

Louisiana Fisheries-Independent Monitoring Program

1. Introduction

The Deepwater Horizon (DWH) oil spill settlement in 2016 provides the Natural Resource Damage Assessment (NRDA) Trustees (Trustees) up to \$8.8 billion, distributed over 15 years, to restore natural resources and services injured by the spill. As described in the DWH oil spill Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS) (DWH Trustees 2016), the Trustees selected a comprehensive, integrated ecosystem approach to restoration. The Final PDARP/PEIS considers programmatic alternatives, composed of Restoration Types, to restore natural resources, ecological services, and recreational use services injured or lost as a result of the DWH oil spill incident. As shown in the PDARP/PEIS, the injuries caused by the DWH oil spill affected such a wide array of linked resources over such an enormous area that the effects must be described as constituting an ecosystem-level injury. The PDARP/PEIS and information on the settlement with BP Exploration and Production Inc. (called the Consent Decree) are available at the [Gulf Spill Restoration](#) website.

Given the unprecedented temporal, spatial, and funding scales associated with the DWH oil spill restoration effort, the Trustees recognized the need for robust Monitoring and Adaptive Management (MAM) to support restoration planning and implementation. As such, the following proposed monitoring program will provide essential data towards the programmatic goals established in the PDARP/PEIS 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). This framework allows the Trustees to evaluate restoration effectiveness, address potential uncertainties related to restoration planning and implementation, and provide feedback to inform future restoration decisions. The integrated restoration portfolio emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem (DWH Trustees 2016). Most of the planned restoration projects identified in the integrated restoration portfolio (DWH Trustees 2016) are concentrated in coastal Louisiana and in conjunction with the Louisiana Coastal Master Plan (CPRA 2017a). More specifically, the large-scale sediment diversions and a suite of marsh creation and ridge restoration projects are concentrated in Breton Sound and Barataria Basins (LA TIG 2018) and designed to restore connectivity with the Mississippi River, promote deltaic processes, and create and restore marshes for the region. This suite of projects include projects that are proposed but with no funding and projects that have received funding for one or more of the various project stages (planning, engineering and design, construction, etc.). The Barataria Basin and the delta region experienced the highest degrees of shoreline oiling from the Deep Water Horizon Oil Spill (DWHOS) (Nixon et al. 2016); heavy oiling and remediation efforts caused direct mortality and reduced growth of wetland vegetation and fauna associated with these habitats, increased erosion rates of the already fragile and degrading marshes in Louisiana, and mortality or degradation to estuarine-dependent fish and invertebrates. (DWH Trustees 2016). In addition to Barataria and Breton Sound basins, there are additional major Louisiana State Master projects proposed within all coastal regions of the state, affecting local conditions within those estuaries, making the coastwide nature of the FIMP important on multiple temporal and spatial scales. In Louisiana, NRDA restoration projects are focused in the eastern parts of Louisiana, where injury occurred. The Louisiana State Master Plan and NRDA Restoration Plans overlap in many critical ways, including the focus on restoring large-scale, foundational delta processes, and restoring the habitat that many flora and fauna injured during the DWHOS, to achieve ecosystem

restoration and thriving estuarine species populations. The FIMP program described below provides critical data to help achieve the overlapping restoration goals in the Louisiana State Master Plan and NRDA Restoration Plans. The monitoring program proposed below allows for the continuation and expansion of fisheries-independent data collection in order to establish a proper baseline condition as large-scale restoration projects, such as river diversions, proceed, as well as provide information on various fisheries populations that are commercially and recreationally important in Louisiana and provide large quantities of seafood to the larger United States.

2. Purpose of this document

This MAM Activities Implementation Plan (MAIP) describes the MAM activity, “*Fisheries-Independent Monitoring Program*” 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; resolve critical information gaps and uncertainties for restoration planning, inform restoration decision-making; and perform monitoring to inform the design and implementation of future restoration projects. This document provides information about the activities to be implemented and the data gaps and uncertainties they will address; describes their applicability to the PDARP/PEIS (there is not currently a Louisiana Restoration Area MAM strategy developed); describes their consistency with the programmatic alternative selected by the DWH Trustees in the PDARP/PEIS, OPA, and compliance with NEPA.

This MAM activity is consistent with the DWH Final PDARP and Final PEIS. The coastwide Fisheries-Independent Monitoring Plan (FIMP) provides valuable data for the nearshore habitats and resources targeted for NRDA restoration, including coastal wetlands, oysters, nekton, and prey resources (e.g., shrimps, crab, fishes) for threatened and/or endangered species such as the gulf sturgeon, sea turtles, and marine mammals. The Louisiana Trustee Implementation Group (LA TIG) can use the data provided by the coastwide FIMP to assess changes in the fish, shellfish and their associated habitats (physical habitat with accompanying environmental data) in the basins over time, allowing for assessment of the influence 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.

3. Monitoring and Adaptive Management: Fisheries-Independent Monitoring Program

This MAM Activities Implementation Plan (MAIP) describes MAM Activity for a fisheries-independent monitoring plan (FIMP) 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.
 - ❖ Rationale

- The FIMP will be used as baseline monitoring for large-scale marsh restoration in the form of sediment diversions and marsh creation, barrier island restoration, and SAV restoration. The diversions will reconnect the Mississippi River to its delta, re-establish important deltaic processes, restore and nourish marsh, and introduce nutrient which support various terrestrial and aquatic food webs. Diversions will also provide resiliency to nearby communities through land building and increase wetland sustainability. Analysis of FIMP data will allow a better understanding of the effects of restoration actions on service flows.
- The FIMP will assess populations of estuarine-dependent fish species, shrimp and oysters in order to understand population dynamics and recovery from the DWHOS
- The FIMP is focused in Louisiana where most of the oiling from DWH occurred.
- Fish and Water Column Invertebrates (Section 5.5.6 in PDARP/PEIS)
 - ❖ Goals Addressed:
 - Restore injured fish and invertebrate species across the range of coastal and oceanic zones by reducing direct sources of mortality.
 - ❖ Rationale
 - The FIMP will assess fish and invertebrate populations across the estuary which will provide critical management information in order to maintain species populations
 - Water quality data collected in conjunction with fish and invertebrate surveys will provide some context for organism population fluctuation and trends.
- Oysters (Section 5.5.9 in PDARP/PEIS)
 - ❖ Goals Addressed:
 - Restore oyster abundance and spawning stock to support a regional oyster larvae pool sufficient for healthy recruitment levels to subtidal and nearshore oyster reefs.
 - Restore resilience to oyster populations that are supported by productive larval source reefs and sufficient substrate in larval sink areas to sustain reefs over time.
 - ❖ Rationale
 - The FIMP will provide population estimates for a variety of oyster life stages which will aid in the management of this important resources towards the goal of having a self-sustaining oyster population and industry.
- Provide and Enhance Recreation Opportunities (Section 5.5.14 in PDARP/PEIS)
 - ❖ Goals Addressed:
 - Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities.
 - ❖ Rationale
 - The FIMP will assess populations of some recreationally important fish to allow for management decisions that protect and enhance the resource for coastal anglers.
- 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
 - The FIMP will be used as baseline monitoring for sediment diversions and continue after diversions are in operation in order assess project impact on fisheries, and will allow for adaptive management decisions about diversion operations. The FIMP will also serve as baseline and post- project monitoring for other coastal restoration project types in the

Louisiana Coastal Master Plan (CPRA 2017a), including marsh creation and ridge restoration. Data analysis will allow evaluation of the effectiveness of restoration actions and techniques, in order to adaptively manage project areas and to improve site selection and techniques for future restoration actions.

3.1. MAM Activity Description

3.1.1. Background

The coastwide FIMP provides valuable data for the nearshore habitats and resources targeted for NRDA restoration, including coastal wetlands, oysters, nekton, and prey resources (e.g., shrimps, crab, fishes) for threatened and/or endangered species such as the gulf sturgeon, sea turtles, and marine mammals. The LA TIG can use the data provided by the coastwide FIMP to assess changes in the fish, shellfish and their associated habitats (physical habitat with accompanying environmental data including, conductivity, dissolved oxygen, salinity, air and water temperature, turbidity, and pH) in the basins over time, allowing for assessment of the influence 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. Additional fisheries dependent data will also be provided in the form of non-confidential landings data for a variety of species. LDWF is currently contracted by CPRA to conduct the portion of coastwide FIMP sampling outlined in the proposal below. LDWF intends to continue to collect the remainder of the LDWF FIMP sampling not funded by this scope of services (approximately 62% of all coastwide FIMP sampling) since the data are important to statewide (e.g., West et al. 2016) and gulf-wide fisheries assessments and management actions (e.g., GDAR 2013, SEDAR 2013, Hart 2016a,b).

