

**OPEN OCEAN RESTORATION AREA TRUSTEE IMPLEMENTATION GROUP**  
*of the*  
**DEEPWATER HORIZON TRUSTEE COUNCIL**

In re: Oil Spill by the Oil Rig “Deepwater Horizon” in the  
Gulf of Mexico on April 20, 2010,  
Civil Action Nos. 10-4536; 10-04182; 10-03059; 13-4677; 13-158; 13-00123 (ED. La.)  
MDL No. 2179

**Resolution #OO-2022-001**

**Funding for Implementation of the Mesophotic and Deep Benthic Communities Projects:  
Habitat Assessment and Evaluation  
Active Management and Protection  
Mapping, Ground-truthing, and Predictive Habitat Modeling,  
Coral Propagation Technique Development**

1. In accordance with the Oil Pollution Act of 1990 (OPA), the National Environmental Policy Act (NEPA), the Deepwater Horizon (DWH) Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (Final PDARP/PEIS), the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the DWH Oil Spill, August 2, 2021 (TC SOPs), and the Consent Decree entered in *United States v. BXPX et al.*, Civ. No. 10-4536, centralized in MDL 2179, In re: Oil Spill by the Oil Rig “Deepwater Horizon” in the Gulf of Mexico, on April 20, 2010 (E.D. La.) (Consent Decree), the undersigned representatives of the Open Ocean Trustee Implementation Group (OO TIG) hereby approve the actions set forth below to support the restoration of natural resources and services injured or lost as a result of the DWH oil spill, which occurred on or about April 20, 2010, in the Gulf of Mexico.
2. The undersigned Authorized Officials for the OO TIG hereby approve the commitment and disbursement of funds to the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior (DOI) (Implementing Trustees) to continue to implement the following four Mesophotic and Deep Benthic Communities Projects (MDBC Projects) selected in the *Deepwater Horizon Oil Spill Open Ocean Trustee Implementation Group Final Restoration Plan/Environmental Assessment 2: Fish, Sea Turtles, Marine Mammals, and Mesophotic and Deep Benthic Communities* (Final RP2/EA):
  - a. Habitat Assessment and Evaluation (HAE Project, Portal ID 232)
  - b. Active Management and Protection (AMP Project, Portal ID 233)
  - c. Mapping, Ground-truthing, and Predictive Habitat Modeling (MGM Project, Portal ID 234)
  - d. Coral Propagation Technique Development (CPT Project, Portal ID 235).
3. The MDBC Projects to be funded through this Resolution support restoration planning and implementation to carry out the restoration goals identified in the Final PDARP/PEIS and the Record

of Decision that provides and explains the Trustees’ selection of the Preferred Alternative (Alternative A) for the Programmatic Restoration Plan in the Final PDARP/PEIS. The MDBC Projects are also consistent with the Consent Decree resolving the civil actions referenced above.

4. The MDBC Projects were developed as a long-range activity in the Final RP2/EA. The NEPA analysis in the Final RP2/EA included an evaluation of a broad range of activities for the MDBC Projects that would be refined over time. The Implementing Trustees have provided an overview and analysis of site-specific actions to be conducted in the attached *Mesophotic and Deep Benthic Communities Restoration Projects: National Environmental Policy Act and Environmental Compliance Review of Implementation Activities (January 2022)*. After reviewing the attached evaluation, the OO TIG affirms the actions are consistent with the OPA evaluation and environmental compliance provided in the Final RP2/EA and that no additional NEPA analysis or public review is necessary. This review will be shared with the public via posting to the Gulf Spill Restoration website and through updates at OO TIG annual meetings.
5. The OO TIG approved prior funding to NOAA and DOI through the Resolutions identified in the tables below.

a. Table 5a: Prior NOAA Funding Authorizations

<b>NOAA</b>	<b>HAE Project</b>	<b>AMP Project</b>	<b>MGM Project</b>	<b>CPT Project</b>	<b>Total Funds</b>
Authorizing Resolutions	OO-2020-003 OO-2021-017	OO-2020-004	OO-2020-005 OO-2021-016	OO-2020-006 OO-2021-015	
Funds Authorized	\$1,405,314	\$1,018,314	\$2,008,314	\$2,345,814	\$6,777,756

b. Table 5b: Prior DOI Funding Authorizations

<b>DOI</b>	<b>HAE Project</b>	<b>AMP Project</b>	<b>MGM Project</b>	<b>CPT Project</b>	<b>Total Funds</b>
Authorizing Resolutions	OO-2020-012 OO-2021-017	OO-2020-012	OO-2020-012	OO-2020-012 OO-2021-012	
Funds Authorized	\$400,000	\$161,000	\$172,000	\$395,500	\$1,128,500

6. The Implementing Trustees will notify the OO TIG of proposed material changes before taking further action on the MDBC Projects. Notification will include a brief description of the change, impacts, and proposed path forward. Any material change must be approved by the OO TIG. The Implementing Trustees may modify in writing the Implementation Plans if the modification is minor and consistent with the Final RP2/EA. Approval of these minor modifications by the OO TIG may be communicated verbally during an OO TIG meeting and memorialized with a memorandum to the Administrative Record, by email, or through other procedures agreed to by the OO TIG that result in a written record of the decision.

7. Funds transferred from the DOI Restoration Fund to the Implementing Trustees as authorized by this Resolution may be used only to implement and monitor the MDBC Projects according to the Final RP2/EA, the TC SOPs, approved Project Implementation Plans, and as applicable, corrective action approved by the OO TIG. Any other use of funds disbursed pursuant to this Resolution is prohibited. Any non-authorized use of disbursed funds must be reported to the full OO TIG immediately upon discovery of the unauthorized use.
8. Through this Resolution and the associated DWH Trustee Withdrawal Forms, the OO TIG authorizes the commitment and disbursement of up to \$7,343,107 to DOI, which includes \$742,327 in contingency funds, and up to \$37,600,093 to NOAA in Mesophotic and Deep Benthic Communities Restoration Type funding from the DOI Restoration Fund as summarized below. No changes to authorized budgets are requested.

<b>Project</b>	<b>DOI Authorized Budget</b>	<b>DOI Funds Requested</b>	<b>NOAA Authorized Budget</b>	<b>NOAA Funds Requested</b>
HAE Project (Portal ID 232)	\$5,826,394	\$5,426,394	\$46,812,606	\$13,174,106
AMP Project (Portal ID 233)	\$951,485	\$145,000	\$19,737,515	\$5,193,900
MGM Project (Portal ID 234)	\$825,534	\$653,534	\$35,083,466	\$13,624,766
CPT Project (Portal ID 235)	\$1,513,679	\$1,118,179	\$15,437,321	\$5,607,321
<b>Total</b>	<b>\$9,117,092</b>	<b>\$7,343,107</b>	<b>\$117,070,908</b>	<b>\$37,600,093</b>

9. At the time this Resolution was approved, environmental compliance with federal regulations was not yet complete for the MDBC Projects. The Implementing Trustees will ensure that all applicable regulatory compliance activities will be complete prior to undertaking any regulated activities for the MDBC Projects and that the terms and conditions of all federal, state, and local permits will be complied with in the course of implementation. All compliance documents will be posted to the Administrative Record.
10. It is resolved that after review of this Resolution and the attached *Mesophotic and Deep Benthic Communities Restoration Projects: National Environmental Policy Act and Environmental Compliance Review of Implementation Activities (January 2022)*, the duly authorized officials for the OO TIG (i) affirm the actions to be conducted by the MDBC Projects are consistent with the environmental compliance provided in the Final RP2/EA and that no additional NEPA analysis or public review is necessary and (ii) authorize the release of funds as specified in Paragraph 8. This Resolution may be authorized in counterparts. The effective date of this Resolution is the last date of the last signature below.

