana. DWH NRDA wetland monitoring protocols have leveraged and taken full advantage of the CRMS SOP. In addition, because data are stored in one publicly accessible database (CIMS), CRMS data are available and used for DWH NRDA project planning and evaluation.

The CRMS program began data collection at some sites in 2006 with the network fully built and operational in 2008. Therefore, the resulting dataset provides extensive information on the vegetation, soils, water levels, flooding, marsh elevation, land/water ratios, etc. throughout the coastal zone. These data have been used in the DWH NRDA project planning process to determine target elevations for marsh creation projects (i.e., Lake Hermitage, Barataria Basin Ridge and Marsh Creation - Spanish Pass Increment, Terrebonne Basin Ridge and Marsh Creation - Bayou Terrebonne Increment, Lake Borgne Marsh Creation, and Upper Barataria Large Scale Marsh Creation). In addition, the robust CRMS hydrology dataset will be used to calculate depth and duration of flooding within projects while the CRMS vegetation dataset will be used to establish appropriate NRDA performance criteria for percent vegetation cover. In future DWH NRDA injury assessment processes, the CRMS water level data would be available to determine the amount of water on the marsh surface, at the time of injury, to assist with oil

penetration calculations. CRMS data are also identified in DWH NRDA monitoring plans (e.g., Lake Hermitage Marsh Creation) as a source of data for project assessment comparisons.

Database Infrastructure

CPRA is committed to transparency and therefore has granted the general public access to all of the data housed in CIMS by making available full tabular data table dumps that are refreshed weekly, while also allowing for more targeted data extractions. All of the geospatial GIS data associated with the CRMS program is also made publicly available. The CRMS SOP includes data transfer procedures for each data type (e.g., vegetation, hydrologic, soils, etc.) to ensure high quality data are stored and available for a variety of uses. Data transfer processes include automated validation checks, automated email notifications, data summaries and dataset completion reports.

The CRMS program has invested a substantial amount of resources to develop the database structure, web interfaces, automated QA/QC procedures, and web mapping environment. The investment in database infrastructure and web applications has enabled programs such as DWH NRDA to easily access quality data at no additional cost. As it pertains to DWH NRDA funded projects, the CIMS development team is actively working on creating connections between CIMS and DIVER using the Diver Data Specifications. These efforts will result in a full database exchange of information for data types supported by both systems.

CRMS Funded Programmatic Level Data Collection

Through the development of SWAMP there has been a concerted effort to eliminate data collection redundancy among programs. Some of the efficiencies realized through SWAMP depend upon continued CRMS programmatic level data collection efforts that benefit multiple programs. CRMS programmatic level data collection are in addition to the ecological field-based sampling at individual CRMS sites. Programmatic data collection includes periodic surveys of coastwide vegetation via a helicopter, coastwide aerial photography acquisition, coastwide soil surveys, and coastwide elevation surveys conducted by professional land surveyors.

The CRMS program has supported acquisition of high-resolution, color-infrared aerial photography of the entire coastal zone every 3 years since 2005. Because the CRMS imagery is made available to partners, the DWH NRDA program indirectly benefits from the fixed CRMS acquisition schedule. Historically, the CRMS program paid for coastwide photography which is the foundation for Barrier Island Comprehensive Monitoring Program (BICM) habitat classifications. The BICM-funded habitat classifications, based on CRMS imagery, are then used by DWH NRDA for project evaluations reducing the need for DWH NRDA to pay for large scale photo acquisition and classification. As such, planned CRMS photography acquisitions are an asset to the DWH NRDA program.

In support of project design and construction, CRMS water level data are converted to the current vertical datum used for restoration planning and implementation in the coastal zone

(currently NAVD88, Geoid 12b). Marsh elevation is also surveyed and tracked. Extensive, coastwide, comprehensive elevation surveys are required to collect hydrology and marsh elevation data relative to a vertical datum. There have been three coastwide surveys to date; one as sites were constructed between 2006 and 2008, one in 2014 and again in 2021. The CRMS program plans to continue to maintain elevations in the future. The next survey, planned for 2026 will incorporate the new gravimetric datum currently in development by NGS.

CRMS marsh and water elevations have been used for DWH NRDA project planning and implementation (e.g., target elevations for marsh creation projects, target water surface elevation for diversion projects). Additionally, the elevations from CRMS sites are a key validation data source for the creation of a seamless Light Detection and Ranging (LIDAR) surface for coastal Louisiana and digital elevation models (DEMs). The resulting DEMs are used extensively for DWH NRDA-funded barrier island restoration and habitat classifications for DWH NRDA project assessments. Within the CRMS programmatic budget, the next comprehensive coastwide elevation survey is scheduled for FY27 (\$2.3M) and is a large portion of the anticipated funding deficit.

3.1.2. Objectives

The objective of this MAIP is to maintain the continuity of CRMS datasets that are fundamental to Louisiana coastal restoration planning, implementation, monitoring, and adaptive management.

In order for the CRMS program to continue to collect data coastwide through the next three-year contract without interruption, additional funds are needed. The LA TIG's NRDA restoration program has benefitted from CRMS data availability and supplementing CRMS' current funding with NRDA funding would help ensure CRMS data collection continues uninterrupted. We propose that the LA TIG, through DWH NRDA funding, fund a portion of contracted data collection activities in basins impacted by the incident not to exceed \$11,195,825 which is the amount the CWPPRA Task Force approved but did not fund for FYs 24-27.

3.1.3. Tasks

CRMS data collection items that cost approximately the same amount as the funding deficit were identified for each FY (Table 2). Proposed monitoring activities include hydrology data collection and station maintenance and vegetation data collection at CRMS sites on the Deltaic Plain in the Barataria, Terrebonne, Breton Sound, Pontchartrain and Mississippi River basins. Proposed work also includes costs for the next coastwide elevation survey in the central and eastern portions of the coast (from the Atchafalaya Basin east. Work will be performed by contracted data collectors and surveyors. These costs do not include CPRA or USGS personnel time or other general programmatic costs.

Table 2. Proposed data collection work from the CRMS contract to be funded by NRDA.

	FY24	FY25	FY26	FY27	Subtotal
Hydrology Data Collection and Station Maintenance - BA, TE, BS and MR Basins	\$1,642,940	\$1,642,940			\$3,285,880
Hydrology Data Collection and Station Maintenance - BA, TE, BS, PO and MR Basins			\$2,221,440	\$2,221,440	\$4,442,880
Vegetation Data Collection - BA, TE, BS and MR Basins		\$488,485	\$488,485	\$488,485	\$1,465,455
Coastwide CRMS Survey Elevation Update - Central and Eastern Coast				\$1,989,000	\$1,989,000
Total by Federal FY	\$1,642,940	\$2,131,425	\$2,709,925	\$4,698,925	\$11,183,215

3.1.4. Activity Implementation Description

CRMS data collection has been ongoing and continuous coastwide since 2008 with some sites coming online in 2006. In that time, we've experienced several hurricanes and other challenges related to field sampling. Protocols are in place for rebuilding sites and re-establishing stations after disturbances. Rod surface elevation table (RSET) stations are maintained until the station erodes into open water and becomes destabilized as can happen in high energy environments. If boardwalks around RSET stations are destroyed, they are rebuilt. If hydrology stations are destroyed, they are re-established. If vegetation stations convert to open water, they remain vegetation stations and data collection continues. It is anticipated that CRMS monitoring will continue, unabated into the future even if additional storms or other disturbances do occur.

3.1.5. Budget

Table 3. CRMS Budget Presented to and Approved by CWPPRA in October, 2017 (federal FY24-27 subset).

	FY24	FY25	FY26	FY27	Total FY24-27
Admin and Supervision	\$517,952	\$528,311	\$538,877	\$549,655	
Landrights	\$1,132	\$1,154	\$1,177	\$1,201	
Engineering Services (coastwide elevation)				\$2,343,319	
Equipment	\$1,104	\$1,126	\$1,149	\$1,172	
Temporal Data Collection	\$9,478,534	\$9,668,104	\$9,976,335	\$10,058,696	
Spatial Data Collection and Analysis		\$255,639			
O&M			\$493,935		
Database Management	\$373,179	\$380,643	\$388,256	\$396,021	
Analysis and Reporting	\$402,989	\$411,049	\$419,270	\$427,656	
CPRA Indirect	\$865,946	\$883,265	\$900,930	\$918,949	
USACE Project Management	\$2,208	\$2,252	\$2,297	\$2,343	
Annual Total Budget	\$11,643,044	\$12,131,544	\$12,722,227	\$14,699,010	\$51,195,825
Budget Funded by CWPPRA Task Force	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$40,000,000
Funding Deficit (Total - CWPPRA Funded)	\$1,643,044	\$2,131,544	\$2,722,227	\$4,699,010	\$11,195,825

3.1.6. Timeline

The activities described above will begin October 1, 2023 and continue through September 30, 2027. CRMS programmatic expenditures are reported on the state (CPRA) and federal (USGS) fiscal year cycles. The programmatic CRMS budget was estimated on the federal FY (Tables 1 and 2).