3.1.1.1. History of Fisheries-Independent Monitoring Program

The FIMP has been in existence since 1967 to the present. Below is a brief history on the development of the program and data application or uses:

- LDWF original FIMP
 - Program began in 1967 and continues to the present
 - Used to track the relative abundance, status and trends, species composition and size distribution of key fish and shellfish within Louisiana’s coastal basins
 - Fisheries management purposes (e.g. setting seasons, harvest limits).
- Caernarvon and Davis Pond Freshwater Diversion
 - Caernarvon Freshwater Diversion opened in 1992 and Davis Pond Diversion opened in 2002,
 - FIMP monitoring data within the respective receiving basins became a source for evaluating potential diversion effects on key fish and shellfish distributions over time.
 - The LDWF and CPRA have maintained an inter-agency field monitoring and data sharing agreement for the two basins since the opening of the diversions.
- Expansion under CPRA’s System Wide Assessment and Monitoring Program (SWAMP)
 - Increased the number of monitoring stations and frequency of some sampling events to enhance seasonal or within-year sampling of the key species (Hijuelos and Hemmerling 2016).
 - Provides important data to continue the long-term baseline data collection for future restoration projects

- Provides additional statistical power and rigor to better evaluate population responses to resource management actions, coastal restoration projects, and/or environmental changes caused by regional climatic factors, major storm events, and catastrophes such as the DWHOS.
- The SWAMP was designed to provide the necessary environmental, ecological, and socioeconomic data indicative of system condition or status within all or part of a hydrographic basin as well as monitoring Louisiana’s coastal zone as a whole (Hijuelos et al. 2013)
- **Deepwater Horizon Oil Spill**
 - The expanded FIMP also include stations that were added in 2010 in response to resource monitoring and assessment needed for the DWHOS.
 - Added stations to support the long-term population assessment and recovery monitoring for Louisiana’s coastal fish and shellfish resources impacted by the spill.
 - The monitoring framework includes an increased number of stations to provide spatio-temporal fish data (with accompanying water quality and physical habitat data) that is useful for evaluation of the DWH-related restoration projects and outcomes.

3.1.2. Objectives

The FIMP is a comprehensive fish and shellfish monitoring program that is supported by multiple funding sources and used to meet multiple program and scientific objectives. In this document we present the entire FIMP program in order provide a comprehensive understanding of the coastwide fisheries data collection but will specify throughout the document which gear types and sampling regimes are supported by this funding request and which are supported by other funding streams including LDWF, and Caernarvon and Davis Pond Freshwater Diversions.

The FIMP supports the following program areas and objectives in coastal Louisiana:

- **Fisheries Management by LDWF**
 - Status and trends of fisheries populations on spatial and temporal scales
 - Setting seasons and harvest limits for commercially and recreationally important species
- **CRPA SWAMP Network**
 - Provide fisheries data for modeling efforts that support Coastal Master Plan development and implementation
 - FIMP data is essential for species specific HSIs and aquatic species population models including Ecopath with Ecosim (EwE) and the Comprehensive Aquatic Systems Model (CASM)
 - These HSIs and models are applied during the Louisiana State Master Plan development processes to past trends in aquatic species population dynamics and to estimate habitat and population changes under future scenarios, with and without Mast Plan projects
 - Restoration project specific modeling and planning
 - Provide a baseline for future restoration projects
 - Evaluate the effect of constructed restoration projects, including diversions, marsh creation, ridge restoration, oyster reef restoration, etc, on estuarine-dependent speices population dynamics on a variety of spatial and temporal scales
- **Deepwater Horizon Oil Spill**
 - Assess estuarine-dependent species population dynamics for injured species, to assess restoration or legacy injury
 - Assess project impacts for restoration projects funded and implemented through DWHOS penalty funding streams (RESTORE, NFWF, NRDA, etc.).

Below, the MAIP is divided into subsections to describe the gear types and sampling strategies carried out in the five Coastal Study Areas (CSAs), or coastal basins, of Louisiana (Figure 1) which were divided to reflect similar hydrologic conditions based on freshwater influences and tidal influences from the gulf, and regional geomorphology and weather patterns. Also indicated will be the various funding streams supporting each gear type and which portion, if any, is supported by the funding requested in this document.

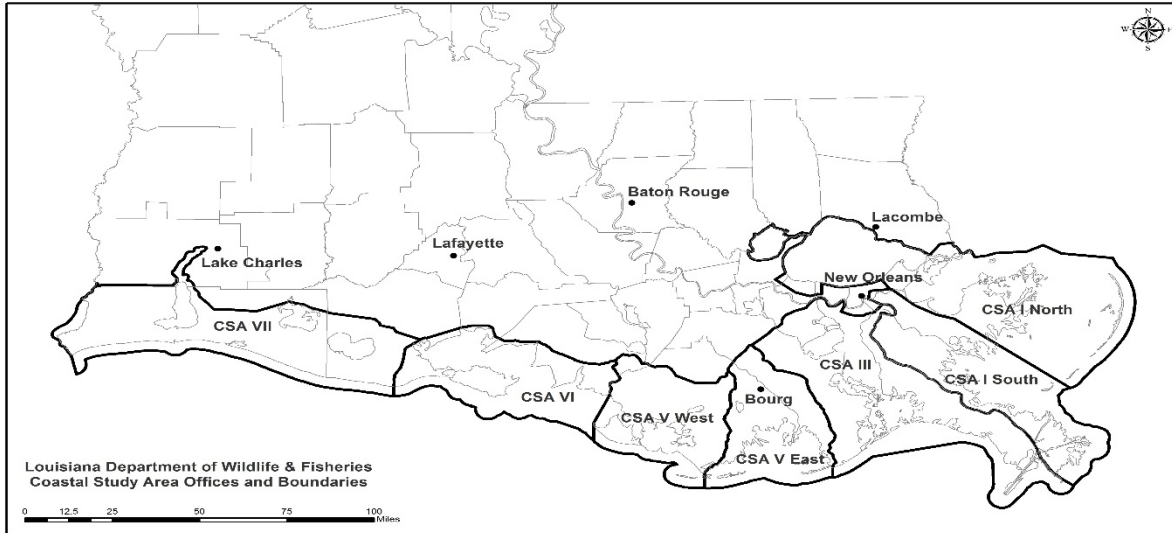


Figure 1: The boundaries for the coastal study areas (CSAs) with the LDWF offices. CSA I North and South = Pontchartrain Basin; CSA III = Barataria Basin; CSA V East and West = Timbalier and Terrebonne Basin; CSA VI = Vermilion Basin; and CSA VII = Calcasieu and Sabine Basin. Source: LDWF 2019

3.1.3. Tasks

Tasks and sampling methodology will be described below by gear type. Table 1 provides a summary of all gear types, sample numbers, and sampling frequency. The FIMP will provide data on many species that are specifically mentioned as injured in the DWHOS in section 4.3/Toxicity of the PDARP. Below is a table of species that are directly mentioned in the toxicity section of the PDARP as injured and the FIMP collects relevant population data.

Common Name	Scientific Name	Main Exposure Vector	Impacts	Life Stage Impacted
Southern Flounder	<i>Paralichthys lethostigma</i>	Contaminated Sediments	Tissue damage to lethality	All
Red Drum	<i>Sciaenops ocellatus</i>	Contaminated Sediments	Reduced growth	Juvenile
Gulf Killifish	<i>Fundulus grandis</i>	Contaminated Sediments and Suspended Sediments	Impaired embryo development, decreased hatch rates, mortality	Embryo
Brown Shrimp	<i>Farfantepenaeus aztecus</i>	Contaminated Sediments	Reduced growth	Adult
White Shrimp	<i>Litopenaeus setiferus</i>	Contaminated Sediments	Reduced growth	Adult
Fiddler Crabs	<i>Uca longisignalis</i>	Contaminated Sediments	Mortality	Larvae
Eastern Oysters	<i>Crassostrea virginica</i>	Contaminated sediments, suspended sediments and water	Decreased fertilization rates, developmental abnormalities, decreased settlement rates, mortality	Eggs, sperm, embryos, veligers, pediveligers, early spat
Gulf Sturgeon	<i>Acipenser oxyrinchus desotoi</i>	Weathered oil	DNA damage and immune injury	Juvenile
Red Snapper	<i>Lutjanus campechanus</i>	Oil	Possible impacts in the form of growth reductions, skin lesions, shifts in diet, recruitment (evidence not conclusive of impact or no-impact)	All
Spotted Seatrout	<i>Cynoscion nebulosus</i>	Oil	Impaired reproduction	All

At the beginning of each gear type, the funding streams supporting that gear type will be indicated. Detail about each funding stream (sample numbers supported, etc) can be found at the end of each gear type. Funding streams include LDWF funded coastwide fisheries sampling as part of their management program, SWAMP added stations and sampling events, Caernarvon Freshwater Diversion fisheries impact sampling, Davis Pond Freshwater Diversion fisheries impact sampling, and NOAA NMFS added stations to investigate changes in fisheries dynamics due to marsh creation projects in a localized region. The entire FIMP sampling program is described below for context. However, only portions of the FIMP program are proposed for NRDA funding; those requests are indicated as “SWAMP” in the “Funding” bullets under each sampling method.