**OPEN OCEAN RESTORATION AREA TRUSTEE IMPLEMENTATION GROUP**



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DATE OF LAST SIGNATURE: January 28, 2022

**Mesophotic and Deep Benthic Communities  
Restoration Projects:**

**National Environmental Policy Act and  
Environmental Compliance  
Review of Implementation Activities**

**January 2022**

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## 1. Background and Purpose of this Document

The Open Ocean Trustee Implementation Group (TIG) selected four Mesophotic and Deep Benthic Communities (MDBC) restoration projects in the 2019 Final Open Ocean Restoration Plan 2/Environmental Assessment: Fish, Sea Turtles, Marine Mammals, and Mesophotic and Deep Benthic Communities (OO RP2/EA) to support the restoration of natural resources and services injured or lost as a result of the Deepwater Horizon (DWH) oil spill. (See Section 3 below for projects and brief descriptions).

As described in the Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (PDARP/PEIS), the restoration of MDBC is complicated by a limited understanding of key biological functions, limited experience with restoration at the depths at which they occur, and remote locations that limit accessibility. Therefore, the Open Ocean TIG's evaluation of restoration alternatives for these resources determined that MDBC projects should include phased implementation to allow for data collection to address critical uncertainties and inform adaptive decision-making.

Implementation of the projects included an initial one- to two-year planning and design stage, followed by a five-year field and lab-based implementation stage, and a final stage of one- to two-years for reporting and project close-out. Implementation of these projects contributes to the following restoration goals for MDBC from the PDARP/PEIS (Section 5.5.13):

- Restore mesophotic and deep benthic invertebrate and fish abundance and biomass for injured species, focusing on high-density mesophotic and deep water coral sites and other priority hard-ground areas to provide a continuum of healthy habitats from the coast to offshore.
- Actively manage valuable MDBC to protect against multiple threats and provide a framework for monitoring, education, and outreach.
- Improve understanding of MDBC to inform better management and ensure resiliency.

This document provides summaries of additional information developed during the planning and design stage for implementation of the four MDBC projects. This information was used to inform the Open Ocean TIG's determination about the operational activities' consistency with the environmental review and NRDA evaluation conducted in OO RP2/EA.

## 2. Summary of Project Selection Process

In 2019, the DWH Open Ocean TIG completed the Final Open Ocean Restoration Plan 2/Environmental Assessment: Fish, Sea Turtles, Marine Mammals, and Mesophotic and Deep Benthic Communities (OO RP2/EA) that included the selection of the four Mesophotic and Deep Benthic Communities (MDBC) projects. The Open Ocean TIG selected the projects from a reasonable range of alternatives suitable for addressing the injuries caused by the DWH oil spill. In developing the reasonable range, the Open Ocean TIG reviewed the Trustees' programmatic restoration goals and Restoration Type specific goals specified in the Final Programmatic Damage Assessment and Restoration Plan/Programmatic

Environmental Impact Statement (PDARP/PEIS). The Open Ocean TIG also considered evaluation factors in the OPA regulations (15 CFR §990.54), the current and future availability of funds under the DWH NRDA settlement payment schedule, as well as projects already funded or proposed to be funded by the other DWH restoration funding sources.

MDBC project alternatives were developed through review of project ideas submitted to the DWH project portal. There were 102 project ideas identified for the MDBC restoration type screening process. From these, 54 project ideas advanced through screening and were used to identify the MDBC reasonable range of alternatives evaluated in the Draft RP/EA. From this screening, the Open Ocean TIG fully evaluated five MDBC project alternatives as well as a No Action alternative.

The Draft OO RP2/EA was available for a 79-day public comment period from May 15, 2019 through August 2, 2019. The Open Ocean TIG received a total of 53 comments. Seven comments were directly applicable to the MDBC restoration projects. Following consideration of public comment, the Open Ocean TIG selected four MDBC preferred alternatives for implementation at a total estimated cost of \$126,188,000. The planning process and all public comments can be found in the OO RP2/EA and DWH Administrative Record.

### 3. Project Descriptions

The following projects were selected by the Open Ocean TIG to restore MDBC injured by the oil spill. The portfolio of projects creates an adaptive management feedback loop by advancing restoration planning, implementing and monitoring initial restoration actions, evaluating and reporting restoration effectiveness, and feeding back information to restoration planning and implementation. In addition, they directly address the following key planning and implementation considerations identified in the PDARP/PEIS.

#### Mapping, Ground-truthing, and Predictive Habitat Modeling (MGM Project)

The abundance and distribution of MDBC across the Gulf of Mexico are not completely known, particularly in deeper waters, presenting a challenge to decision-making for restoration, management, and protection, and to evaluations of DWH injuries and recovery. This project would conduct high-resolution mapping efforts in both mesophotic and deep benthic habitats and use this information to refine predictive models to improve the effectiveness and cost efficiency of future restoration and mapping efforts. This project would also analyze the abundance and distribution of these communities, as well as provide species-specific data on depth ranges, densities, and distributions of specific coral species. The data collected in this project would provide fundamental information to prioritize and support MDBC protection and management activities and to identify potential locations for direct restoration activities. This project would be adaptively managed throughout its seven- to eight-year timeframe and is estimated to cost \$35,909,000.

#### Habitat Assessment and Evaluation (HAE Project)

The life histories, diversity, and population structures of MDBC species in the Gulf of Mexico are not well understood. The goal of this project is to fill those data gaps, determine baseline conditions, and characterize key community conditions at both injured and reference sites. This project would support and inform restoration planning and implementation for MDBC through



strategically designed field surveys, with subsequent laboratory-based analyses of MDBC components and interactions. The surveys would yield the types of samples that support determinations of ages, growth rates, and reproductive potential of mesophotic and deep water corals, as well as their health and condition. In addition, the project would maximize the effectiveness of MDBC restoration and protection efforts through the use of population genetic analysis methods. The project results would fill critical gaps in our understanding of the biology, ecology, health, biodiversity, recovery, and resilience of mesophotic and deep-sea habitats (corals and soft sediments) following the DWH spill. This project would be adaptively managed throughout its seven to eight-year timeframe and is estimated to cost \$52,639,000.

### Coral Propagation Technique Development (CPT Project)

The most direct approach to restoring MDBC is to facilitate the growth of new corals. As described in the PDARP/PEIS, the creation of interim habitat and active transplantation of corals would help to accelerate an otherwise protracted natural recovery due to the slow natural growth rate and low recruitment of mesophotic and deep benthic corals. The objective of this pilot scale project is to develop techniques that can be used for direct restoration of MDBC at a scale that is meaningful relative to the injury to these communities. The project proposes both field and lab work to test a variety of substrates as potential coral colonization substrates and to test a variety of coral transplant techniques. Although some preliminary testing of substrates in laboratory settings may be necessary, this project would primarily test substrates and techniques *in situ* (in the natural location) in mesophotic and deep water coral habitats. Additional lab work would be conducted to develop coral cultivation techniques. Development of these methods and techniques would ultimately be applied at scales necessary for effective enhancement of coral recruitment and growth. This project would be adaptively managed throughout its seven- to eight-year timeframe and is estimated to cost \$16,951,000.