3.1.7. Implementation Roles

CPRA and USGS will continue to implement the CRMS program. Approximately 13% of the program is federal (USGS), 15% is state (CPRA), and 73% is contracted data collection.

3.1.8. Data management and reporting

Well-established data management procedures outlined in the CRMS SOP have been in place since 2006, and were described in previous sections of this MAIP (sections 3.1). All CRMS data are publicly available and direct linkages between the CIMS database and NRDA's DIVER database are under development. Additionally, progress will be reported through the Restoration Management Portal.

4. Consistency of MAM Activity with the PDARP/PEIS

This MAM activity is consistent with and supports multiple programmatic goals (section 5.3) in the PDARP/PEIS, including a variety of restoration types (section 5.5) and restoration approaches (Appendix 5.D). This MAM activity supports the programmatic goals of, (1) Restore and conserve habitat; and (2) Provide for monitoring, adaptive management, and administrative oversight to support restoration implementation. A fully funded CRMS program will support a variety of restoration types described in the PDARP/PEIS, including but not limited to Sections 5.5.2, *Wetlands, Coastal, and Nearshore Habitats*, 5.5.3, *Habitat Projects on Federally Managed Lands*, and 5.5.15, *Monitoring and Adaptive Management*. The PDARP/PEIS makes numerous references to creation and restoration of multiple habitat types, especially through river diversions, marsh creation, and barrier island restoration which are listed as main strategies for restoring habitat (Section 5.5.2.2). A fully funded CRMS network will also provide data for monitoring and adaptive management of wetland resources, including determining recovery from injury during the DWH. Therefore, CRMS provides baseline data for future projects, important resource management data, and is an essential part of Operations, Maintenance, Monitoring, and Adaptive Management Plans (OMMAM) for current and possible future large-scale restoration projects in Louisiana. Rationale for how these data support and are consistent with a variety of restoration approaches found in the DWH PDARP/PEIS appendices 5.D and 5.E. Linkages between CRMS activities and the restoration approaches as identified in the PDARP/PEIS as appropriate under the Oil Pollution Act (OPA) are provided below.

- Habitat Restoration Approaches (D.1)

- Create, Restore, and Enhance Coastal Wetlands (D.1.1)
 - CRMS provides elevation data for marsh creation project planning and implementation (e.g., target elevations for marsh creation projects, target water surface elevation for diversion projects).
 - CRMS provides hydrology data to determine if salinity gradients and flow regimes are suitable to enhance coastal habitats.
 - CRMS provides vegetation and soils data to determine if projects are colonizing with communities capable of supporting sustainable marshes.
 - CRMS has sites within created, restored marshes and in unrestored areas. Data are available to improve assumptions about how created marsh surfaces behave.
- Restore and Preserve Mississippi-Atchafalaya River Processes (D.1.2)
 - River diversions represent a long-term strategy to restore injured wetlands and resources by reducing widespread loss of existing wetlands.
 - Currently no large-scale sediment diversions exist on the Mississippi River.
 - CRMS data was used to update models for the Mid-Barataria Sediment Diversion planning, act as baseline, construction phase and post-construction monitoring data for basin hydrology, vegetation, soils, and land change providing the ability to adaptively manage project outcomes as benefits and impacts become clear.
- Create, Restore, and Enhance Barrier and Coastal Islands and Headlands (D.1.4)
 - The CRMS program has and will continue to fund high resolution coastwide photography which is the basis for barrier island habitat classifications used to assess barrier island project effectiveness.
 - The CRMS program has and will continue to support coastwide elevation surveys providing a key validation data source for the creation of a seamless Light Detection and Ranging (LIDAR) surface for coastal Louisiana and digital elevation models (DEMs). The resulting DEMs are being used extensively for DWH NRDA funded barrier island restoration and habitat classifications for DWH NRDA project assessments.
- Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats (D.1.7)
 - The CRMS program would inform the restoration approach to develop and implement management activities at restoration projects by providing hydrology data to inform the need for debris removal within choked canals. Additionally, reference vegetation and elevation data inform planning and implementation of vegetation plantings.
- Monitoring and Adaptive Management (5.E)
 - CRMS would provide both project level (E.3.1), resource level (E.3.2), and cross-resource level (E.3.3) monitoring
 - This coastwide data set would provide for project specific monitoring that would *“inform restoration planning, supports the evaluation of project performance and ensures project compliance.”* It would also provide feedback information in order to adaptively manage projects.
 - The coastwide data set would also provide important resource information and *“can fulfill data and information needs for multiple projects benefitting a common*

injured resource, thereby promoting efficiency and consistency in data collection and restoration evaluation.”

- The CRMS programmatic data collections would apply directly to wetlands and barrier islands providing *“cross-resource-level monitoring and scientific support to fulfill data and information needs common among multiple injured resources, thereby promoting efficiency and consistency in data collection and restoration evaluation.”*

The CRMS activities described above would clearly address many of the key areas of restoration outlined in the PDARP/PEIS by leveraging a coastwide, long-term data set that monitors coastal wetlands and barrier islands that received direct injury during the DWH oil spill. A fully funded CRMS would provide valuable data towards the DWH LA TIG’s vision of large-scale restoration of multiple coastal and estuarine habitats and the ability to conduct proper monitoring and adaptive management on restoration projects. Without additional funding, the CRMS program will have to remove sites from the monitoring network or cancel planned data collection campaigns which will impact restoration efforts coastwide including DWH NRDA’s ability to assess projects.

5. National Environmental Policy Act (NEPA) Review

The Trustees’ approach to compliance with NEPA summarized in this section is consistent with, and follows where applicable from, the PDARP/PEIS Section 6.4.14. Resources considered and impacts definitions (minor, moderate, major) align with the PDARP/PEIS. Relevant analyses from the PDARP/PEIS are incorporated by reference. Such incorporation by reference of information from existing plans, studies or other material is used in this analysis to streamline the NEPA process and to present a concise document that briefly provides sufficient evidence and analysis to address the LA TIG’s compliance with NEPA (40 CFR 1506.3, 40 CFR § 1508.9). All source documents relied upon are available to the public and links are provided in the discussion where applicable.

This MAIP addresses the CRMS environmental data collection program. The activity consists of field data collection and data analysis. Those activities which are data-based analyses, planning meetings, and preparation of reports have no effects on the environment and are fully addressed in PDARP/PEIS Section 6.4.14. No further evaluation is necessary.

Temporary impacts to the biological and physical environment could include short-term, temporary disturbance of habitats and species, and minor disturbance to terrestrial, estuarine, and marine environments through the placement of instrumentation at field sites. Consistent with the analysis in Section 6.14.4 of the PDARP/PEIS, environmental consequences would be direct, short-term, minor impacts through the associated field work. Those activities which are components of field data collection include use of instrumentation and field sampling. Sites are in undeveloped coastal marshes throughout coastal Louisiana. Navigation from the launches to the monitoring sites will be in a small watercraft or airboat. For each data collection event, crews of 2-4 people will be on site collecting data for less than 8 hours at a time. All activities

will be on the marsh surface at the monitoring site locations and through continuous hydrologic recorders in nearby water that will be deployed for the duration of the CRMS program. Existing structures include temporary data collection platforms (approximately 3m x3m) on the marsh surface. Collection of surface elevation change and accretion data is performed from the temporary data collection platforms once per year. Collection of surface elevation change data includes placing fiberglass pins (less than 0.5cm in diameter) on the marsh surface for approximately 30 mins. The marsh surface is not disturbed while collecting the data as the pins rest gently on existing substrate. Accretion data is collected by removing small amounts of sediment from the surface down to 15cm using a cryogenic core. While the accretion collection will temporarily disturb the substrate, the disturbance is localized and will naturally fill back in. Approximately every 6 to 10 years, 3 soils cores are collected from the marsh surface at each site. Each soil core is less than 0.5m long. Cores will temporarily disturb substrates, but disturbance would be highly localized and would fill back in naturally over time. Hydrologic data is collected from equipment placed on temporary data collection posts (4"x4") in nearby waterbodies or tidal creeks. Hydrologic equipment does not make noise. The existing marsh platforms and posts with hydrologic instrumentation are not expected to have any effects on EFH. Additional information about the methods of equipment deployment and data collection can be found in the CRMS SOP (Folse et al. 2020).

NEPA Review of MAM Activities

Activities related to this program would have the potential to cause short-term, minor, localized adverse impacts when monitoring stations are moved or replaced. Impacts to geology and substrates would occur from soil disturbance when new monitoring stations are placed or during annual sampling. The CRMS network is established and new stations are not constructed on a regular basis. There could be brief, localized disturbance of water quality if loose soil enters the water column, or if monitoring stations are replaced in waterbodies, as well as minor emissions from vehicles while accessing monitoring sites. There could similarly be short-term, minor, localized adverse impacts to wildlife and their habitats when monitoring stations are moved, placed, or replaced, because of human presence and the noise associated with placement activities. In the long-term, data gathered from this program are expected to lead to beneficial impacts to biological resources through increased understanding of Louisiana coastal resources and the application of this understanding to future restoration activities. These impacts, and the intent with which the data are gathered, are consistent with the impacts described in the PDARP/PEIS Section 6.4.14, "Preliminary Phases of Restoration Planning", which analyzes the potential impacts of data gathering activities to support development of restoration plans.