3.1.3.1. Bottom Trawls (6-foot, 16-foot, and 20-foot)

The 6-foot balloon otter trawls, 16-foot flat otter trawls, and 20-foot balloon otter trawls are used to sample penaeid shrimps, blue crab (*Callinectes sapidus*), groundfish, and several other species caught in high abundance within the nearshore shelf waters. The trawl data have been useful in the past to evaluate the catch per unit effort (CPUE) spatially and temporally with the salinity, temperature, turbidity and dissolved oxygen (DO) data collected concurrently in response to the opening of freshwater diversions and major hurricanes (e.g., Piazza and LaPeyre 2009 and 2010, Sable and Villarrubia 2011a,b, O’Connell et al. 2014), the DWHOS (e.g., van der Ham and de Mutsert 2014, Ward et al., in review), and in relation to varying environmental conditions and differences in habitat (e.g., Chesney et al. 2000, Sable et al. 2010).

Six-foot Trawls:

- Funding for this gear type from LDWF and NOAA NMFS

Purpose:

The 6-foot balloon otter trawls are used to sample juvenile penaeid shrimp in the shallow marsh edge habitats and interior water bodies. The data are used to provide relative abundance and size distribution data for managing the inshore brown and white shrimp fisheries including when each season is opened and closed. More detail on data uses can be found in the LWDF fisheries manual (LDWF 2019) and attached here as Appendix 1.

Methods:

The 6-foot trawls are sampled weekly from April through early May, and then semi-monthly in June through July for a total of nine sampling events per year (Table 1). There are 92 six-foot trawl stations across the coast, and a random number of stations are sampled for each sampling event from predefined geographical strata in each CSA (i.e., 12 of 22 stations in Pontchartrain; 10 of 26 stations in Barataria; 12 of 39 stations in Timbalier/Terrebonne; 5 of 5 stations in Vermilion; 0 stations in Calcasieu/Sabine) (Figure 2). Only penaeid shrimp are identified, counted, and up to 50 measured (in 5 mm length groups) per species. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

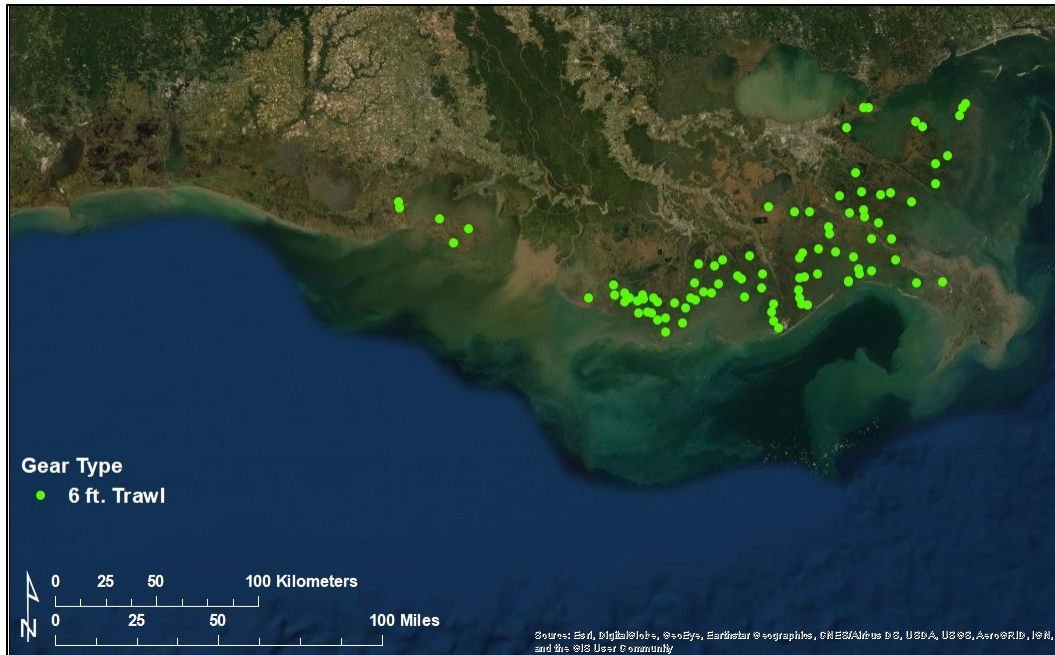


Figure 2: The six-foot trawl station locations.

Funding Streams:

- LDWF,
 - The 6-foot trawl samples are used to manage the coastwide brown and white shrimp fisheries, therefore this gear type is entirely funded by LDWF.
- NOAA NMFS
 - NOAA added three additional 6-foot trawl sites. Specific sample locations for these sites have not been chosen. The three stations will be sampled twice per month from April through July for a total of 8 samples in 2020 (this frequency is different than LDWF’s normal frequency for 6’ trawls). These samples will be supported by NOAA NMFS. These samples will be funded under a separate resolution that extends from April, 2020 through March, 2021.

Sixteen-foot Trawls:

- Funding for this gear type from LDWF, SWAMP, Caernarvon and Davis Pond Freshwater Diversions.

Purpose:

The 16-foot trawls are used to collect juvenile and sub-adult fish and shellfish in the non-vegetated bottom habitat of larger bays and lakes to provide relative abundance and size distribution data for managing the inshore brown and white shrimp fisheries. They are also used by CPRA and NOAA NMFS to determine long-term patterns in relative abundance, size distribution, and seasonal occurrence by life stage within the estuaries of several other key fish and invertebrate species, such as blue crab and ground fish, in the coastal basins. The 16-foot trawl data are used to determine indices of relative abundance and recruitment of blue crab in Louisiana’s estuaries (West et al. 2016). These data are also used to initialize and calibrate fish habitat suitability index models (Hijuelos et al. 2016) and estuarine food web models (de Mutsert et al. 2016; Dynamic Solutions 2016) used in the Louisiana Coastal Master

Plan and large-scale coastal restoration projects for evaluation of potential species impacts and responses.

Methods:

The 16-foot trawls are sampled semi-monthly from April through July and in December, then monthly from August through November and January through March, for a total of 17 sampling events per year (Table 1). CPRA determined that a frequency of 17 sampling events per year, beyond the 11 sampling events deemed necessary by LDWF for management, would provide the temporal resolution necessary to appropriately manage the river diversion projects and provide input to Coastal Master Plan predictive models (see table below). There are 101 stations (91 LDWF, 10 SWAMP) that are sampled 17 times per year (Figure 3). More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

Jan		Feb		Mar		Apr		May		Jun	
X		X		X		X	X	X	X	X	X
Jul		Aug		Sep		Oct		Nov		Dec	
X	X	X		X		X	X	X	X	X	X

X= LDWF pays for this sampling event

X = CPRA pays for this sampling event

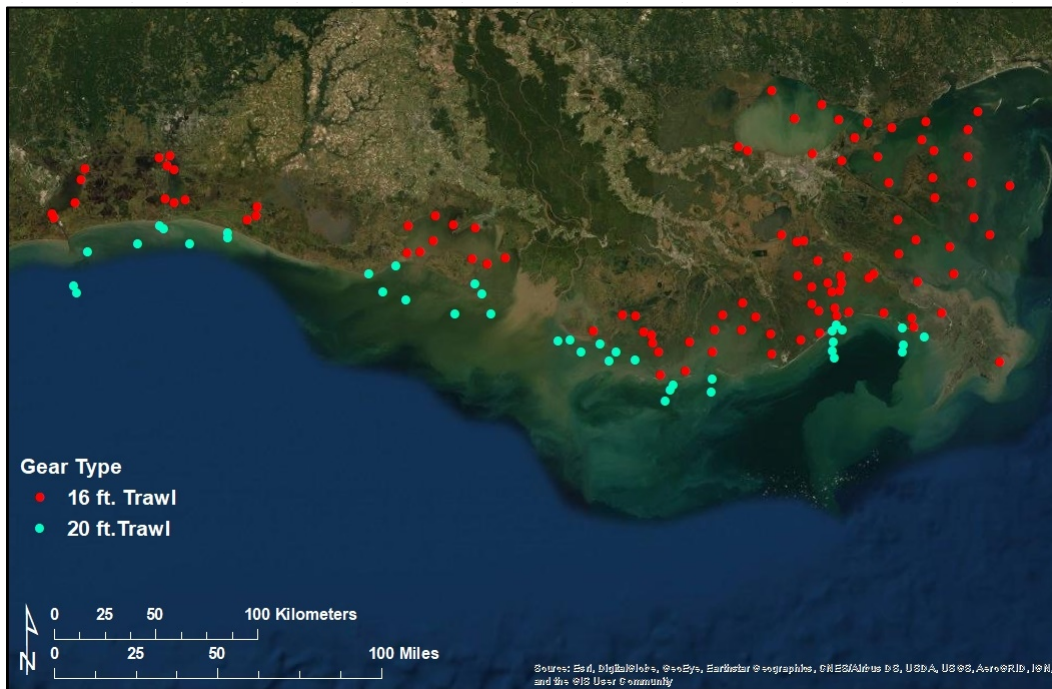


Figure 3: The sixteen-foot and twenty-foot trawl station locations.