### Active Management and Protection (AMP Project)

Despite the depth at which MDBC occur, human activities threaten the health and resiliency of these communities. The project aims to protect and manage these communities through development of a framework for management and protection, including monitoring, education, outreach, and engagement. Project activities would include education and outreach targeting resource users and the public; engagement of stakeholders and development of socioeconomic analyses to evaluate potential impacts of management or protection actions; and directly addressing threats to MDBC through management activities such as mooring buoy installations, removal of invasive species such as lionfish, documentation and removal of marine debris and derelict fishing gear, and assessing and remediating risks associated with leaking and abandoned oil and gas infrastructure. This project would be adaptively managed throughout its seven to eight-year timeframe and is estimated to cost \$20,689,000.

## 4. Implementation Planning Phase

MDBC project implementation planning phase work is establishing foundational management plans, data management systems and standards, best practices, stakeholder engagement and project management strategies that leverage shared resources and needs across the portfolio of projects. The NEPA and environmental compliance analysis captured in this document is also a key output of the implementation planning phase of the MBDC planning phase.

The following are key activities being conducted during the planning phase.

*Data Inventory, Acquisition, and Analysis:* The MDBC portfolio conducted comprehensive inventories and, in some cases, acquisition of existing data and best available science for the MGM, HAE, and CPT projects. Data gaps identified through the DWH injury assessment and subsequent injury studies, recent assessments as part of the Flower Garden National Marine Sanctuary expansion, and assessments by the Gulf of Mexico Fisheries Management Council for Amendments 9 and 10 to the Fishery Management Plan for Coral and Coral Reef Resources in Gulf of Mexico U.S. waters were also considered. These efforts engaged many stakeholders to assemble the most comprehensive inventory of MDBC data and science available for the Gulf of Mexico. An online atlas of spatial data, bibliographies, and scientific reports was developed to support analysis of data gaps, establish data collection standards, identify best practices, and select priority areas and information needs for the projects. These products will be completed and made available to stakeholders and the public through online products, technical reports, and other communication products.

*Geographic Prioritization:* To identify priority areas consistent with the objectives of the MDBC portfolio, an online participatory Geographic Information System (pGIS) was developed to collect standardized recommendations from regional experts. A 25 x 25 km grid was overlaid on the northern Gulf of Mexico between 27° N latitude and the 50 m isobaths. Sixty-four individuals from federal, state, academic, and non-governmental organizations provided suggestions. Each respondent placed 100 virtual coins across the grid to denote the location and urgency of their priorities. Respondents also indicated what data and modeling products they recommended for each cell. These ranged from delineation of large landscape features such as pinnacles and escarpments, to identification of individual coral species and their condition. Lastly, participants justified their priorities by indicating which aspects of the MDBC portfolio their recommendations supported. The results will be integrated with a gap analysis informed by data inventory and analysis described above to derive operational plans for 2022 and beyond.

*Field Operations Planning:* Using the geographic prioritization work and the data inventory and analyses, the project teams assessed operational requirements for obtaining priority data and data products, prioritized specific sites, and identified vessels, equipment, and partners that provided needed operational capacities. Detailed mission plans, budgets, data management and analysis plans, other operational work plans and environmental compliance will be completed for field expeditions that begin in 2022. Vessel requests and obligations for contracts and other agreements have also been made to support field operations beginning in 2022 and to provide templates for future operations planning. Additional project activities to support field operations include data analysis and management and conducting adaptive management workshops with partners and

stakeholders to evaluate operations and inform future operational planning and prioritization of sites and activities.

*Establishing Coral Propagation Labs, Coral Husbandry, and Procedure Development:* During the implementation planning and design phase, the CPT Project established three federal coral propagation labs within nationally recognized programs experienced in coral husbandry and research. New cold water aquarium designs, equipment requirements, and protocols and procedures for mesophotic and deep sea corals were developed. Equipment designs and specifications for operation are being jointly developed at NOAA's Hollings Marine Lab in Charleston, South Carolina, NOAA's Southeast Fisheries Science Center lab at Fort Crockett in Galveston, Texas, and the USGS Wetland and Aquatic Research Center in Gainesville, Florida.

Inventory and data acquisition efforts were conducted to create maps for the distribution of injured coral species that were used to select optimal locations for the collection of coral specimens to establish federal labs. The project also completed one successful field operation to collect 34 live colonies of coral specimens for rearing in the federal labs. These specimens are being used to further develop best practices and requirements for the selection of partners to establish a network of partner labs familiar with coral husbandry techniques. Future work will phase in lab network partners, collect additional coral colonies, establish coral husbandry operations, and establish network coordination and communication mechanisms.

*Stakeholder Engagement:*

The Implementing Trustees developed an extensive stakeholder engagement process to prioritize specific geographic areas and data collection and information needs for those areas. Longer-term project management plans and budgets will also be developed and detail project objectives and performance criteria; assess existing data and resource requirements; sequence implementation plans; and provide stakeholder engagement strategies. A comprehensive data management framework will be established to guide long-term implementation and data sharing objectives.

## 5. Planned Implementation Activities

Planned implementation activities for the four selected MDBC restoration projects are based on a coordinated and phased cross-project planning effort. The coordinated management of project infrastructure and capacity requirements (e.g., vessel time, scientific vehicles and instruments, information technology infrastructure, research facilities, and standards for monitoring and data management) have been considered to maximize efficiencies and cost-effectiveness during planned field operations. Operations beginning in 2022 will be conducted as multi-mission cruises (Table 1) during which the operations described in this section are to be undertaken. Following Table 1, project-specific activities are summarized in relation to how the activities implement the goals and objectives established for each project.

Table 1: Planned MDBC Cruises beginning in 2022

<b>Anticipated Vessel Platforms and Vehicles</b>	<b>Tentative Dates</b>
<b>NOAA Ship <i>Ferdinand R. Hassler</i></b>	<b>April through June</b>
<b>R/V <i>Point Sur</i> w/ ROV <i>Global Explorer</i></b>	<b>June</b>
<b>NOAA Ship <i>Pisces</i> w/ ROV <i>Mohawk</i> + REMUS 600 AUV</b>	<b>June through July</b>
<b>R/V <i>Manta</i> w/ ROV <i>Beagle</i></b>	<b>July</b>
<b>NOAA Ship <i>Nancy Foster</i> w/ ROV <i>Global Explorer</i></b>	<b>August</b>
<b>R/V <i>Manta</i> w/ ROV <i>Mohawk</i></b>	<b>September</b>
<b>R/V <i>Point Sur</i></b>	<b>September</b>
<b>R/V <i>Point Sur</i> w/ ROV <i>Mohawk</i></b>	<b>October</b>
<b>Office of Coast Survey Contract Cruise</b>	<b>Summer and Fall</b>

### MGM Project Field Operations

The goal of the MGM project is to document the abundance and distribution of MDBC and to gain a better understanding of their extent, species composition, and habitat characteristics. The planned field operations support these goals and further project objectives to map (e.g., high-resolution surveying, backscatter interpretation, and photomosaic assemblage) and ground-truth (i.e., visually and including sample collections) MDBC at sufficiently high-resolution for habitat characterization. Mapping operations will also collect data to refine predictive models to improve the effectiveness and cost efficiency of restoration and mapping efforts.