NEPA Conclusion

After review of the proposed activities against those actions previously evaluated in the PDARP/PEIS, the Louisiana TIG determined that the environmental consequences resulting from this MAM activity falls within the range of impacts described in Section 6.4.14 of the PDARP/PEIS, thus no additional NEPA evaluation is necessary at this time.

No additional NEPA evaluation is anticipated to be necessary for those activities previously evaluated in the PDARP/PEIS or other relevant NEPA evaluation. Should there be activities that fall outside of current permits or that would require modification of current permits, those actions would be fully evaluated and any requisite NEPA for such permit modification would be completed prior to such actions being taken.

6. Compliance with Environmental Laws and Regulations

This project would consist mainly of field data collection and data analysis. Field activities for the installation and maintenance of the CRMS network are authorized under Category 1 of the Programmatic General Permit by the United States Army Corps of Engineers (Attachment 1). A water quality certification from the Louisiana Department of Environmental Quality is applicable per the determination of consistency with the USACE Programmatic General Permit. Additionally, the project has been reviewed and deemed consistent with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 (c)(1)(A) of the Coastal Zone Management Act of 1972, as amended by the Louisiana Department of Natural Resources, Office of Coastal Management (Attachment 2).

Table 4: Status of federal regulatory compliance reviews and approvals for the proposed project: Fisheries-Independent Monitoring Program

Federal Statute	Compliance Status
Bald and Golden Eagle Protection Act (USFWS)	Not Applicable
Coastal Barrier Resources Act (USFWS)	Not Applicable
Coastal Zone Management Act	Complete
Endangered Species Act (NMFS)	Complete
Endangered Species Act (USFWS)	Not Applicable
Essential Fish Habitat (NMFS)	Complete
Marine Mammal Protection Act (NMFS)	Complete
Marine Mammal Protection Act (USFWS)	Not Applicable
Migratory Bird Treaty Act (USFWS)	Not Applicable
National Historic Preservation Act	Under Evaluation
Rivers and Harbors Act/Clean Water Act	In Progress

7. Literature Cited

Deepwater Horizon Louisiana Trustee Implementation Group. 2021. Louisiana Trustee Implementation Group Monitoring and Adaptive Management Strategy (LA TIG MAM Strategy). Baton Rouge, 55 p. <https://la-dwh.com/wp-content/uploads/2021/09/MAM>

Deepwater Horizon (DWH) Natural Resource Damage Assessment Trustees. 2017. Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0. Appendix to the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the DWH Oil Spill. December.

DWH Trustees. 2016. Deepwater Horizon oil spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. Deepwater Horizon (DWH) Natural Resource Damage Assessment Trustees Retrieved from <http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan>

Deepwater Horizon Louisiana Trustee Implementation Group. 2021. Louisiana Trustee Implementation Group Monitoring and Adaptive Management Strategy (LA TIG MAM Strategy). Baton Rouge, 55 p. Available: <https://la-dwh.com/wp-content/uploads/2021/09/MAMstrategy.pdf>

Folse, T. M., T.E. McGinnis, L. A. Sharp, J. L. West, M. K. Hymel, J. P. Troutman, D. Weifenbach, W. M. Boshart, L. B. Rodrigue, D. C. Richardi, W. B. Wood, C. M. Miller, E.M. Robinson, A.M. Freeman, C.L. Stagg, B.R. Couvillion, and H.J. Beck. 2020. A Standard Operating Procedures Manual for the Coastwide Reference Monitoring System-Wetlands and the System-Wide Assessment and Monitoring Program: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control. Louisiana Coastal Protection and Restoration Authority. Baton Rouge, LA. 252 pp.

LA TIG. 2018. Louisiana Trustee Implementation Group Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, LA. March 2018. Available: https://la-dwh.com/wp-content/uploads/2018/03/Final_SRP.EA_508-Compliant.pdf

Nixon, Z., S. Zengal, M. Baker, M. Steinhoff, G. Fricano, S. Rouhani, J. Michael. 2016. Shoreline oiling from the Deepwater Horizon oil spill. *Marine Pollution Bulletin* 107(1):170-178.

State of Louisiana's Office of Coastal Protection and Restoration, April 2020, Coastal Information Management System (CIMS) Data Descriptions. Baton Rouge, LA. 27 pp.

Steyer, G.D., C. E. Sasser, J. M. Visser, E. M. Swensen, J. A. Nyman, and R.C. Raynie. 2003. A proposed coast-wide reference monitoring system for evaluating wetland restoration trajectories in Louisiana. *Environmental Monitoring and Assessment* 81:107-117.

Attachment 1. USACE Programmatic General Permit



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
7400 LEAKE AVE
NEW ORLEANS, LA 70118-3651

15 June 2018

Operations Division
Eastern Evaluation Section

SUBJECT: MVN-2004-04612-MM

Coastal Protection and Restoration Authority of Louisiana
Attention: Mr. Bill Boshart
2045 Lakeshore Drive
New Orleans, Louisiana 70122

Dear Mr. Boshart:

The proposed work, to install and maintain 390 Coastwide Reference Monitoring Systems (CRMS) stations for the purpose of assessing the ecological condition of coastal wetlands located throughout the Louisiana Coastal Zone, as shown on the enclosed drawings, is authorized under **Category 1** of the **Programmatic General Permit** provided that all conditions of the permit are met.

In addition, you must comply with the enclosed "Standard Manatee Conditions for In-water Activities".

The permittee is advised that a portion of the work will take place over Government-owned easement areas. Because the activities proposed in this permit application are temporary in nature, they do not interfere with the rights of the Government at this time. As such, no real estate documentation is necessary. However, the permittee is advised that the United States shall in no case be liable for any damage or injury to persons performing the activities in those areas over which the Government owns easements. Furthermore, the Government shall not be liable for any damages to property caused by the permittee in its performance of the proposed activities.

This authorization has a blanket water quality certification from the Louisiana Department of Environmental Quality; therefore, no additional authorization from DEQ is required.

However, prior to commencing work on your project, you must obtain approvals from state and local agencies as required by law and by terms of this permit. These approvals include, but are not limited to, a permit, consistency determination or determination of "no direct or significant impact (NDSI) on coastal waters" from the Louisiana Department of Natural Resources, Office of Coastal Management.

This approval to perform work is valid for 5 years from the date of this letter. Permittee is aware that this office may reevaluate its decision on this permit at any time the circumstances warrant.

Should you have any further questions concerning this matter, please contact Melissa Marino at (504) 862-2637 or melissa.l.marino@usace.army.mil.

Sincerely,

for
Martin S. Mayer
Chief, Regulatory Branch

Enclosures

Copies furnished:

Ms. Sarai Piazza, USGS

1. Activities authorized under this general permit shall not be used for piecemeal work and shall be applied to single and complete projects. All components of a single and complete project shall be treated together as constituting one single and complete project. All planned phases of multi-phased projects shall be treated together as constituting one single and complete project. This general permit shall not be used for any activity that is part of an overall project for which an individual permit is required.
2. No activity is authorized under this general permit which may adversely affect significant cultural resources listed or eligible for listing in the National Register of Historic Places until the requirements for Section 106 of the National Historic Preservation Act are met. Upon discovery of the presence of previously unknown historic and/or prehistoric cultural resources, all work must cease and the permittee must notify the State Historic Preservation Office and the Corps of Engineers. The authorization is suspended until it is determined whether or not the activity will have an adverse effect on cultural resources. The authorization may be reactivated or modified through specific conditions if necessary, if it is determined that the activity will have no adverse effect on cultural resources. The PGP authorization will be revoked if it is determined that cultural resources would be adversely affected, and an individual permit may be necessary.
3. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein. The permittee will, at his or her expense, install and maintain any safety lights, signals, and signs prescribed by the United States Coast Guard, through regulations or otherwise, on authorized facilities or on equipment used in performing work under the authorization.
4. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the water body, including those species which normally migrate through the area, unless the activity's primary purpose is to block or impound water.
5. If the **authorized** activity involves the installation of aerial transmission lines, submerged cable, or submerged pipelines across navigable waters of the United States the following is applicable:

The National Ocean Service (NOS) has been notified of this authorization. You must notify NOS and this office in writing, at least two weeks before you begin work and upon completion of the activity authorized by this permit. Your notification of completion must include a drawing which certifies the location and configuration of the completed activity (a certified permit drawing may be used). Notification to NOS will be sent to the following address: National Ocean Service, Office of Coast Survey, N/CS261, 1315 East West Highway, Silver Spring, Maryland 20910-3282.