Funding Streams:

- LDWF
 - Supports 11 sampling events (see table above) at 91 stations
- SWAMP
 - At 70 sampling stations, 6 events per year (see table above) will be supported by NRDA
 - 10 new sampling stations added in Barataria with all 17 events, annually, supported by NRDA

- Caernarvon Freshwater Diversion (CPRA)
 - 6 events per year at all 6 stations in Breton Basin
- Davis Pond Freshwater Diversion (CPRA)
 - 6 events per year at 15 stations in Barataria Basin

Twenty-foot Trawls:

- Funding for this gear type from LDWF only

Purpose:

Sampling with 20-foot balloon trawls in the nearshore shelf waters of Louisiana began in 2013. Nearshore stations previously sampled with 16-foot trawls were converted to 20-foot trawl stations, and additional 20-foot trawl sample stations were added throughout Louisiana’s offshore waters in order to better sample the brown and white shrimp fishery resources. The 20’ trawls expand the coverage for monitoring shrimp, crabs, and groundfish in the shelf waters and provide indices of relative abundance and size distribution of the species for the region. The trawl data is used to open and close the offshore shrimp fishery seasons within the respective coastal basins.

Methods:

The 20-foot trawls are sampled semi-monthly in April and in December, then once per month in January, March, May and November for a total of eight sampling events per year (Table 1). There are a total of 39 stations that are sampled 8 times a year for a total of 312 samples per year (Figure 3). More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

Funding Streams:

- LDWF
 - Supports all 312 annual samples

3.1.3.2. Marsh Edge and Finfish: Seines, Electrofishing, Gill Nets, Trammel Nets

Fifty-foot Seine

- Funding for this gear type from SWAMP, NOAA NMFS, and Caernarvon and Davis Pond Freshwater Diversions

Purpose:

The 50-foot bag seine is used to sample the relative abundance and size distribution of small juvenile shrimps, crabs, and fish along the shoreline and shallow marsh edge habitats within the coastal basins. CPRA funds all seine sampling to monitor juvenile abundance in available marsh edge habitat, and the changes in each with changing environmental conditions and coastal restoration efforts. The importance of coastal wetlands to fishery species productivity via nursery habitat function, providing foraging grounds for growth and predation and refuge from mortality has been addressed in numerous independent field studies, modeling and meta-analyses (e.g., Minello 1999, Zimmerman et al. 2000, Minello and Rozas 2002, Minello et al. 2003, Rozas et al. 2005, Baker and Minello 2010, Roth et al. 2008, Rozas and Minello 2011, Rozas et al. 2014, Leo et al. 2015, Sable and Rose, in review). The seine data also provide species composition, relative distribution, and ancillary life history information on selected species for population assessment and initialization and testing of the existing CASM and EwE estuarine food web models used by CRPA in Coastal Master Plan development.

Methods:

The 50-foot seine is with 3/16 inch square mesh. A total of 105 seine stations are currently sampled monthly year-round (Figure 4, Table 1). The 21 stations in Barataria and 12 stations in Breton Sound are paid for by the Davis Pond and Caernarvon Freshwater Diversions, respectively, and therefore are not charged for in this scope of work. There will also be three seine stations added at the request of NOAA NMFS for restoration project specific monitoring. These three sites will monitor changes to fisheries dynamics around a marsh creation project. Specific sample locations have not been chosen. The three additional sites will follow the same protocol and sampling frequency as the existing stations (monthly sampling, year round). Therefore, there will be a total of 108 seine stations. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

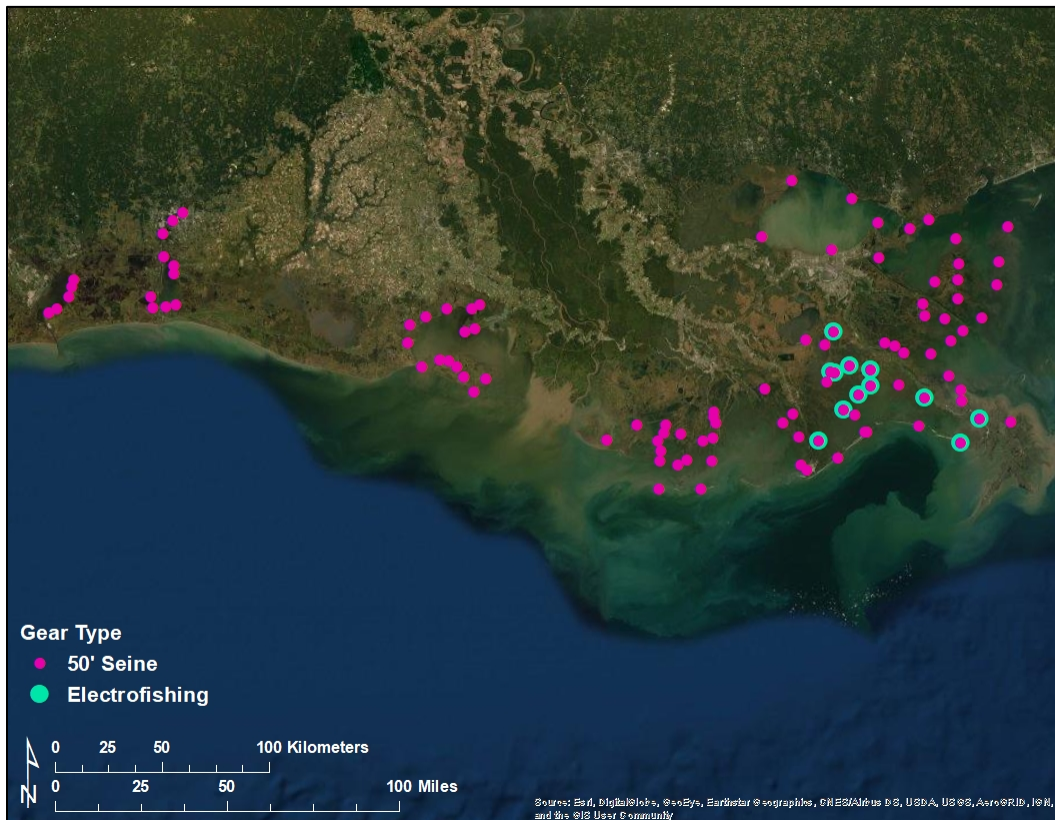


Figure 4: Fifty-foot bag seine station locations. Paired electrofishing stations in Barataria are also shown.

Funding Streams:

- SWAMP
 - 12 events at 72 sampling locations per year will be supported by NRDA for a total of 864 samples
- NOAA NMFS
 - 3 new stations sampled 12 times per year will be supported by NRDA for a total 36 samples. These will be supported under a separate NRDA resolution that will extend from April, 2020 through March, 2021 and these samples will be collected during that timeframe only.
- Caernarvon Freshwater Diversion (CPRA)
 - 12 events per year at all 12 stations in Breton Basin
- Davis Pond Freshwater Diversion (CPRA)

- 12 events per year at all 21 stations in Barataria Basin

Electrofishing:

- Funding for this gear type from SWAMP only

Purpose:

The electrofishing is being conducted by LDWF to quantitatively compare electrofishing and the 50-foot seines for sampling small fish and invertebrates in the shallow vegetated habitats of the estuary. The SWAMP power analysis indicated that the LDWF 50-foot seines were only effective for detecting changes that are greater than 25-30% per year for most species (Hijuelos and Hemmerling 2015, 2016) most likely due to the low and variable catch efficiency of the seine gear when sampling shallow shoreline and marsh edge habitats (Rozas and Minello 1997). Electrofishing is perhaps more effective at sampling the small marsh fish in the vegetated marsh edge, while also capturing a wider size distribution of fishes such as larger bass, drum, catfish and seatrout predators that feed in the shallow vegetated habitats but can outswim the seines (LDWF, unpubl. data). This comparison study is ongoing. So far, with only one year of data, not many conclusions can be made to direct whether current methods are preferred, both scientifically and economically, or if a switch to electrofishing would be preferred. Therefore, 3 more years of data are needed to gain enough insight to determine the effectiveness of the two gear types in marsh-edge aquatic species populations.