Mapping operations (OORP2/EA Section 3.8.1.1) will include moderate-resolution (2-16 meter) ship-based exploratory mapping using multi-beam echosounders, underway conductivity, temperature, and depth (CTD) probes, Remotely Operated Vehicle (ROV)-based ground-truthing, high resolution (<2 meter) mapping over potential dive targets using ship- and Autonomous Underwater Vehicle (AUV)-based sensors, and ground-truthing previously mapped sites. AUV operations will include multibeam echosounder or sonar surveys from vehicles flown at low altitude above the seafloor, as well as photo imaging of the seabed for ground-truthing, photomosaic assemblage, and photogrammetry. Ship-based multi-beam operations will be performed with instruments including the Kongsberg EM2040 (hydrographic surveying in mesophotic depths of 50-300m), Kongsberg EM710 (hydrographic surveying in depths of 300-2000m), Kongsberg ME70 and Kongsberg Simrad EK80 (fish and deep scattering layer characterization, and coarse resolution hydrographic surveying in deep water), and Knudsen CHIRP 3260 (sub-bottom profiling in mesophotic depths).

Typically, on multi-mission cruises, mapping operations are carried out at night while ROV operations are carried out during the day, to take advantage of any available light. Multibeam echosounder operations will be carried out to conduct mapping to find seafloor features on which ROV dives will be conducted to meet the objectives of the HAE Project.

### HAE Project Field Operations

The goal of the HAE Project is to fill critical gaps in our understanding of the health, biodiversity, recovery, and resilience of mesophotic and deep-sea habitats (both hard bottom communities and soft sediment communities) following the DWH oil spill. The planned field operations further this goal and project objectives by documenting changes to the structure and function of MDBC impacted by the DWH oil spill and other threats and establishing environmental baseline conditions and changes over time around impacted and healthy MDBC.

Habitat assessment operations (OORP2/EA Section 3.8.2.1) will include ROV dives to characterize the fish and water column community including the deep scattering layer, and to perform sub-bottom profiling to characterize sediment and substrate stratigraphy. Visual/image transects will be conducted at previously imaged and new sites and biological, geological, and water column samples (i.e., tissues, organisms, colonies, sediment, substrate, water, eDNA) will be taken to support habitat assessment.

Conductivity, temperature, and depth probes (“CTD casts”) and expendable bathythermograph probes (“XBT casts”) will be deployed for physical oceanographic data collection both while underway and while stationary. Underway CTD casts will be conducted to collect sound velocity data for multibeam mapping, while CTD rosette deployments will be used to collect water column data from ROV dive locations. Sediment sample collection will be performed using ship-deployed multicores and ROV- or diver-deployed push-cores.

Physical markers will be deployed on the seafloor as targets for ROVs, AUVs, and divers to establish monitoring sites and return to them during repeated surveys. Instrumented landers (frames to which monitoring instrumentation and equipment are attached) will be deployed for long term monitoring. In addition, specific corals will be selected at these sites for monitoring using imaging techniques. ROV operations will include transect surveys, video, and still imagery documentation of coral and reef fish communities, with collections of corals, other invertebrates, water samples, and sediment or substrate samples also taken throughout the dives. These operations also support the goals and objectives of the CPT Project.

### CPT Project Field Operations

The goals of the CPT Project are to develop techniques to propagate and transplant corals and to enhance larval coral recruitment. Field operations beginning in 2022 advance these goals and support project objectives to develop coral husbandry techniques for priority species and conduct specialized analyses of biological and environmental samples to evaluate potential restoration sites that can maximize survival and recruitment.

Coral propagation technique development-related field operations (OORP2/EA Section 3.8.3.1) will include the targeted collection of coral specimens (whole colonies, fragments for genetics analysis, commensal organisms, associated sediments or substrates, and water containing gametes or larvae) and small-scale deployments of experimental settlement substrates on landers to test coral

recruitment potential and performance. Targeted coral collections are planned during cruise missions for laboratory culture and in support of studies of genetic connectivity, life history characteristics, health condition, and trophodynamic linkages among ecosystem components. None of the coral species to be collected are listed under the Endangered Species Act (ESA).

### Geographic Areas for Field Operations

The MDBC habitats and areas targeted for field operations beginning in 2022 are described in Sections 3.5.3 and 4.5 of the DWH PDARP/PEIS and in Section 4.3.2.1.1 of the OORP2/EA. As shown in Figure 1, the area for MDBC field operations is represented by the heavy black polygon (bounded to the north, east, and west by the 50m isobath and to the south by the 27th N parallel), and includes slightly shallower depths in the gray polygon extending to the east outside the black line (the Florida Middle Grounds). The gray polygons represent areas with known MDBC habitats encompassing a number of protected or managed areas including both injured sites and areas that may be used as reference sites.

Field operations will take place in mesophotic reef habitats along the continental shelf edge (50-200 meter depths) and ocean floor habitats in the continental slope (>200-800 meters depth) and/or deep sea (>800 meters depth).

The sites selected for implementation further project goals and objectives by conducting operations in areas identified as priorities, including areas to serve as reference sites. Project operations will be conducted in both the mesophotic and the deep water depths. Project operations were designed to collect data at sites that provide fundamental information to support protection and management activities and to target locations for direct restoration.

Sites that are currently designated or under consideration for designation as protected areas (e.g., Habitat Areas of Particular Concern [HAPC] or National Marine Sanctuaries [NMS]), were used as a basis for prioritizing operations beginning in 2022. Additionally, as described in OO RP2/EA, several existing datasets were used to prioritize locations. For example, BOEM's deep water bathymetric grid of the northern Gulf of Mexico and the dataset of seismic water bottom anomalies were used to evaluate initial mapping priority areas.

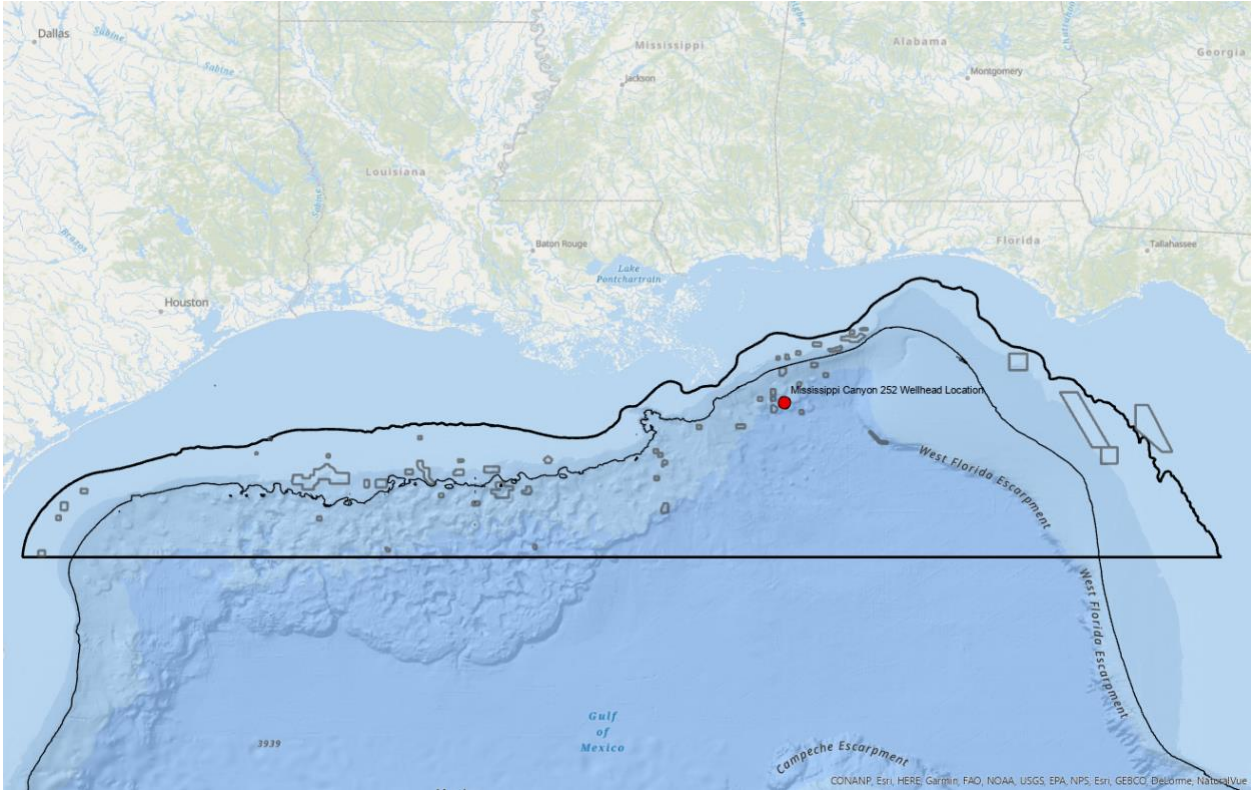


Figure 1. Planned Project area for MDBC field work.