6. For pipelines under an anchorage or a designated fairway in the Gulf of Mexico, the following is applicable: The NOS has been notified of this authorization. You must notify NOS and this office in writing, at least two weeks before you begin work and upon completion of the activity authorized by this permit. Within 30 days of completion of the pipeline, 'as built' drawings certified by a professional engineer registered in Louisiana or by a registered surveyor shall be furnished to this office, the Commander (dpw), Eighth Coast Guard District, Hale Boggs Federal Building, 500 Poydras Street, Room 1230, New Orleans, Louisiana 70130, and to the Director, National Ocean Service, Office of Coast Survey, N/CS261, 1315 East West Highway, Silver Spring, Maryland 20910-3282. The plans must include the location, configuration and actual burial depth of the completed pipeline project.

7. If the **authorized** project, or future maintenance work, involves the use of floating construction equipment (barge mounted cranes, barge mounted pile driving equipment, floating dredge equipment, dredge discharge pipelines, etc.) in the waterway, you are advised to notify the Eighth Coast Guard District so that a Notice to Mariners, if required, may be prepared. Notification with a copy of your permit approval and drawings should be mailed to the Commander (dpw), Eighth Coast Guard District, Hale Boggs Federal Building, 500 Poydras Street, Room 1230, New Orleans, Louisiana 70130, about 1 month before you plan to start work. Telephone inquiries can be directed to the Eighth Coast Guard District, Waterways Management at (504) 671-2107.

8. All activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Clean Water Act (PL 92-500: 86 Stat 816), or pursuant to applicable state and local laws.

9. Substantive changes to the Louisiana Coastal Resources Program may require immediate suspension and revocation of this permit in accordance with 33 CFR 325.7.

10. Irrespective of whether a project meets the other conditions of this permit, the Corps of Engineers retains discretionary authority to require an individual Department of the Army permit when circumstances of the proposal warrant this requirement.

11. Any individual authorization granted under this permit may be modified, suspended, or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest.

12. The Corps of Engineers may suspend, modify, or revoke this general permit if it is found in the public interest to do so.

13. Activities proposed for authorization under the PGP must comply with all other necessary federal, state, and/or local permits, licenses, or approvals. Failure to do so would result in a violation of the terms and conditions of PGP.

14. The permittee shall permit the District Commander or his authorized representative(s) or designee(s) to make periodic inspections of the project site(s) and disposal site(s) if different from the project site(s) at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

15. This general permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and it does not authorize any injury to property or invasion of rights or any infringement of federal, state, or local laws or regulations nor does it obviate the requirements to obtain state or local assent required by law for the activity authorized herein.

16. In issuing authorizations under this permit, the federal government will rely upon information and data supplied by the applicant. If, subsequent to the issuance of an authorization, such information and data prove to be false, incomplete, or inaccurate, the authorization may be modified, suspended, or revoked, in whole or in part.

17. For activities resulting in sewage generation at the project site, such sewage shall be processed through a municipal sewage treatment system or, in areas where tie-in to a municipal system is not practical, the on-site sewerage system must be approved by the local parish sanitarian before construction.

18. Any modification, suspension, or revocation of the PGP, or any individual authorization granted under this permit, will not be the basis for any claim for damages against the United States.

19. Additional conditions deemed necessary to protect the public interest may be added to the general permit by the District Commander at any time. If additional conditions are added, the public will be advised by public notice. Individual authorizations under the PGP may include special conditions deemed necessary to ensure minimal impact and compliance with the PGP.

20. The PGP is subject to periodic formal review by MVN and OCM in coordination with the Environmental Protection Agency, US Fish and Wildlife Service, the National Marine Fisheries Service, and the Louisiana Department of Wildlife and Fisheries. Comments from reviewing agencies will be considered in determination as to whether modifications to the general permit are needed. Should the District Commander make a determination not to incorporate a change proposed by a reviewing agency, after normal negotiations between the respective agencies, the District Commander will explain in writing to the reviewing agency the basis and rationale for his decision.

21. CEMVN retains discretion to review the PGP, its terms, conditions, and processing procedures, and decide whether to modify, reissue, or revoke the permit. If the PGP is not modified or reissued within 5 years of its effective date, it automatically expires and becomes null and void.

22. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

23. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party as described in Special Condition 25 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

24. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

25. If you sell the property associated with this permit, you must provide this office with a copy of the permit and a letter noting your agreement to transfer the permit to the new owner and the new owner's agreement to accept the permit and abide by all conditions of the permit. This letter must be signed by both parties.

26. Many local governing bodies have instituted laws and/or ordinances in order to regulate dredge and/or fill activities in floodplains to assure maintenance of floodwater storage capacity and avoid disruption of drainage patterns that may affect surrounding properties. Your project involves dredging and/or placement of fill; therefore, you must contact the local municipal and/or parish governing body regarding potential impacts to floodplains and compliance of your proposed activities with local floodplain ordinances, regulations or permits.

27. In issuing authorizations under this permit, the federal government does not assume any liability for: damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest; damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit, and; design or construction deficiencies associated with the permitted work.

STANDARD MANATEE CONDITIONS FOR IN-WATER ACTIVITIES

During in-water work in areas that potentially support manatees, all personnel associated with the project shall be instructed and aware of the potential presence of manatees, manatee speed zones, and the need to avoid collisions with, and injury to, manatee. All personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel shall be instructed not to attempt to feed or otherwise interact with the animal.

All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). To minimize potential impacts to manatees in areas of their potential presence, the permittee shall insure the following are adhered to:

- All work, equipment, and vessel operation shall cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- If a manatee(s) is sighted in or near the project area, all vessels associated with the project shall operate at “no wake/idle” speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels shall follow routes of deep water whenever possible.
- If used, siltation or turbidity barriers shall be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.
- Temporary signs concerning manatees shall be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities shall display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½ " X 11" reading language similar to the following: “CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSTRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT”. A second temporary sign measuring 8½ " X 11" shall be posted at a location prominently visible to all personnel engaged in water-related activities and shall read language similar to the following: “CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION”.
- Collisions with, injury to, or sightings of manatees shall be immediately reported to the U.S. Fish and Wildlife Service’s, Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.

CRMS Sites

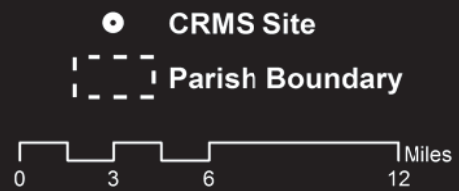
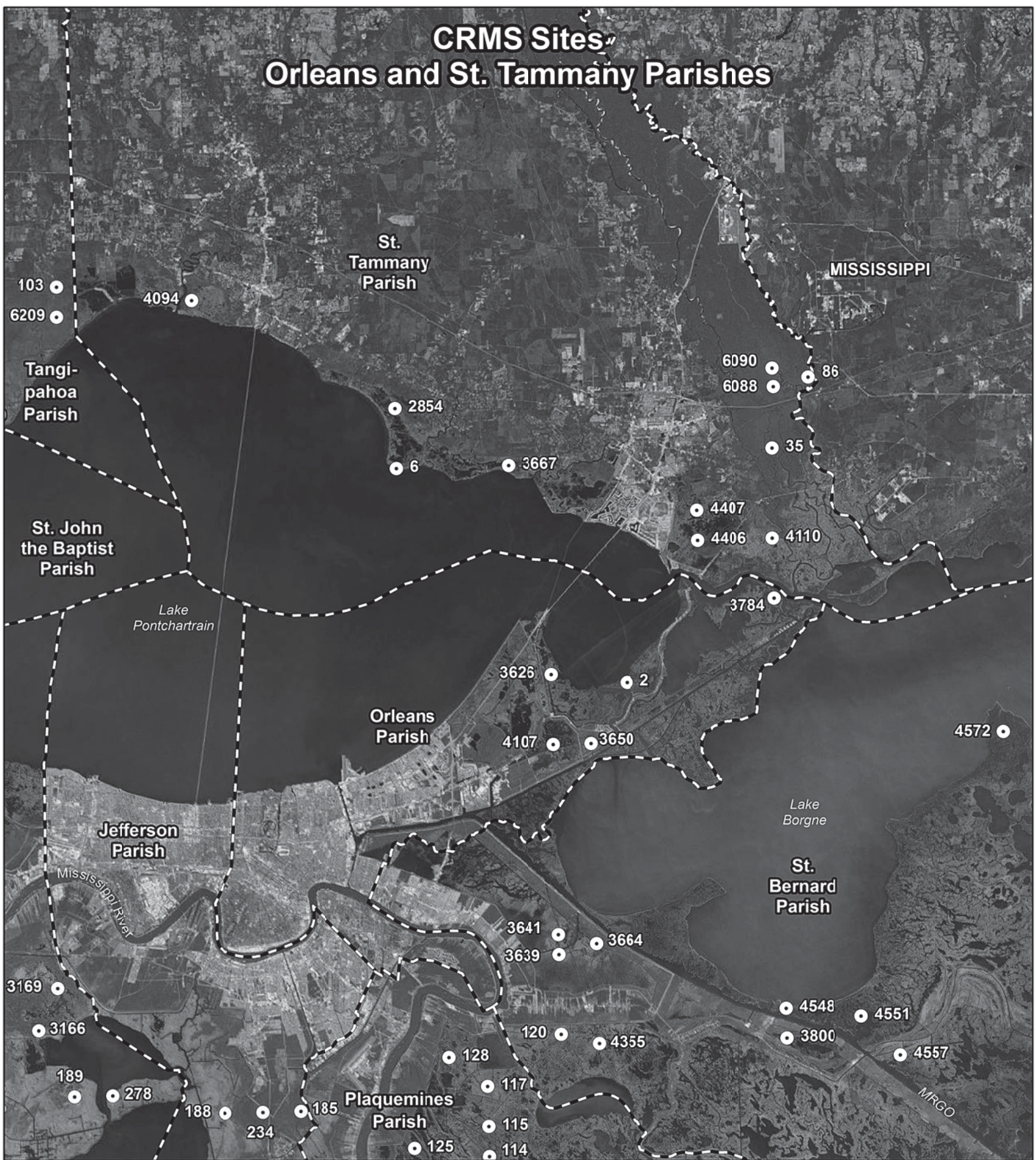