Methods:

Monthly electrofishing samples are collected at a fixed subset of 12 of the 22 seine stations in Barataria Basin (Figure 4). The estuarine electrofishing methodology described in Warry et al. 2013 is followed for sampling the paired seine stations in Barataria Basin. For each paired seine and electrofishing sample event, one of the two sampling gears is randomly selected to be performed first, and a 50-meter buffer on either side of the first sampling track is set for sampling with the second gear (CPRA 2017b). Three replicate sampling events (Table 1.) of 90 seconds total “on-time” will be performed with the electrofishing rig, for a total of 270 seconds of electrofishing at each sample site. The total distance track for each 90 second replicate will be recorded with a GPS receiver. All individuals are to be identified and counted, with the same species to be measured individually as done for the seine samples. Additional lab work may be needed for some species identification, and samples in high abundance will be tagged in the field with a subsample brought to the laboratory for positive identification and/or enumeration.

Funding Streams:

- SWAMP
 - 12 events at 12 sites will be funded by NRDA each year for a total of 144 sampling events per year.

Gill Nets

- Funding for this gear type is from LDWF and SWAMP

Purpose:

Gill nets are used to sample larger subadult and adult finfish (e.g., spotted seatrout, Gulf menhaden, red drum) in the open waters of the estuaries. The gill net data are used by LDWF and NOAA NMFS to estimate fisheries-independent indices of age-1+ relative abundance and size distribution for fishery stock assessment of gulf menhaden (SEDAR 2013), striped mullet (West et al. 2013), spotted seatrout (West et al. 2016), and red drum (Powers and Burns 2010). The gill nets also provide species

composition, relative distribution, and ancillary life history information on selected species for population assessment and updating and refining of the existing CASM and EwE estuarine food web models used in CPRA Coastal Master Plan development.

Methods:

A 750-foot monofilament gill net composed of five panels of differing mesh sizes is used to sample monthly from October through March, with bi-monthly samples taken in April through September, for a total of 18 sampling events within the year (Table 1). There are currently 110 gill net stations in coastal Louisiana (Figure 5), with 54 stations randomly selected by basin per sample event (Table 1). In FY 2020, coastwide SWAMP analysis added 4 stations to CSAs 6 and 7 (only two are sampled at each event) in order to expand spatial coverage of the samples within the western basins to more effectively evaluate the coastwide patterns in species. The number of random stations per basin are 15 of 32 stations in Pontchartrain, 14 of 24 stations in Barataria, 5 of 24 stations in Timbalier/Terrebonne, 10 of 15 stations in Vermilion, and 10 of 15 stations in Calcasieu/Sabine. All individual fish caught by the gill nets are identified and counted, and up to 30 specimens per panel are measured to the nearest mm in length. Best management/monitoring practices will be used specifically for the gill and trammel nets for the benefit of protected species. Prior to deploying gill nets, the field biologists will carefully observe the area for the presence of any protected species (e.g., sea turtles). If they observe any protected species, sampling will not occur until the animals leave the area on their own volition. Once the net is set and fishing, if any protected species are observed in the area, fishing will cease and the net retrieved immediately. Sampling will not resume until the animals leave on their own volition. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

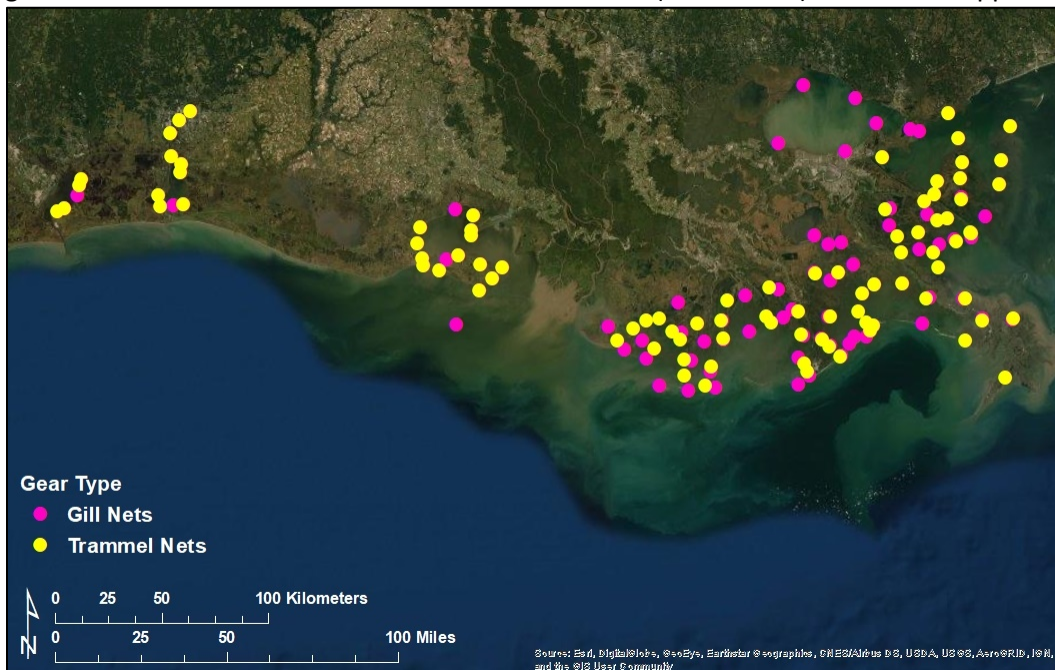


Figure 5: Gill net and trammel net stations.

Funding Streams

- LDWF
 - 52 stations with 18 sampling events for a total of 936 samples per year.
- SWAMP
 - 2 stations with 18 sampling events per year will be paid for by NRDA for a total of 36 samples.

Trammel Nets

- Funding for this gear type is from LDWF only

Purpose:

Trammel nets capture a wider variety of size classes of finfish than the gill net. They have traditionally been used in Louisiana to capture higher trophic-level predators such as sheepshead and black drum. The trammel net data are used as fisheries-independent indices of relative adult abundance in fishery stock assessments for red drum (Powers and Burns 2010), Southern flounder (Davis et al. 2015a), sheepshead (West et al. 2015), and black drum (Davis et al. 2015b) in Louisiana's state waters. The data are used to evaluate relative abundance and size indices of late young-of-the year, subadult and adult finfish that are important to commercial and recreational fisheries.

Methods:

The 750' trammel net is an inshore gear consisting of three layers of net panels grouped together in a sandwich-like fashion. The inner panel mesh is smaller and the outer panel mesh is large enough to allow the inner panel to be pushed through, causing a pocketing effect for tangling individual fish. The trammel nets are sampled monthly from October through March for a total of six sampling events within a year (Table 1). Many of the trammel net stations overlap or are the same as the gill net stations (Figure 5). There are 89 trammel net stations in coastal Louisiana (Figure 5), with 45 stations randomly selected by basin for each sample event (Table 1). The number of stations randomly selected from each basin is 11 of 25 stations for Pontchartrain, 6 of 16 stations for Barataria, 12 of 22 stations in Timbalier and Terrebonne, 6 of 13 stations in Vermillion, and 10 of 13 stations in Calcasieu/Sabine. All individual fish caught by the trammel nets are identified and counted, and up to 30 specimens of each species are measured to the nearest mm in length. Described under the gill net gear type, best management/monitoring practices are used for the benefit of protected species. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

Funding Streams:

- LDWF
 - 45 stations are surveyed 6 times for a total of 270 samples per year.