The following areas are targets for field operations beginning in 2022:

Mesophotic depths (~50-300m):

- Injured sites (e.g., Alabama Alps, Roughtongue Reef) and other reefs in Pinnacles Trend.
- Potential reference areas (previously surveyed during injury assessment or other studies, no damaged corals identified) (e.g., Coral Trees, Madison Swanson, DeSoto Canyon, Flower Garden Banks NMS).
- Areas designated as or under consideration for designation as HAPCs, and areas designated as or previously under consideration for designation as National Marine Sanctuaries, located in reasonable proximity to injured sites.

Deep depths (~300-2500m):

- Sites where injuries to corals from DWH were documented (e.g., Biloxi Dome, Gloria Dome, Dauphin Dome).
- Coral reference sites (e.g., Henderson Ridge South, St. Tammany Basin Rim, Horn Dome, Whiting Dome).
- Injured sediment zones (see e.g. Reuscher et al. 2020).
- Potential reference areas of deep sediment zones where historic data exist (see e.g. Reuscher et al. 2020; Rowe and Kennicutt 2008).
- Other biogenic structured deep water habitats such as *Lophelia pertusa* habitats at Viosca Knolls.

## 6. Consistency with OO RP2/EA OPA Evaluation

The Trustees conducted Oil Pollution Act (OPA) evaluations for the range of project alternatives as described in Chapter 3 of the OO RP2/EA. The MDBC projects were approved as long-range actions structured to include a full lifecycle of activities such as initial project design and assessment, tool design, and tool testing through long-term site-specific project implementation. Therefore, the following OPA evaluation factors were considered through a programmatic lens for the MDBC projects: Cost Effectiveness; Trustee Restoration Goals and Objectives; Likelihood of Success; Avoid Collateral Injury; Benefits Multiple Resources; and Public Health and Safety.

The Trustees determined that the projects have a strong nexus to the injury, meet the Trustees' goals at reasonable and appropriate costs, have a high likelihood of success, and provide potential benefits to more than one natural resource or service. In addition, the Trustees determined that the projects are not expected to have negative impacts to public health and safety and would avoid collateral injury by evaluating environmental consequences of techniques during the project planning and design activities and by identifying BMPs to minimize potential collateral injury. Additionally, the Trustees recognized that the MDBC projects will increase scientific understanding of restoration and better characterize the status, trends, and spatiotemporal distributions of injured resources and habitats. Together they will improve the Trustees' ability to target restoration activities and track resource and ecosystem recovery.

The planning phase work being conducted has strengthened the projects' ability to meet OPA evaluation factors. The Implementing Trustees are establishing best practices, best available science, and proven techniques to cost-effectively accomplish restoration goals while minimizing potential environmental consequences or collateral injury.

The Implementing Trustees have also identified best practices and techniques to minimize potential environmental consequences by reviewing other National Environmental Policy Act (NEPA) documents as described in Section 7 (below).

The inventory, gap analysis, prioritization process, and engagement with subject-matter experts have improved the projects' likelihood of successfully meeting project objectives, including filling data gaps to evaluate sites for restoration and protection, providing data to detect and quantify trends affecting MDBC habitats, and identifying impacts and assessing threats to these communities.

In addition, project implementation activities have been designed in stages to address key questions and ensure appropriate deployments of equipment to ensure cost-effectiveness and increase likelihood of success. For example, initial project activities will compile regional oceanographic characterization data, assess existing image analysis/species recognition tools to determine further tool development and application, ground-truth existing predictive habitat models, and produce refined models that will assist in identifying priority areas for mapping and ground-truthing.

Field operations will be performed in remote offshore areas by experienced, licensed crews applying rigorous safety plans and standard operating protocols. The Implementing Trustees will ensure personnel are properly trained, that appropriate equipment and safety standards are employed, and that routine safety inspections are performed to minimize any risks to public health and safety.



All of the project field operations described in Section 5 remain consistent with the OPA findings per the OO RP2/EA and fully meet OPA evaluation criteria. They are consistent with the activities that were anticipated to be conducted for the MDBC portfolio in OO RP2/EA and therefore meet the goals and objectives of each project. Therefore, there is no new or additional information to consider that alters the OPA evaluation of each project alternative in the OO RP2/EA Sections 3.8.1.3, 3.8.2.3, 3.8.3.3, and 3.8.4.4.

## 7. Consistency with OO RP2/EA and Other Relevant NEPA Evaluation

### Introduction

This Section reviews the affected environment and the findings of the OO RP2/EA. Additionally, it summarizes and incorporates by reference other NEPA evaluations of field methodologies that will be used in completion of these projects. It concludes with affirming the project activities are consistent with existing NEPA evaluations and no additional environmental analyses are needed.

### Activity Description

Field operations for the four selected MDBC restoration projects are based on a coordinated and phased cross-project planning effort described in OO RP2/EA and above in Section 5. The coordinated management of project infrastructure and capacity requirements (e.g., vessel time, scientific vehicles and instruments, information technology infrastructure, research facilities, and standards for monitoring and data management) have been considered to maximize efficiencies and cost-effectiveness during planned field operations. Operations beginning in 2022 will be conducted as multi-mission cruises (Table 1) during which the operations described in Section 5, above, are to be undertaken.

### Affected Environment

The MDBC areas and habitats targeted for the field operations beginning in 2022 are described above in Section 5 and generally in Sections 3.5.3 and 4.5 of the DWH PDARP/PEIS and in Section 4.3.2.1.1 of the OO RP2/EA. As shown in Figure 1, above, the area for MDBC field operations lies within the territorial waters of the Gulf of Mexico and is represented by the heavy black polygon (bounded by the north, east, and west by the 50 m isobaths and to the south by the 27<sup>th</sup> N parallel), and includes slightly shallower depths in the gray polygon extending to the east outside the black line (the Florida Middle Grounds). The gray polygons represent areas with known MDBC habitats encompassing a number of protected or managed areas including both injured sites and areas that may be used as reference sites.

Since the time of approval of the OO RP2/EA additional protected areas have been implemented within the Project Area. On January 19, 2021, NOAA issued the Final Rule for expansion of Flower Garden Banks National Marine Sanctuary, which took effect March 22, 2021. This action protects 14 additional reefs and banks, slightly adjusts the boundaries of the sanctuary's original three banks, and expands the sanctuary from 56 square miles to a total of 160 square miles. The final rule applies existing sanctuary regulations to all of the new areas, providing protection from the destructive impact of activities related to fishing with bottom-tending gear, ship anchoring, oil and gas exploration and production, and salvage activities on sensitive biological resources. On October 19, 2020, NOAA announced the final rule implementing

Amendment 9 to the Fishery Management Plan for Coral and Coral Reef Resources in Gulf of Mexico U.S. waters (Amendment 9). The final rule became effective November 16, 2020. The rule established 13 new habitat areas of particular concern with fishing regulations, designated 8 new areas without fishing regulations, and modified the regulations in 3 existing areas. These areas have been identified as having sufficient numbers and diversity of deep-water corals to be considered essential fish habitat. These changes do not alter the evaluations of environmental consequences for MDBC project activities included in OO RP2/EA or those incorporated by reference below.