- CRMS Site
- ▭ Parish Boundary



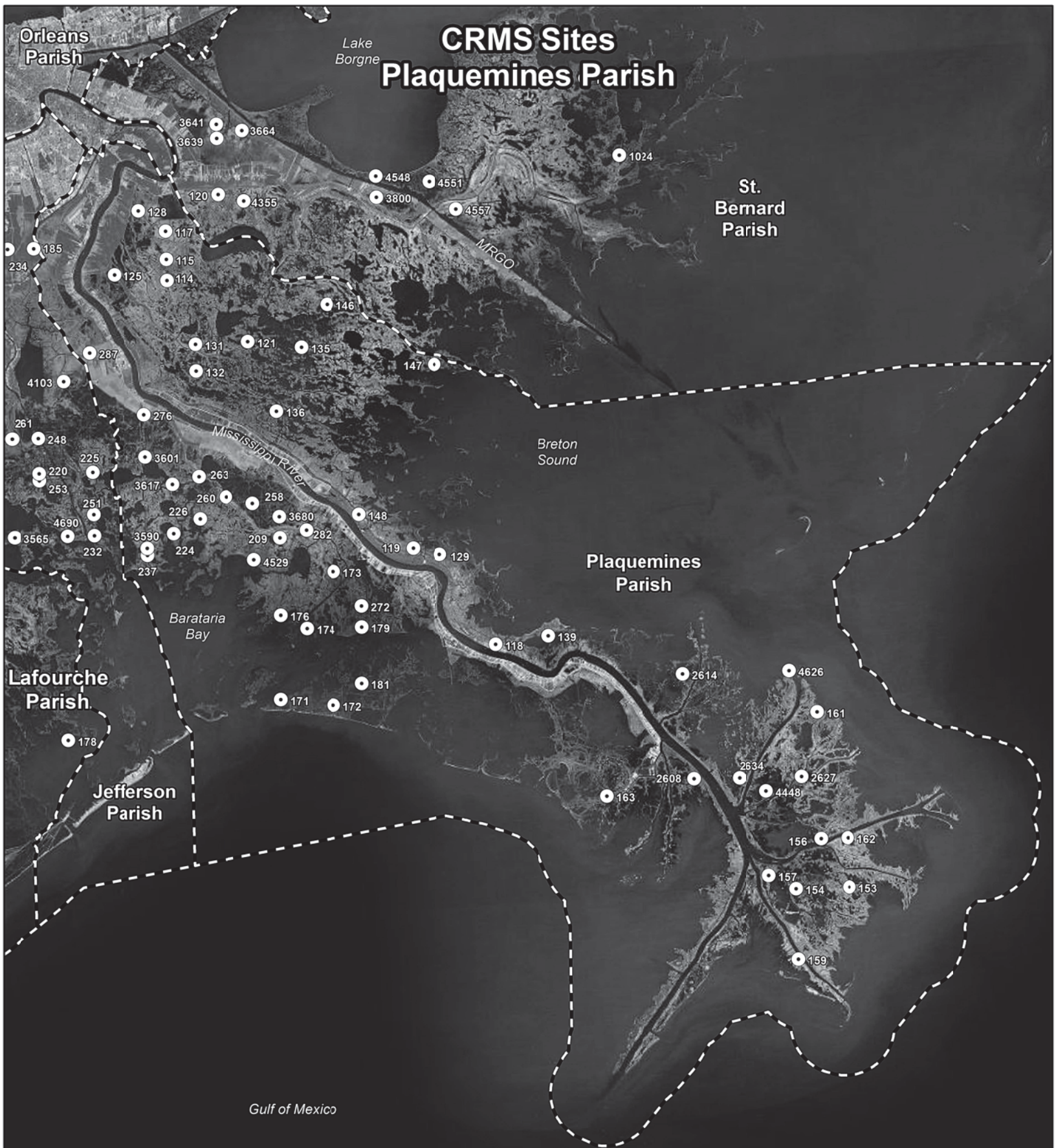
Map Date: 8/16/2017
Path: //2017040339/
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye,
Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
AeroGRID, IGN, and the GIS User Community

CRMS Sites Orleans and St. Tammany Parishes



Map Date: 8/7/2017
 Path: //2017040339/
 Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

CRMS Sites Plaquemines Parish

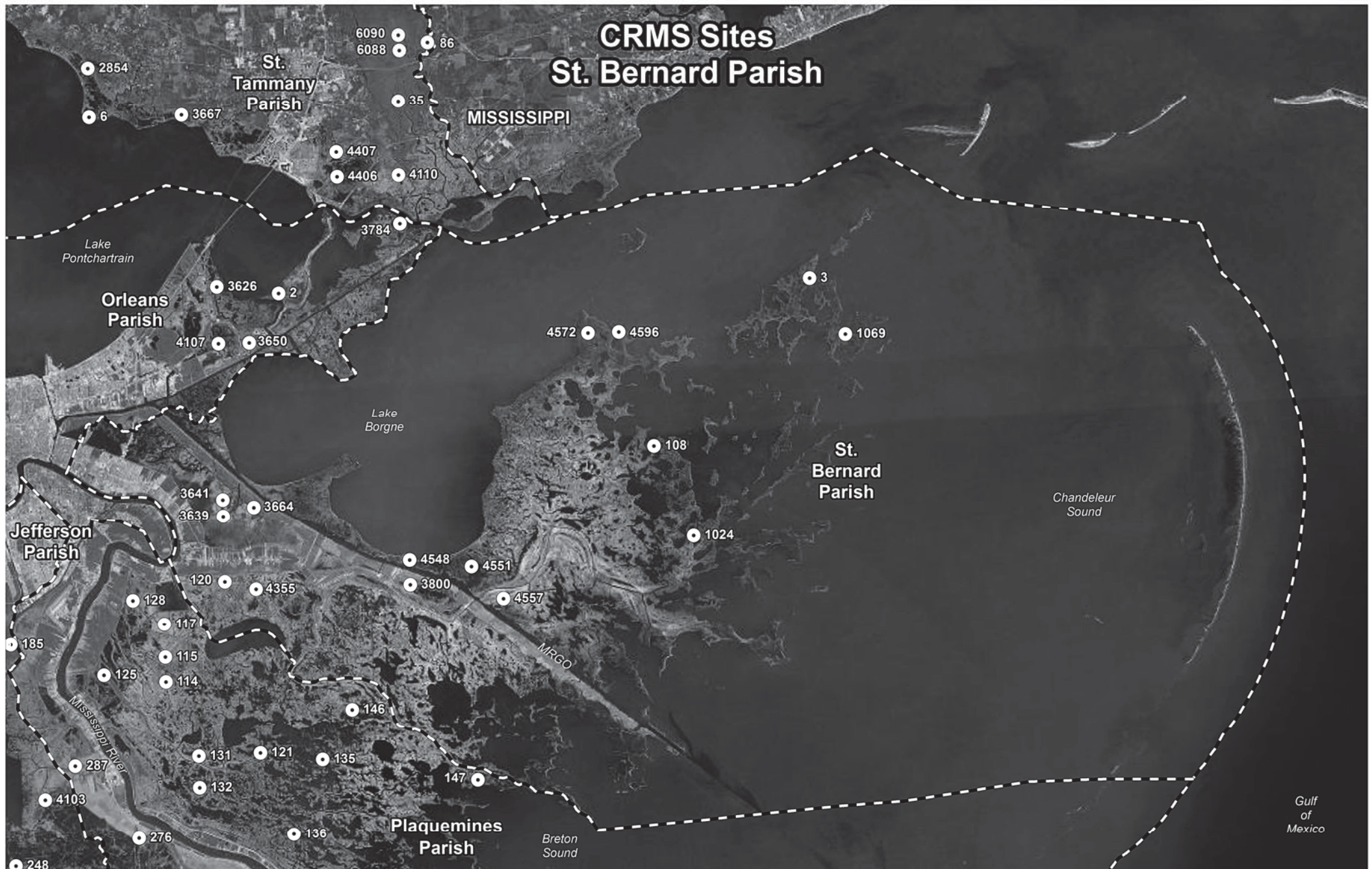


● CRMS Site
- - - Parish Boundary

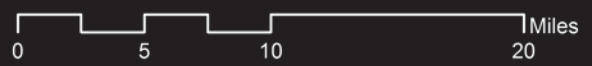


Map Date: 8/7/2017
Path: //2017040339/
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