3.1.3.3. *Oysters: Square Meter and Dredge Sampling*

Two gear types are used to monitor the oyster resources at the basin-scale and coastwide. The square meter and oyster dredge samples are used to characterize oyster spat settlement, size distribution, and mortality for management and assessment of Louisiana's oyster fishery (LDWF 2015). The oyster data have also been evaluated for opening and operation of freshwater diversions (e.g., La Peyre et al. 2009), the DWHOS (DWH Trustees 2016), and to estimate and compare long-term oyster production in the coastal basins (e.g., Lowe et al. 2017). Oyster health and the population-level responses to changing estuarine conditions are major concerns for CPRA and resource damage assessments such as that performed for the DWHOS (DWH Trustees 2016). Spat settlement, oyster size distribution and mortality are important to monitor in the square meter and oyster dredge samples along with temperature, salinity, turbidity, dissolved oxygen, and sessile competitors and/or predators as planned coastal restoration projects like the large-scale river diversions will likely change these conditions and affect the oyster populations.

Square-Meter Samples

- Funding for this gear type is from LDWF and SWAMP

Purpose:

Square-meter oyster samples are used to estimate the density (number per m²) of living and dead spat (< 1 inch), seed (1 to 3 inches), and sack (> 3 inches) oysters on the public seed oyster grounds within the coastal basins as well as predatory mussels. The data are used to characterize oyster spat settlement, size distribution, and oyster mortality on the public oyster grounds. The spat recruitment, size distribution, and mortality estimates from the data are combined with estimates from the oyster dredge samples to produce annual values of the total available oysters on the public seed grounds by basin and coastwide (LDWF 2015). The data also provide counts or presence/absence data for reef-associated species such as gobies, crabs, shrimps, and fish predators like black drum and sheepshead (e.g., Humphries and La Peyre 2015) to help inform modeling of food web interactions and how the reefs can function as habitat to alter growth and survival of the species living on them.

Methods:

Five replicate samples are taken at each of the 102 meter-square stations in late June or early July each year (Figure 6). At 9 stations in Barataria Basin and 42 stations in the Pontchartrain Basin, additional sampling events were added in the spring and fall with three replicates, by the SWAMP program (Table 1). The SWAMP program also added 25 stations in Barataria Basin where spring, summer and fall sampling will take place with three replicates each time (Table 1). The SWAMP stations and sampling events were added to provide additional seasonal data to support CPRA with evaluation and assessment of the oyster populations that likely will be affected by the large-scale river diversion projects designed to divert freshwater, sediments, and nutrients into the basins. For each replicate sample, a 1m² frame is laid on top of the oyster bed and a certified diver collects all material from within the frame to an approximate depth of six inches. Oysters are separated into live and recently dead spat, seed, and sack oysters, then counted and measured in 5mm length groups. Live gastropods, crabs, and mussels are counted. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2018) attached as Appendix 1.

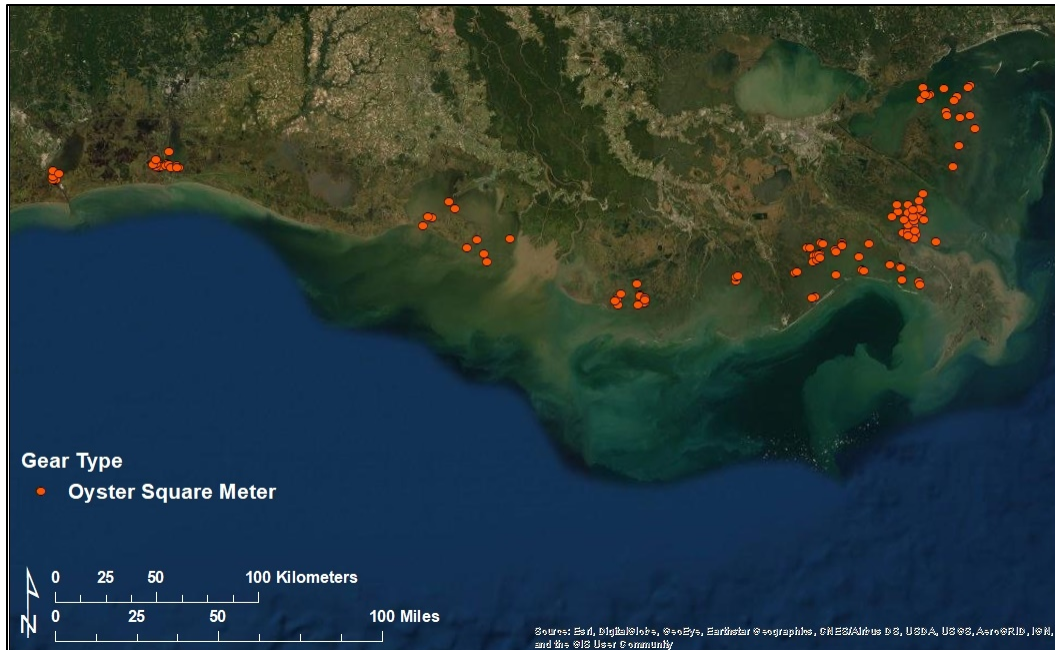


Figure 6: Oyster square-meter station locations.

Funding Streams

- LDWF
 - 102 stations are sampled in the summer each year.
- SWAMP
 - 25 new stations sampled 3 times per year and 51 existing stations have two sampling events per year added will be paid for by NRDA for a total of 177 sampling events per year.

Oyster Dredge Samples

- This gear type is funded by LDWF and SWAMP

Purpose:

The oyster dredge is used to sample oysters, fouling organisms, and other sessile organisms such as the oyster drill and hooked mussel in order to characterize oyster spat set, size distribution, and mortality of oysters throughout the year. The average monthly oyster sizes and mortality rates are estimated from the dredge samples and combined with the square meter data for LDWF fishery management actions (Banks et al. 2016) and the oyster stock assessment report (LDWF 2015) for the public oyster grounds in each basin and coastwide. The average spat settlement and the number of Southern oyster drill predators for the oyster grounds are also estimated from the dredge samples as an index of annual recruitment and predation mortality for the stock assessments (LDWF 2015). A newly published study uses the long-term dredge data to relate growth and mortality rates of spat, seed, and sack oysters on the public oyster grounds to temperature and salinity (Lowe et al. 2017). The growth and mortality response curves to seasonal salinity and temperature provide updated and local information to better inform the habitat suitability indices as well as predict basin-scale and coastwide production potential for fishery management actions and coastal restoration impacts.

Methods:

A 24-inch-wide oyster dredge is used to take samples monthly, except for July, for a total of 11 sample events within the year (Table 1). LDWF may also sample weekly in April and May in order to adaptively manage the oyster fishery within the basins, if needed and funding is available. All 79 (76 LDWF, 3 SWAMP) of the coastwide dredge station locations are sampled at each event (Figure 7), with two replicate dredge samples taken per site (Table 1). Each replicate dredge sample is pulled for three minutes. All dredge samples are processed as previously described for square meter samples, with limitations on the number of oysters measured. A total number for each species other than oysters is recorded. A total number of each size class (spat, seed, and sack) of oysters is recorded. More detail on sampling methods can be found in the LDWF fisheries manual (LDWF 2019) attached as Appendix 1.

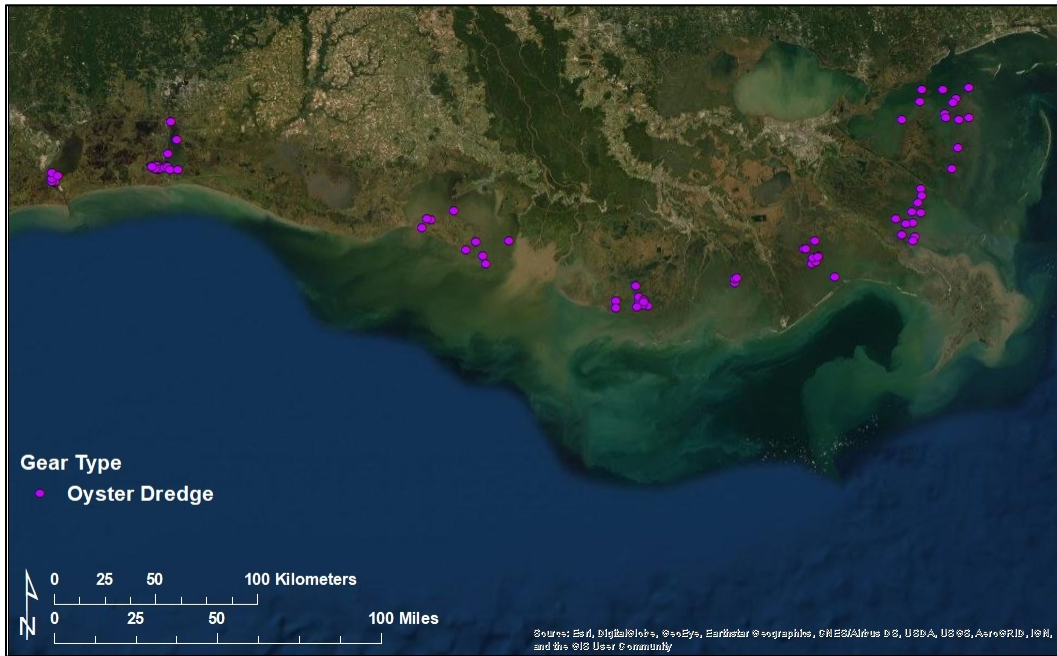


Figure 7: Oyster dredge station locations.