Activities will take place in mesophotic reef habitats along the continental shelf edge (50-200 m depths) and ocean floor habitats in the continental slope (>200-800 m depth) and/or deep sea (>800 m depth). Ships will operate from ports in state waters and transit through state waters between ports and project areas; seafloor mapping activities may extend into state waters. Planned field operations will take place beginning in 2022 for varying lengths of time. In 2022, project activities are cumulatively anticipated to be performed during approximately 230 days at sea and are generally anticipated to be conducted from April to November.

Since the time of approval of the OO RP2/EA, NOAA Fisheries revised the common and scientific name of the Gulf of Mexico Bryde's whale to Rice's whale, *Balaneoptera ricei*, and classification to species to reflect the new scientifically accepted taxonomy and nomenclature of the species. In 2019, NOAA Fisheries updated the Rice's whale Core Distribution Area to include areas of the northeastern Gulf of Mexico along the continental shelf between roughly 100 and 400 meters depth. No critical habitat has been designated under the Endangered Species Act for Rice's whale.

Biological resources found within the Project Area are those typical of the mesophotic and deep benthic Gulf of Mexico ecosystem and are presented in OO RP2/EA in Sections 4.3.2. Human Uses and Socioeconomic conditions are similarly presented in Section 4.3.3 of OO RP2/EA.

### Existing Relevant Environmental Evaluations

In OO RP2/EA, the projects in the MDBC portfolio are described as "long-range activities" and are evaluated from a programmatic perspective. Section 4.1.2 described the process by which the Open Ocean TIG would affirm consistency with that programmatic environmental review once site-specific actions were fully developed in the out years of the long-ranging project. Following are the specific methodologies for the MDBC implementation activities and review of existing environmental compliance to support an affirmation of consistency with prior analyses.

Project activities were programmatically evaluated in the OO RP2/EA. The environmental consequences in OO RP2/EA relied on analyses conducted in the Trustee's PDARP/EIS, analysis in the plan, and, for the MDBC portfolio, incorporated environmental consequences by reference from the following NEPA documents:

- Final Programmatic Environmental Assessment for the Office of Coast Survey Hydrographic Survey Project (NOAA 2013).
- Integrated Ocean Observing System Program Programmatic Environmental Assessment (NOAA 2016).
- Final Programmatic Environmental Assessment for Fisheries and Ecosystem Research Conducted and Funded by the Southeast Fisheries Science Center (NOAA 2020)

In this evaluation of field operations that will begin in 2022, specificity of individual cruise plans is known, including the instrumentation and methodologies for data collection intended for use across the planned cruises. All methods are routine in scientific data collection and have been previously evaluated for potential environmental consequences. Existing relevant NEPA review is summarized here and incorporated by reference. No methods or instrumentation are expected to be modified beyond the typical approaches previously evaluated and consequently are not expected to have environmental consequences beyond those evaluated in the noted existing NEPA reviews.

Table 2. Activity-based Environmental Consequences cross-walk to OO RP2/EA and other NEPA documents that are Incorporated by Reference

Activity and Instrumentation	OO RP2/EA Analysis References	Other NEPA Incorporation References
Vessel transit operations	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2020 – 4.2.4.2
moderate-resolution (2-16 meter) ship-based exploratory mapping using multi-beam echosounders	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.1 NOAA 2016 – 4.2.1, 4.2.2, 4.2.3
Remotely Operated Vehicle (ROV)-based ground-truthing	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.1 NOAA 2020 – 2.2.10, 4.2.7.2
high resolution (<2 meter) mapping over potential dive targets using ship- and Autonomous Underwater Vehicle (AUV)-based sensors	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.1 NOAA 2016 – 4.2.1, 4.2.2, 4.2.3
ground-truthing previously mapped sites	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3	NOAA 2013 – 5.1.1
visual/image transects at previously imaged and new sites	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.1 NOAA 2020 – 2.2.10, 4.2.7.2
Collection of biological, geological, and water column samples (i.e., tissues, organisms, colonies, sediment, substrate, water, eDNA)	4.4.6.1.1, 4.4.6.1.2, 4.4.6.1.3, 4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.5, 5.1.6 NOAA 2020 – 2.2.10, 4.2.7.2
Physical markers deployment on the sea floor	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2016 – 4.2.1, 4.2.2, 4.2.3
selecting and imaging specific corals used for long term monitoring	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.8
deployment of instrumented landers	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.8

targeted collection of coral specimens	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013
small-scale deployments of experimental settlement substrates on landers to test coral recruitment potential and performance	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2016 – 4.2.1, 4.2.2, 4.2.3
Sediment sample collection	4.4.6.2.1, 4.4.6.2.2, 4.4.6.2.3, 4.4.6.3.1, 4.4.6.3.2, 4.4.6.3.3	NOAA 2013 – 5.1.5

## Summary of Environmental Consequences Evaluated Programmatically in OO RP2/EA

The following resource categories were evaluated with respect to the MDBC projects and the environmental consequences associated with those actions. Summaries of those findings include:

*Physical Resources – the MGM, HAE, and CPT projects* may have short-term, localized, and minor adverse impacts to geology, substrates, and noise, with long-term benefits to geology and substrates. Further, each project would include activities undertaken using sonar operations (e.g., ship-mounted, towed, and AUV-mounted side scan sonars; synthetic aperture sonars; and multi-beam echo-sounders) that may result in temporary, short-term, minor changes to the acoustic environment in the areas that would be surveyed, leading to disturbances to fish, sea turtles, and marine mammals. These determinations and analyses were determined to be consistent with previous evaluations involving ships, sonar, ROVs, and AUVs (NOAA 2013, 2016, and 2020).

*Biological Resources –* The MGM and HAE projects were projected to have both long-term benefits and short-term, minor adverse impacts to habitats, marine fauna, protected species, benthic habitats and communities. Long-term benefits associated with protection and management of these communities were also anticipated and are consistent with previous evaluations involving sonar and ROVs (NOAA 2013 and 2016). The CPT project was anticipated to result in short-term, localized, minor adverse impacts to the benthic habitats and communities (sessile marine fauna) from which samples (e.g., coral fragments, sediment cores) would be collected or on which/into which landers or moorings would be deployed and also short-term, minor adverse impact to protected species such as marine mammals and sea turtles based on the adverse impacts to the noise environment; however, long-term benefits were also expected to protected species if habitats they utilize are restored. These determinations and analyses were determined to be consistent with previous evaluations involving ships, sonar, ROVs, and AUVs (NOAA 2013, 2016, and 2020).

*Human Uses and Socioeconomics -* The MGM and HAE projects were not expected to adversely impact marine management, tourism and recreation, and fisheries resources but would have long-term benefits to these resources. The CPT project was expected to result in short-term to long-term, minor to moderate adverse impacts and short-term to long-term benefits to socioeconomic resources from placing hard ground substrate and transplanting coral. All three projects were expected to have the potential for long-term, minor adverse impacts to cultural resources from disturbance to the adjacent seafloor by underwater equipment (ROV), but also with potential long-term benefits to cultural resources should previously unknown cultural resource be revealed.