CRMS Sites St. Bernard Parish



● CRMS Site
- - - Parish Boundary



Map Date: 8/7/2017
Path: //2017040339/
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CRMS Sites Vermilion Parish

Jefferson
Davis
Parish

Lafayette
Parish

Acadia
Parish

Vermilion
Parish

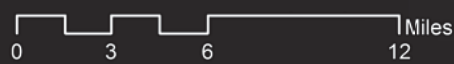
Cameron
Parish

Iberia
Parish



● CRMS Site

--- Parish Boundary



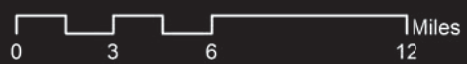
Map Date: 8/7/2017
Path: //2017040339/

Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

CRMS Sites Ascension, Assumption, and St. James Parishes



● CRMS Site
 - - - Parish Boundary



Map Date: 8/7/2017
 Path: //2017040339/
 Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

CRMS Sites Calcasieu and Cameron Parishes

TEXAS

Jefferson
Davis
Parish

Acadia
Parish

Vermilion
Parish

Calcasieu
Parish

Cameron
Parish

Sabine
Lake

Calcasieu
Lake

Grand
Lake

Gulf of Mexico



- CRMS Site
- - - Parish Boundary



Map Date: 8/7/2017
Path: //2017040339/
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye,
Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
AeroGRID, IGN, and the GIS User Community

CRMS Sites Iberia, St. Martin, and St. Mary Parishes





● CRMS Site

--- Parish Boundary

CRMS Sites

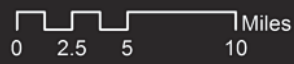
Jefferson, Lafourche, and St. Charles Parishes

Gulf of Mexico

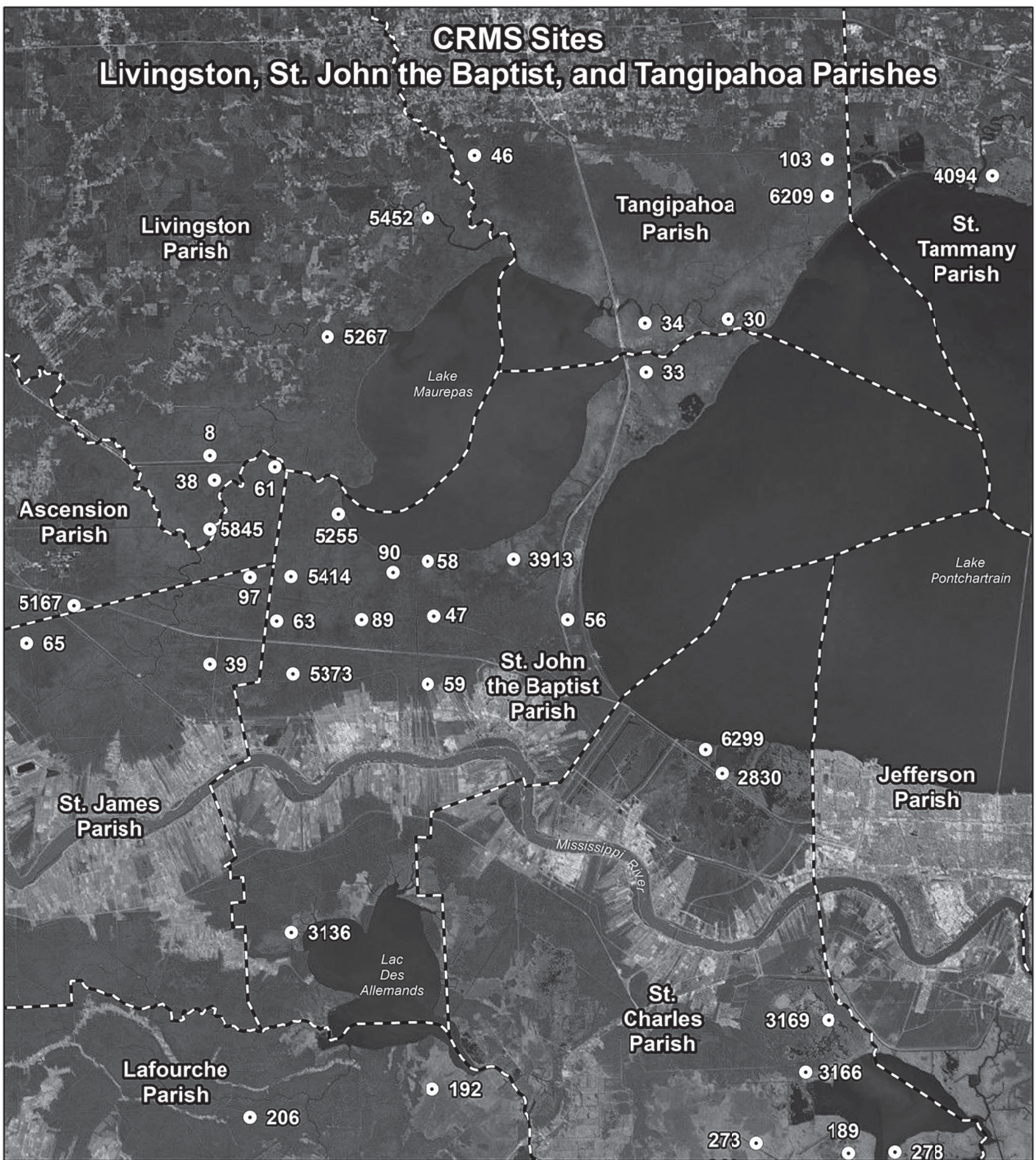


Map Date: 8/7/2017
 Path: //2017040339/

Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

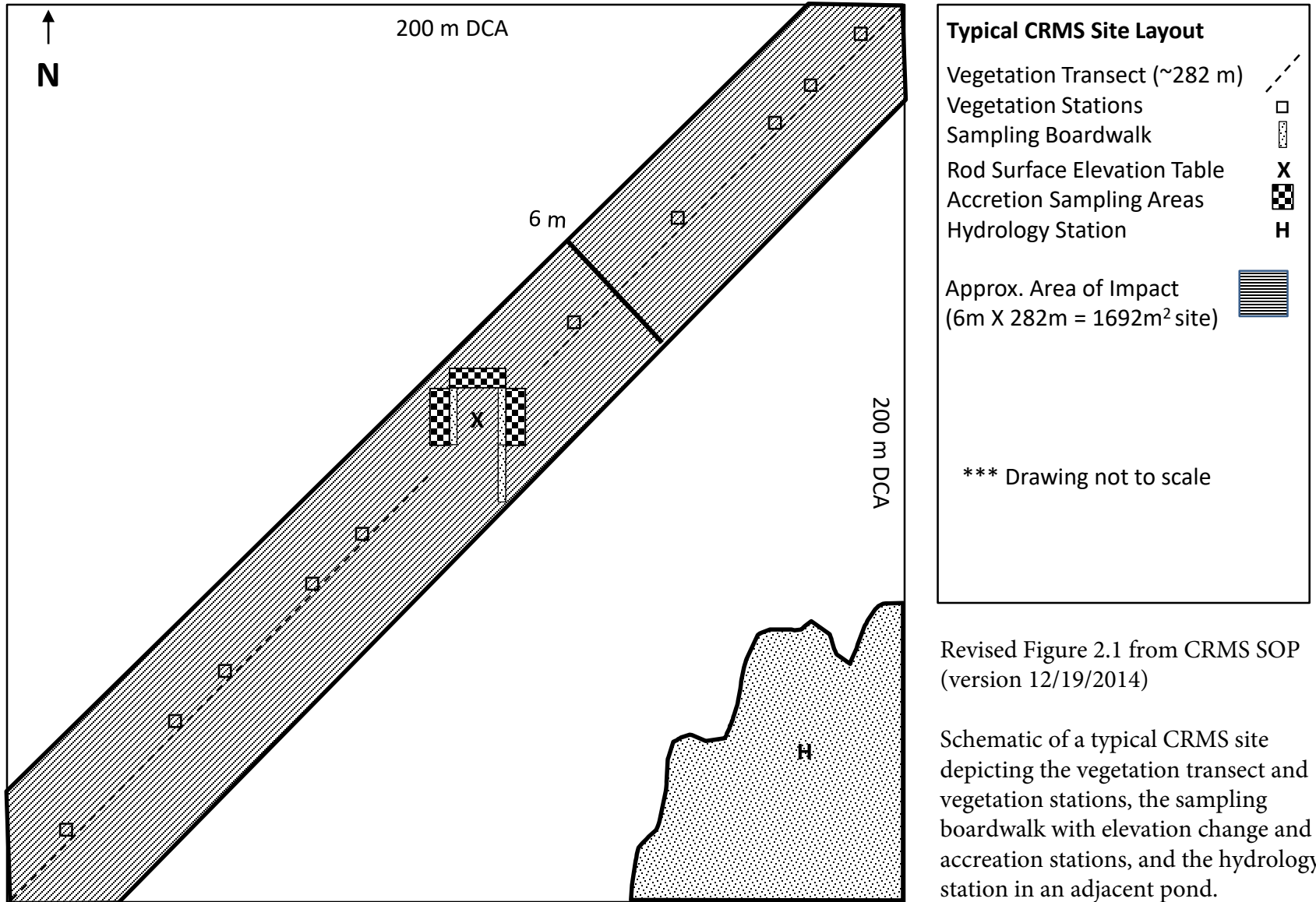


CRMS Sites Livingston, St. John the Baptist, and Tangipahoa Parishes



● CRMS Site
 - - - Parish Boundary





Typical CRMS Site Layout

- Vegetation Transect (~282 m)
- Vegetation Stations
- Sampling Boardwalk
- Rod Surface Elevation Table
- Accretion Sampling Areas
- Hydrology Station