Funding Stream

- LDWF
 - 76 stations are sampled 11 times per year for a total of 836 samples.
- SWAMP

- 3 stations were added by SWAMP that will be sampled 11 times per year, paid for by NRDA, for a total of 33 samples for year.

Table 1: Annual coastwide fisheries-independent monitoring program (FIMP) sampling frequency and number.

Geartype	Sampling Frequency	Samples Not Part of This Agreement											Samples paid by this Agreement						Total FIMP Samples					
		LWDF					Caernvon and Davis Pond Freshwater Diversions				NOAA Supplemental Samples*****		SWAMP Supplemental Samples						Total Sample by Gear Type					
		# Stations	# Events	# Reps	# Samp. w/ reps	# Samp. w/o Reps ****	Station Type	# Stations	# Events	# Reps	# Samp.	Station Type	Stations Added	# Events Added	# Reps	# Samp.	Station Type	Stations Added	# Events Added	# Reps	# Samp. w/ reps	# Samp. w/o Reps ****	Total # Samp. w/ reps.	Total # Samp. w/o Reps ****
16' Trawl*	Semi-monthly: Apr to Jul; Dec	91***	11	1	1,001	1,001	Existing - CFD	6	6	1	36						Existing (70)**		6	1	420	420	1,717	1,717
	Monthly: Aug to Nov; Jan to Mar						Existing - DPFW	15	6	1	90	New	10 stations in BA	17	1	170	170							
Oyster Dredge*	Monthly exc. Jul; Weekly Adaptive Management: Apr through May	76	11	2	1,588	794											New	3	11 (exc. July)	2	66	33	1,654	827
Oyster M ² *	Annual: Late Jun or Early Jul	102	1	5	510	102											New	25 in BA	3 (Summer, Fall, Spring)	3	225	75	1,041	279
														Existing (9 in BA)	2 (Fall, Spring)	3	54	18						
														Existing (42 in PO)	2 (Fall, Spring)	3	252	84						
Seine*	Monthly						New - CFD	12	12	1	144	New	3	9	1	27	New	72**	12	1	864	864	1,287	1,287
							New - DPFW	21	12	1	252													
Electrofishing*	Monthly																New	12 (Paired w/ select BA seine stations)	12	3	432	144	432	144
Gill Net*	Semi-monthly: Apr to Sep Monthly: Oct to Mar	52	18	1	936	936											New	2 (1 in CSA6, 1 in CSA7)	18	1	36	36	972	972
Trammel Net	Monthly: Oct to Mar	45	6	1	270	270																270	270	
6' Trawl	Weekly: Apr to early May	39	9	1	351	351						New	3	2	1	6							357	357
	Semi-monthly: Jun to Jul																							
20' Trawl	Semi-monthly: Apr, Dec	39	8	1	312	312																	312	312
	Monthly: Jan, Mar, May, Nov																							
Sub - Totals					4,968	3,766					522				33						2,519	1,844	8,042	6,165
Grand Totals											4,321										1,844		6,165	

*Denotes the gear types that have been factored in for funding by the contract agreement because they provide data for continued population assessment and evaluation of species responses to DWH-related restoration

** Number of stations excluding stations in Breton and Barataria Basins paid for by Caernarvon and Davis Pond Freshwater Diversions

*** There are 91 existing 16' trawl stations that LDWF monitors 11 times a year, Caernarvon and Davis Pond Diversions pay for an additional 6 events at 21 of those stations, and SWAMP pays for additional 6 events and the remaining 70 stations and all 17 events at 10 new stations

**** Billing is by sampling station, replicates are included in sample price. Number of samples without replicates was used to make the budget found in Table 2.

***** NOAA samples will be collected for the first nine months of FY 21 only.

3.1.4. Budget

A detailed budget by gear type, including cost per sample and annual cost, can be found in Table 2. A total budget including CPRA administrative costs can be found in Table 3. The total funding for LDWF to continue the enhanced coastwide FIMP with support from NRDA in Louisiana for 3 years is

\$3,951,192.31 for three years (\$1,277,362.07 for FY21, \$1,316,607.53 for FY22, and \$1,357,222.71 for FY 23). This will ensure adequate spatial and temporal coverage to properly evaluate benefits and impacts from future restoration projects and recovery from the DHWOS. In addition to the data that is collected under this MAIP, the NRDA TIG will also receive the fisheries data funded by LDWF and CPRA that are not funded through this proposal. Therefore, for cost to NRDA for this MAIP, NRDA will receive a data set with the value of over \$11 million over the three years of the MAIP.

Table 2: Budget for fisheries sampling only for fiscal years 21, 22, and 23 for cost to NRDA.

Fisheries-Independent Monitoring Program Sample Collection for NRDA Resolution

Geartype	Total # of Annual Samples paid by NRDA	FY 21 Costs*		FY22 Costs*		FY23 Costs*		Total Cost to NRDA for 3 Years	% of FIMP Total Funded by NRDA
		Cost/ Sample	Total For NRDA	Cost/ Sample	Total For NRDA	Cost/ Sample	Total For NRDA		
16' Trawl	590	\$614.56	\$362,590.40	\$633.19	\$373,582.10	\$652.44	\$384,939.60	\$1,121,112.10	34%
Oyster Dredge	33	\$547.92	\$18,081.36	\$563.88	\$18,608.04	\$580.35	\$19,151.55	\$55,840.95	4%
Oyster M ²	177	\$1,071.07	\$189,579.39	\$1,107.47	\$196,022.19	\$1,145.20	\$202,700.40	\$588,301.98	63%
Seine	864	\$614.62	\$531,031.68	\$634.68	\$548,363.52	\$655.45	\$566,308.80	\$1,645,704.00	68%
Electrofishing	144	\$690.46	\$99,426.24	\$712.71	\$102,630.24	\$735.74	\$105,946.56	\$308,003.04	100%
Gill Net	36	\$649.25	\$23,373.00	\$670.04	\$24,121.44	\$691.55	\$24,895.80	\$72,390.24	4%
Trammel Net	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0%
6' Trawl	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0%
20' Trawl	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0%
Totals	1,844		\$1,224,082.07		\$1,263,327.53		\$1,303,942.71	\$3,791,352.31	32%

*See attached Appendix 2 for explanation of sample price and inflation rate calculation

Table 3: Total cost to NRDA for fisheries sampling and CPRA's administrative costs to administer the contract with LDWF and other duties.

Total Budget for NRDA				
Item	FY 21 Costs	FY22 Costs	FY23 Costs	Total Cost to NRDA for 3 Years
Fisheries Sampling	1,224,082.07	1,263,327.53	1,303,942.71	\$3,791,352.31
Contract Administration - CPRA	53,280.00	53,280.00	53,280.00	\$159,840.00
Grand Totals	1,277,362.07	1,316,607.53	1,357,222.71	\$3,951,192.31

3.1.5. Timeline

The activities described above and in Table 1 reflect annual activities. This resolution requests that the same scope of work, be approved for an extension of 36 months, from July 1, 2020 through June 30, 2023 to aid in restoration planning and monitoring for species that received direct injury during the DHWOS. The frequency and timing of sample collection by gear type can be found in Table 1. In total, the NRDA LA TIG will be enhancing the FIMP by supporting the collection of over 1,800 additional samples annually to further restoration monitoring, both baseline and post-project, population assessments for injured species, and management of commercially and recreationally important species in Louisiana that are important seafood species nationwide.

3.1.6. Data management and reporting

Data management by LDWF includes all field data input, QA/QC, and quarterly dissemination of electronic data to CPRA through an established internet-based portal. All data are logged on field data sheets by coastal biologists. The field data sheets are scanned as electronic pdf files and the hardcopies are archived at the field offices. As field data sheets are collected, they are entered into computer data files and initially reviewed by the LDWF data management section for quality assurance. The final QA/QC'd data maintained by the Fisheries Database Manager will be provided to CPRA on a quarterly (3 month) basis with an expected three month lag time from data collection to delivery on the internet-based portal. All QA/QC'd data files are delivered as csv files to the internet-based portal maintained between CPRA and LDWF. All csv files will be available to CPRA and members of the LA TIG. This data storage system will serve as the primary data storage platform for the LA TIG. All QA/QC'd data not protected from public disclosure by the State (LDWF FIMP data being protected from public disclosure is rare) will also be made available through the LA TIG for storage and public access on the DIVER Restoration Portal (Section 10.6.5 of SOP; DWH NRDA Trustees, 2016) within one year from when the data are collected.