## Summary of Environmental Consequences Evaluated by Field Methodology

The planned field methodologies are conventional approaches that have been previously evaluated in relation to other oceanographic field operations. Existing NEPA assessments of such methodologies were reviewed in preparing this document and are summarized in Table 3. Those NEPA analyses (e.g., NOAA 2013, NOAA 2016) conclude that there would be no or negligible impacts to human uses and socioeconomic resources associated with the activities planned for the MDBC portfolio, therefore, the table below focuses on a summary of the physical and biological resource environmental consequences analyses from those documents.

Table 3. Summary of environmental consequences from existing NOAA NEPA Evaluations<sup>1</sup>

<b>Activity and Instrumentation</b>	<b>Physical Resources</b>	<b>Biological Resources</b>
Vessel transit operations	NOAA 2016 concluded that vessel operations would have short-term, negligible, adverse impacts on geological resources or water quality in the low likelihood of a vessel grounding or if a vessel is required to anchor.	NOAA 2016 concluded that vessel operations would have no impacts on terrestrial biological resources. Short-term, negligible adverse impacts on marine biological resources due to the small potential for vessel strikes; however, the potential for vessel strikes would be minimized by following best management practices. Consistent with NOAA 2020, the relatively slow vessel speeds, the presence of bridge crew watching for marine mammals during ship transit and survey activities, and the small number of cruises, ship strikes with marine mammals during MDBC project activities would be unlikely to occur. The potential for vessels to cause serious injury or mortality to any marine mammals due to ship strikes is considered minor adverse throughout the MDBC project areas using vessel types and protocols planned. Likewise, discharge of contaminants from NOAA or chartered vessels is possible, but

<sup>1</sup> The following NEPA analyses were reviewed for relevant analyses, summarized and those findings incorporated by reference to inform this affirmation of prior NEPA consideration: Final Programmatic Environmental Assessment for the Office of Coast Survey Hydrographic Survey Project (NOAA 2013); Integrated Ocean Observing System Program Programmatic Environmental Assessment (NOAA 2016); Programmatic Environmental Assessment of Field Operations in the Southeast and Gulf of Mexico National Marine Sanctuaries (ONMS 2018); Final Programmatic Environmental Assessment for Fisheries and Ecosystem Research Conducted and Funded by the Southeast Fisheries Science Center (NOAA 2020).

Activity and Instrumentation	Physical Resources	Biological Resources
		unlikely to occur. If an accidental discharge does occur, it is likely to be a rare event and the potential volume of material is likely to be small and localized. The potential impacts to biological resources would be similarly short-term, localized, and likely affect a small number of animals. The overall impact of accidental contamination of biological resources would therefore be considered minor adverse.
Moderate-resolution (2-16 meter) ship-based exploratory mapping using multi-beam echosounders	<p>NOAA 2013 concluded that these activities would have no to minor adverse impacts because there are no interactions associated with operating multi-beam echosounders with physical resources.</p> <p>NOAA 2016 concluded these activities would have no impacts on geological resources and short- and long-term, negligible, adverse impacts on water quality from installation and maintenance activities. Installation activities are not part of the MDBC action so therefore, we conclude that there would be no effects to water quality.</p>	<p>NOAA 2013 concluded that these activities would range from no to moderate adverse impacts for resources evaluated that occur in the MDBC action area. These conclusions were based on the low possibility of a ship strike because of the speed of vessel travel during mapping and presence of fishery observers, the temporary avoidance behavior of marine mammals due to marine sound as opposed to long term injuries to marine mammals, and because mapping sounders do not come in contact with sensitive bottom habitats.</p> <p>NOAA 2016 concluded these activities would have no impacts on terrestrial biological resources and short- and long-term negligible adverse impacts on marine biological resources.</p>
Remotely Operated Vehicle (ROV)-based ground-truthing	NOAA 2013 concluded that these activities would have no to minor adverse impacts because there are no interactions associated with operating ROVs with physical resources. Likewise, NOAA 2020 concluded that ROVs generally do not interact with the benthos and their likelihood for physical disturbance can be considered negligible.	<p>NOAA 2013 concluded that these activities would have no impacts because there are no likely biological resources interactions anticipated with operating ROVs to conduct ground truthing activities.</p> <p>NOAA 2020 concluded that ROVs are not considered to pose any risk to protected species because of their small size, slow deployment speeds, and/or structural details of the gear.</p>
High resolution (<2 meter) mapping over	NOAA 2013 concluded that these activities would have no to minor adverse	NOAA 2013 concluded that these activities would have no impacts because there is a

<b>Activity and Instrumentation</b>	<b>Physical Resources</b>	<b>Biological Resources</b>
potential dive targets using ship- and Autonomous Underwater Vehicle (AUV)-based sensors	<p>impacts. Minor adverse impacts are due to operation of AUVs in the marine environment and associated noise from propellers and potentially instrumentation associated with AUVs.</p> <p>NOAA 2016 concluded these activities would have no impacts on geological resources because they move within the water column and long-term negligible adverse impacts on water quality due to the potential for leakage of their batteries from sealed compartments.</p>	<p>low likelihood of interactions with biological resources.</p> <p>NOAA 2016 concluded these activities would have no impacts on terrestrial biological resources and short- and long-term, negligible, adverse impacts on marine biological resources due to the very low likelihood of an AUV striking marine mammals, which would be significantly minimized due to the speed at which AUVs operate in the water column.</p>
Ground-truthing previously mapped sites	<p>Ground-truthing activities will be accomplished using multi-beam echosounders and AUVs and anticipated environmental consequences would be similar to those evaluated for those activities, which NOAA 2013 concluded would have no to minor adverse impacts. Minor adverse impacts because there are no interactions associated with operating multi-beam echosounders with physical resources.</p>	<p>Ground-truthing activities will be accomplished using multi-beam echosounders and AUVs and anticipated environmental consequences would be similar to those evaluated for those activities, which NOAA 2013 concluded would have no to minor adverse impacts. NOAA 2013 concluded that impacts from these activities would range from no to moderate adverse for resources evaluated that occur in the MDBC action area. These conclusions were based on the low possibility of a ship strike because of the speed of vessel travel during mapping and presence of fishery observers, the temporary avoidance behavior of marine mammals due to marine sound as opposed to long term injuries to marine mammals, and because mapping sounders do not come in contact with sensitive bottom habitats.</p>
Visual/image transects at previously imaged and new sites	<p>Visual/ image transects are similar to groundtruthing activities and would be accomplished using ROVs and/or AUVs, which NOAA 2013 concluded would have no to minor adverse impacts because there are no interactions with physical resources associated with operating ROVs or AUVs. Likewise, NOAA 2020 concluded that ROVs generally do not interact with the benthos and their</p>	<p>Visual/ image transects are similar to groundtruthing activities and would be accomplished using ROVs and/or AUVs, which NOAA 2013 concluded would have no to minor adverse impacts. NOAA 2013 concluded that these activities would range from no to moderate adverse impacts for resources evaluated that occur in the MDBC action area. These conclusions were based on the low possibility of a ship strike</p>