Approx. Area of Impact
(6m X 282m = 1692m² site)

*** Drawing not to scale

Revised Figure 2.1 from CRMS SOP (version 12/19/2014)

Schematic of a typical CRMS site depicting the vegetation transect and vegetation stations, the sampling boardwalk with elevation change and accretion stations, and the hydrology station in an adjacent pond. Approximate area of impact includes access to stations along length of vegetation transect

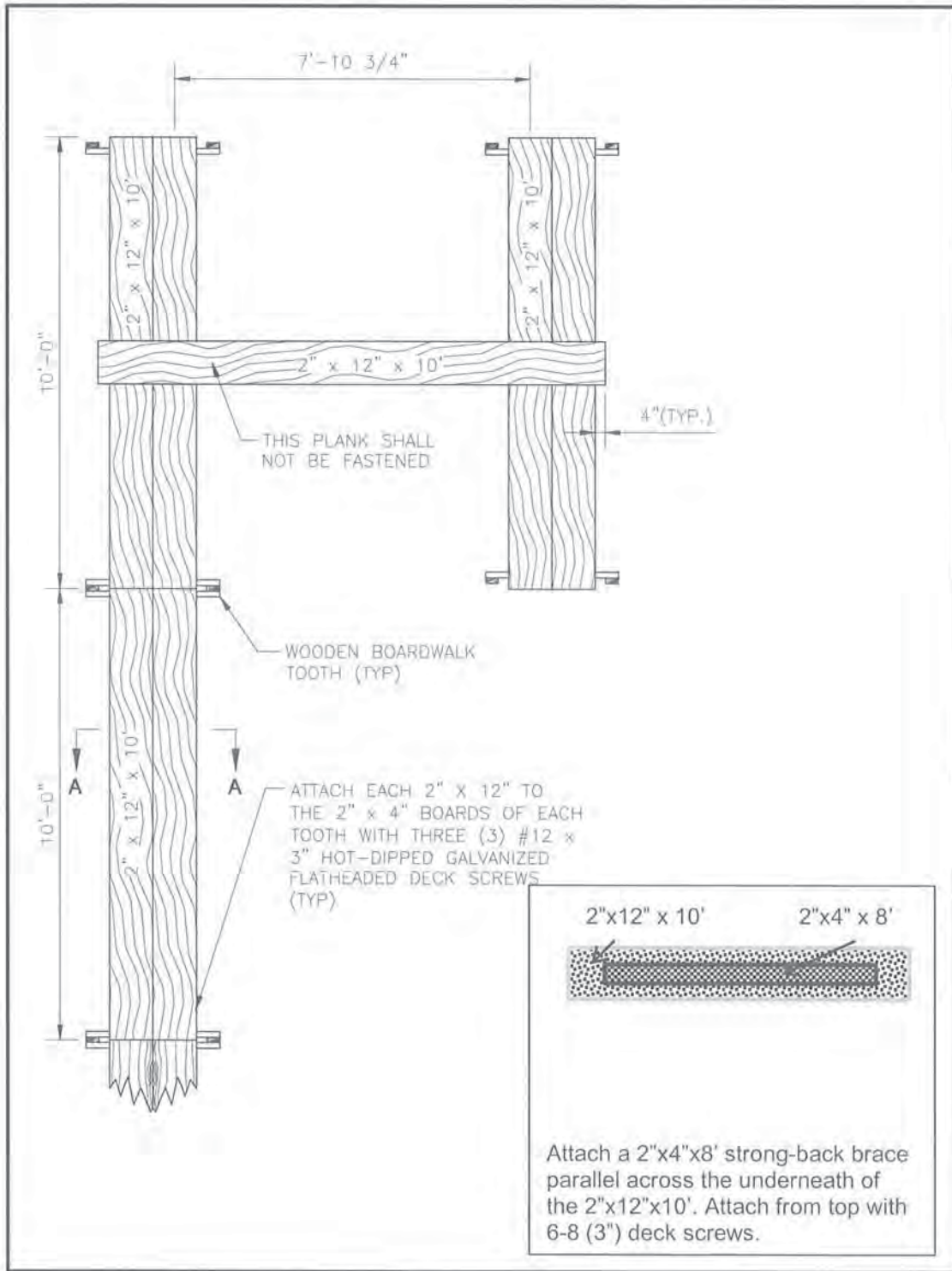


Figure 2.5a. Typical schematic of a base boardwalk in an attached marsh.

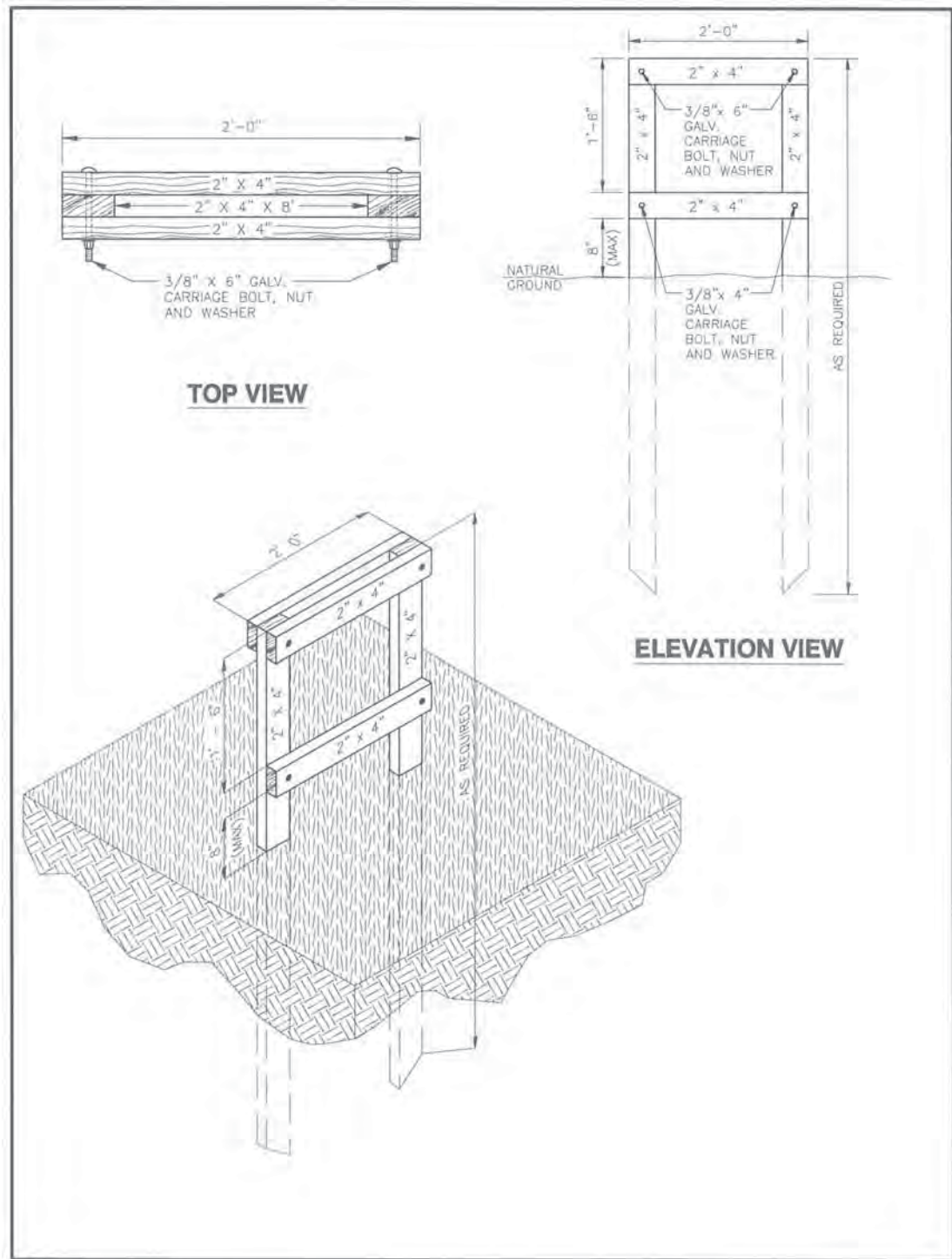


Figure 2.6a. Tooth construction diagram used to support the boardwalk for access to the data collection stations.