In addition to sharing of the electronic data files, LDWF will prepare an annual report on the coastwide FIMP sampling conducted by the field offices. The report will cover each calendar year (CY) of data collection and be submitted to CPRA by the end of March and will be made available to the LA TIG. The summary report will briefly describe the data collection by gear type such as completeness for the samples, any missed samples, and observations or issues associated with the data that may impact the data or their interpretation. The summary report will also include any interpretation or insights into what the field biologists are seeing with the data collection.

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; (2) Replenish and Protect Living Coastal and Marine Resources; (3) Provide and enhance recreational activities; and (4) Provide for monitoring, adaptive management, and administrative oversight to support restoration implementation. The FIMP will support a variety of restoration types described in the PDARP/PEIS, mainly Sections 5.5.2, *Wetlands, Coastal, and Nearshore Habitats* and 5.5.15, *Monitoring and Adaptive Management*. However, the FIMP also supports the goals of the restoration type sections of 5.5.6, *Fish and Water Column Invertebrates*; 5.5.9, *Oysters*; and 5.5.14, *Provide and Enhance Recreational Opportunities*. The PDARP/PEIS makes numerous references to creation and restoration of multiple habitat types, especially through restoring natural processes such as reconnecting the Mississippi River to its delta through river diversions and is listed as a main strategy for restoring habitat (Section 5.5.2.2). The FIMP will also provide data for monitoring and adaptive management of restoration project performance and important fisheries resources, including determining recovery from injury during the DWHOS. FIMP data is essential for species specific HSIs and aquatic species population models including Ecopath with Ecosim (EwE) and the Comprehensive Aquatic Systems Model (CASM). These HSIs and models are applied during the Louisiana State Master Plan development processes to past trends in aquatic species population dynamics and to estimate habitat and population changes under future scenarios, with and without Mast Plan projects. Therefore, the FIMP provides baseline data for future, planned sediment diversions in Louisiana's Coastal Master Plan,

important resource management data and is an essential part of Operations, Maintenance, and Adaptive Management Plans (OMAM) for large-scale restoration projects in Louisiana. Below, find the rationale for how this data supports and is consistent with a variety of restoration approaches found in the PDARP/PEIS appendices 5.D and 5.E. Restoration approaches listed in the PDARP/PEIS are appropriate under the Oil Pollution Act (OPA).

- Habitat Restoration Approaches (D.1)
 - 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
 - FIMP data would be used to update models for diversion planning, act as baseline, construction phase and post-construction monitoring data for basin fisheries, provide the ability to adaptively manage project outcomes as benefits and impacts become more clear.
 - Restore Oyster Reef Habitat (D.1.3)
 - The FIMP would not directly restore habitat but would provide data to inform the placement of cultch, living shorelines, and where to deploy a spawning stock of oysters.
 - Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats (D.1.7)
 - The FIMP data would inform the restoration approach to develop and implement management activities at restoration projects by providing fisheries population data and trends, as well as pre- and post- project monitoring.
- Fish Restoration Approaches (D.3)
 - Reduce impacts of ghost fishing through gear conversion and/or removal (D.3.1)
 - The FIMP would provide data that could help assess the effectiveness of removal or gear conversion projects, especially if these projects were executed on a large-scale
 - The FIMP data could be useful especially if there is industry wide changes (e.g. biodegradable panels on all crab traps) that limit ghost fishing on a regional scale.
 - Voluntary reduction in Gulf Menhaden Harvest (D.3.3)
 - The FIMP would provide data that could help set voluntary management quotas for companies.
 - Voluntary Fisheries-Related Actions to Increase Fish Biomass (D.3.5)
 - The FIMP could provide valuable data to determine management activities that would increase fish biomass and provide data to show success or impacts of management actions that are taken.
- Monitoring and Adaptive Management (5.E)
 - The FIMP would provide both project level (E.3.1) and resource level (E.3.2) monitoring
 - This coast-wide data set will provide for project specific, especially in the case of river diversions, monitoring that will *“inform restoration planning, supports the evaluation of project performance and ensures project compliance.”* It will also provide feedback information in order to adaptively manage projects.
 - The coast-wide 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 FIMP activities described above will clearly address many of the key areas of restoration outlined in the PDARP/PEIS by leveraging a coast-wide, long-term data set that monitors the populations of many species that received direct injury during the DWHOS. The FIMP will provide valuable data towards NRDA TIG’s vision of large-scale restoration of multiple coastal and marine habitats and the

ability to conduct proper monitoring and adaptive management on restoration projects and important fishery resources.

5. Evaluation of NEPA Requirements

The Trustees' approach to compliance with NEPA summarized in this section is consistent with, and tiers where applicable from the PDARP/PEIS Section 6.14.4. 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 Louisiana 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.

As discussed in Chapter 6 of the PDARP/PEIS, a TIG may propose funding a planning phase (e.g., initial engineering, design, and compliance) in one plan for a conceptual project, or for studies needed to maximize restoration planning efforts. This would allow the TIG to develop information needed leading to sufficient project information to develop a more detailed analysis in a subsequent restoration plan, or for use in the restoration planning process. Where these conditions apply and activities are consistent with those described in the PDARP/PEIS, NEPA evaluation is complete and no additional evaluation of individual activities is necessary at this time.

5.1. NEPA Review of MAM Activity

Consistent with the impacts considered in the PDARP/PEIS, this activity would include minimally intrusive field activities and data-based activities. 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 use of a variety of gear types that may temporarily disturb marsh edge and benthic habitats during sampling. Analysis of the data collected, planning meetings, and preparation of reports are data-based components of this activity. Consistent with the analysis in Section 6.4.14 of the PDARP/PEIS, environmental consequences would be direct, short-term, minor impacts through the associated field work. The data gathered would provide critical data on the population status of a variety of commercially and recreationally important fisheries species that were injured in the DWHOS as well as important baseline and MAM data for future large-scale restoration initiatives in Louisiana, such as Mississippi River Diversions.

LDWF has over 50 years of experience in this type of data collection and have developed a thorough field manual for this type of sampling, which is updated periodically (LDWF 2019). The manual includes protocol for pre-sampling survey for any threatened and endangered species. In addition, , there are specific protocols that personnel must take for marine mammals, sea turtles and Diamondback terrapins if one of these organisms are captured during fisheries sampling. Data collection by this means does not require federal nor state permits for actions involving threatened and endangered species. Based on review of the proposed activities against those actions previously evaluated in the PDARP/PEIS, no additional NEPA evaluation is likely necessary.

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.

6. Compliance with Environmental Laws and Regulations

The Louisiana TIG has completed technical assistance with the appropriate regulatory agencies for this project and consultations with NMFS ESA are complete, NMFS EFH is not required and consultations with NOAA MMPA are in progress. NMFS ESA consultation on the Louisiana FIMP was completed in 2018 (<https://www.fws.gov/doiddata/dwh-ar-documents/2124/DWH-ARZ002541.pdf>) and covers the project described here through 2023. There are no effects to EFH as a result of this project, thus consultation with NMFS is not needed.

Federal environmental compliance responsibilities and procedures follow the Trustee Council Standard Operating Procedures (SOP), which are laid out in Section 9.4.6 of that document. Following the SOP, the Implementing Trustees for each activity will ensure that the status of environmental compliance (e.g., completed vs. in progress) is tracked through the Restoration Portal.

Documentation of regulatory compliance will be available in the Administrative Record that can be found at the DOI's Online Administrative Record repository for the DWH NRDA (<https://www.doi.gov/deepwaterhorizon/adminrecord>). The current status of environmental compliance can be viewed at any time on the Trustee Council's website: <http://www.gulfspillrestoration.noaa.gov/environmental-compliance/>.

7. Activity Close Out

In accordance with Section 9.5.1.6 of the TC SOPs, the Implementing Trustee shall provide the LA TIG with a closeout report after all activities and expenditures have been accomplished. The Final Report shall include a description and any documentation of the completed activity, estimated benefits to natural resources, the final funding balances and any transfers described in Section 7 of the TC SOPs, a summary of the results of monitoring, and any recommendations on adaptive management for the activity. Upon request, the Implementing Trustee shall provide the LA TIG with additional information and supporting documents to complete the closeout report.

8. Literature Cited

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Appendix 1:
Marine Fisheries Section Independent Sampling
Activities: Field Manual, November 2019