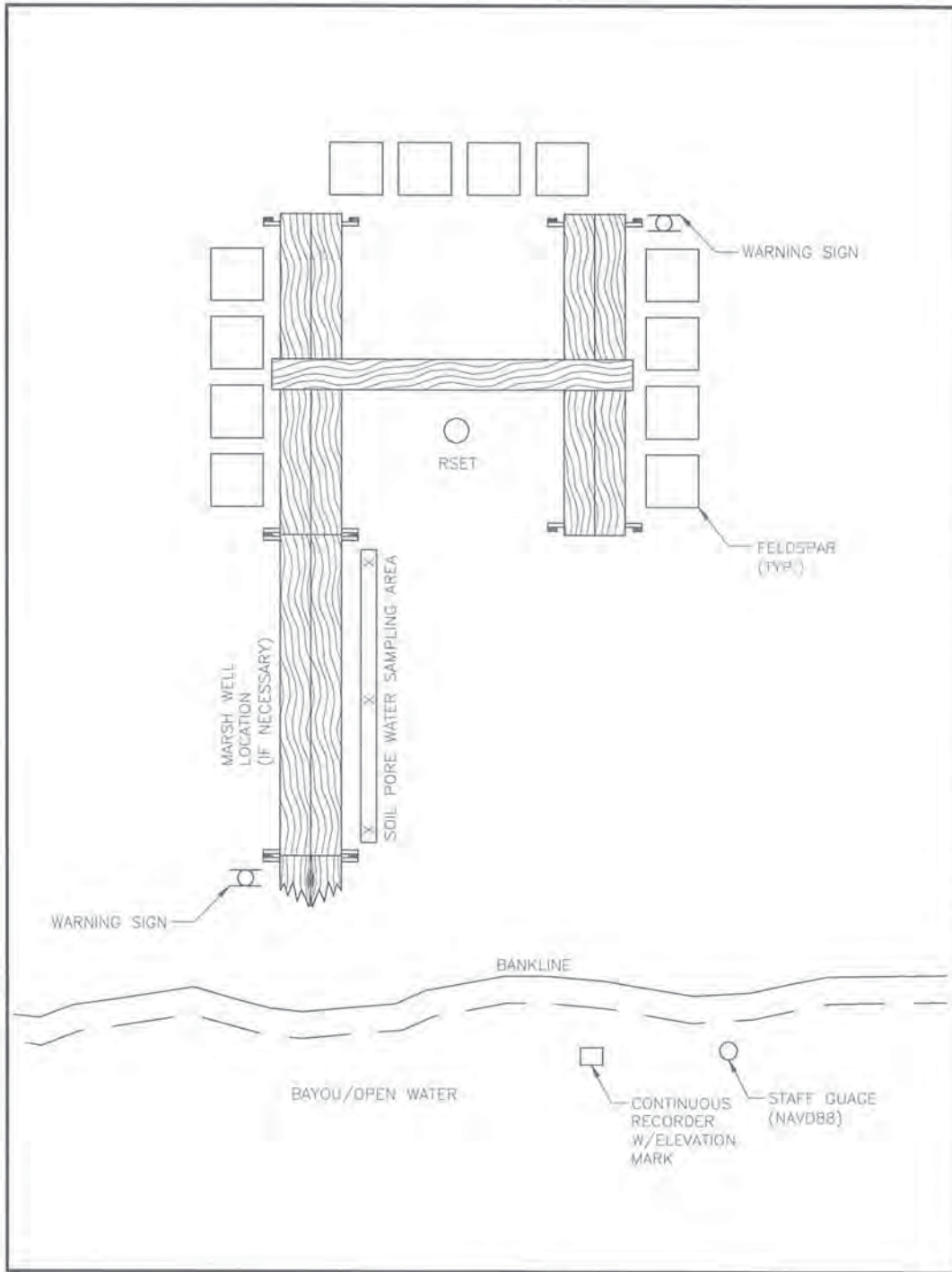


Figure 2.7. Typical layout schematic of the constructed site features at an attached marsh site.

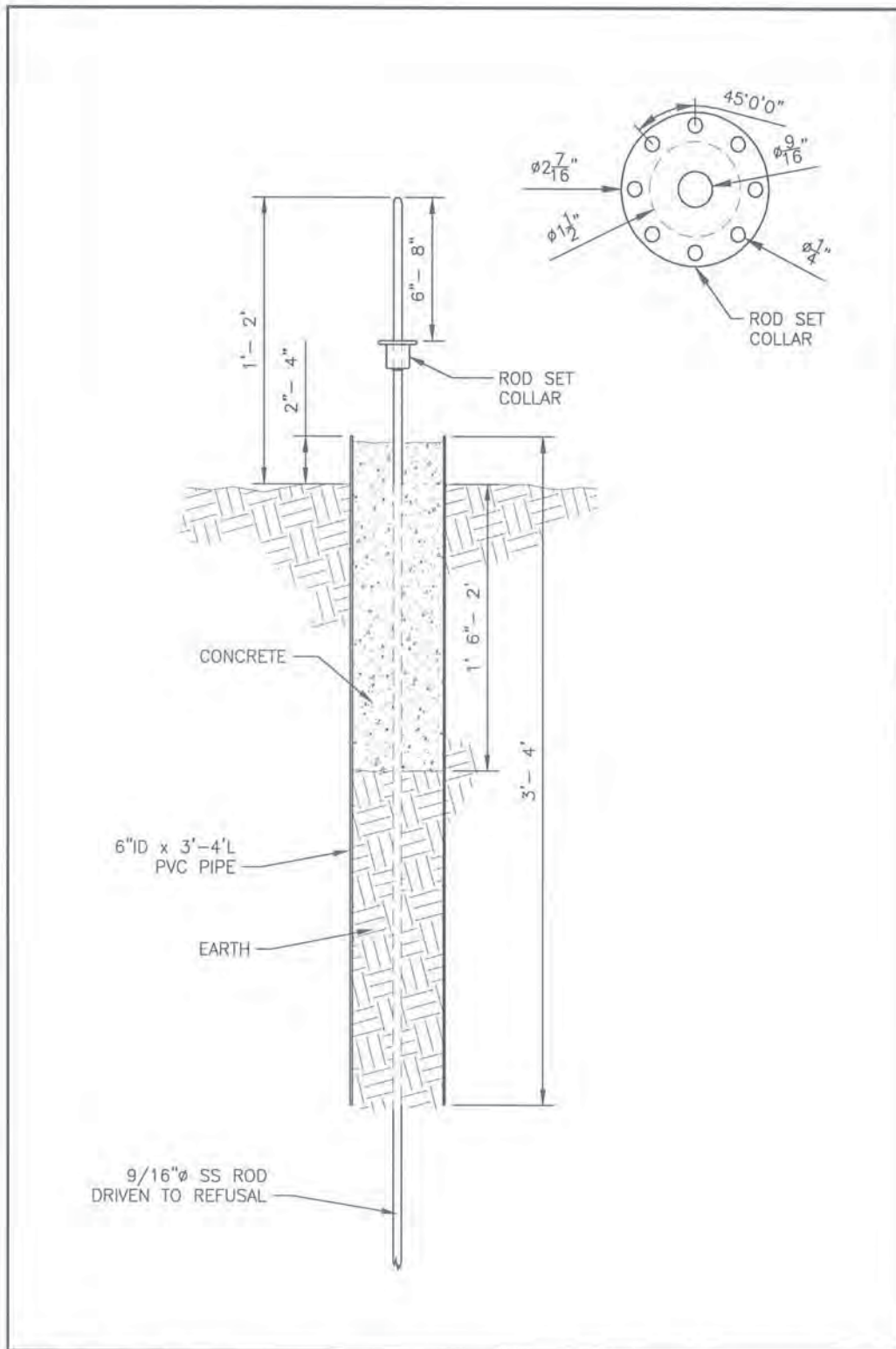


Figure 4.3a. Detailed construction drawing of a typical RSET station with collar. Inset: Collar detail.

Attachment 2. Louisiana Coastal Resource Program Consistency Letter



State of Louisiana
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF COASTAL MANAGEMENT

September 27, 2017

Bill Boshart
Coastal Protection and Restoration Authority of Louisiana
2045 Lakeshore Drive
New Orleans, LA 70122
Via e-mail: Bill.Boshart@la.gov

RE: **C20170169**, Coastal Zone Consistency
U. S. Geological Survey
Direct Federal Action
Maintenance and Operation of the Coastwide Reference Monitoring System (CRMS)
Louisiana Coastal Zone

Dear Mr. Boshart:

The above referenced project has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 (c)(1)(A) of the Coastal Zone Management Act of 1972, as amended. The project, as proposed in the application, is consistent with the LCRP.

If you have any questions concerning this determination please contact Jim Bondy of the Consistency Section at (225) 342-3870 or 1-800-267-4019.

Sincerely,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK/jab

cc: Sarai Piazza, USGS
Martin Mayer, NOD-COE
Dave Butler, LDWF