<b>Activity and Instrumentation</b>	<b>Physical Resources</b>	<b>Biological Resources</b>
	likelihood for physical disturbance can be considered negligible.	because of the speed of vessel travel during mapping and presence of fishery observers, the temporary avoidance behavior of marine mammals due to marine sound as opposed to long term injuries to marine mammals, and because mapping sounders do not come in contact with sensitive bottom habitats. NOAA 2020 concluded that ROVs are not considered to pose any risk to protected species because of their small size, slow deployment speeds, and/or structural details of the gear.
Collection of biological, geological, and water column samples (i.e., tissues, organisms, colonies, sediment, substrate, water, eDNA)	NOAA 2013 concluded that bottom sampling activities would have no adverse impacts due to the small footprint of bottom samples and distribution of sample collection activities from year to year. NOAA 2020 concluded that ROVs generally do not interact with the benthos and their likelihood for physical disturbance can be considered negligible.	NOAA 2013 concluded that bottom sampling activities would have minor adverse impacts to corals if bottom samples are taken in the vicinity of coral colonies and no adverse impacts to other biological resources due to the small footprint and distribution of sample collection activities from year to year. NOAA 2020 concluded that ROV operations are not considered to pose any risk to protected species because of their small size, slow deployment speeds, and/or structural details of the gear.
Physical markers deployment on the sea floor	NOAA 2016 evaluated fixed seafloor bottom-mounted stations, which would be anticipated to have similar effects to placing physical markers on the sea floor. The analysis concluded that this action would have short-term, minor adverse impacts to marine geological sediments in the vicinity of installation with the potential for negligible impacts if equipment broke away from an anchor and short-term, minor, adverse impacts to water quality.	NOAA 2016 evaluated fixed seafloor bottom-mounted stations, which would be anticipated to have similar effects to placing physical markers on the sea floor. The analysis concluded that certain BMPs and site specific evaluation were needed to minimize and assess effects to marine resources from this action.
Selecting and imaging specific corals used for long term monitoring	Imaging specific corals for long term monitoring will be accomplished using multi-beam echosounders and AUVs and anticipated environmental consequences would be similar to those evaluated for those activities, which NOAA 2013	Imaging specific corals for long term monitoring will be accomplished using multi-beam echosounders and AUVs and anticipated environmental consequences would be similar to those evaluated for those activities, which NOAA 2013



<b>Activity and Instrumentation</b>	<b>Physical Resources</b>	<b>Biological Resources</b>
	concluded would have no to minor adverse impacts because there are no interactions associated with operating multi-beam echosounders with physical resources.	concluded would have no to minor adverse impacts. NOAA 2013 concluded that these activities would range from no to moderate adverse impacts for resources evaluated that occur in the MDBC action area. These conclusions were based on the low possibility of a ship strike because of the speed of vessel travel during mapping and presence of fishery observers, the temporary avoidance behavior of marine mammals due to marine sound as opposed to long term injuries to marine mammals, and because mapping sounders do not come in contact with sensitive bottom habitats.
Deployment of instrumented landers	Deploying instrumented landers would have similar environmental consequences to those evaluated for fixed seafloor bottom-mounted stations. NOAA 2016 evaluated fixed seafloor bottom-mounted stations. The analysis concluded that this action would have short-term, minor adverse impacts to marine geological sediments in the vicinity of installation with the potential for negligible impacts if equipment broke away from an anchor and short-term, minor, adverse impacts to water quality.	Deploying instrumented landers would have similar environmental consequences to those evaluated for fixed seafloor bottom-mounted stations. NOAA 2016 evaluated fixed seafloor bottom-mounted stations. The analysis concluded that certain BMPs and site specific evaluation were needed to minimize and assess effects to marine resources from this action.
Targeted collection of coral specimens	As evaluated in OO RP2/EA targeted collection could result in short-term, localized, minor adverse impacts to the benthic habitats and communities from which biological samples would be collected. Coral collections are targeted activities that occur while the ROV hovers over the substrate. As evaluated in NOAA 2013 this action has no potential to impact physical resources. The approach is for the ROV, controlled by trained technicians aboard the vessel, to hover 1-2 meters over the substrate to avoid impacts to sensitive coral habitats. This activity would follow any terms and conditions of applicable permits.	As evaluated in OO RP2/EA targeted could result in short-term, localized, minor adverse impacts to the benthic habitats and communities from which biological samples would be collected. Coral collections are targeted activities that occur while the ROV hovers over the substrate. As evaluated in NOAA 2013 this action has no potential to impact biological resources. Deep coral collections are targeted activities that occur in areas generally deeper than the ESA-listed coral species. The approach is for the ROV, controlled by trained technicians aboard the vessel, to hover 1-2 meters over the substrate to avoid impacts to sensitive coral

Activity and Instrumentation	Physical Resources	Biological Resources
		habitats. This activity would follow any terms and conditions of applicable permits.
Small-scale deployments of experimental settlement substrates on landers to test coral recruitment potential and performance	NOAA 2016 evaluated fixed seafloor bottom-mounted stations, which would be anticipated to have similar effects to working with settlement substrates on the sea floor. The analysis concluded that this action would have short-term, minor adverse impacts to marine geological sediments in the vicinity of installation with the potential for negligible impacts if equipment broke away from an anchor and short-term, minor, adverse impacts to water quality.	NOAA 2016 evaluated fixed seafloor bottom-mounted stations, which would be anticipated to have similar effects to working with settlement substrates on the sea floor. The analysis concluded that this action would have no effect on terrestrial resources and that certain BMPs and site specific evaluation were needed to minimize and assess effects to marine resources.
Sediment sample collection	NOAA 2013 concluded that bottom sampling activities would have no adverse impacts due to the small footprint of bottom samples and distribution of sample collection activities from year to year.	NOAA 2013 concluded that bottom sampling activities would have minor adverse impacts to corals if bottom samples are taken in the vicinity of coral colonies and no adverse impacts to other biological resources due to the small footprint and distribution of sample collection activities from year to year.

### Best Management Practices

Federal regulatory agencies provide guidance on best management practices (BMPs) as part of the environmental compliance process. BMPs include design criteria, lessons learned, expert advice, tips from the field, and more. DWH Trustees use appropriate BMPs to avoid or minimize impacts to natural resources, including protected and listed species and their habitats. These include mitigation measures for protected species identified in Sections 2.2.2 and 2.2.3 of NOAA 2020, incorporated here by reference. BMPs identified in required permits, consultations, or environmental reviews, including those described in Appendix 6.A of the PDARP/PEIS that are relevant to a project, will be applied. Through technical assistance with regulatory agencies, additional BMPs may be identified for implementation and would be catalogued in compliance documents. In addition to the BMPs identified in the PDARP/PEIS, the following project-specific BMPs will be followed during MDBC project activities and the status other required consultations and associated BMPs is provided below in Section 8.

Project field operations will be conducted under the direction of NOAA and DOI project team members and contracted partners. Project team members are staff of NOAA’s Office of Habitat Conservation (OHC),

National Centers for Coastal Ocean Science (NCCOS), Southeast Fisheries Science Center (SEFSC), and Office of National Marine Sanctuaries (ONMS), as well as the Department of Interior's US Geological Survey (USGS), Bureau of Ocean Energy Management (BOEM), and Bureau of Safety and Environmental Enforcement (BSEE). Project partners include NOAA's Office of Coast Survey (OCS), Office of Ocean Exploration and Research (OER), and Office of Marine and Aviation Operations (OMAO).

MDBC project team members will carry all necessary permits required based on the nature and location of the project work to be performed onboard with them during operations. Such permits may include a scientific research permit from the NMFS Southeast Regional Office, a permit issued by NOAA's Office of National Marine Sanctuaries for work affecting National Marine Sanctuary resources, and/or a permit issued by the US Army Corps of Engineers for activities affecting navigable waters of the United States. BMPs identified in required permits, consultations, or environmental reviews will be followed to reduce or eliminate potentially adverse environmental impacts. For example, BMPs identified for other similar work and from consultations conducted for that work include:

- MDBC field vessels will operate at slow speeds (4-8 knots) by necessity to achieve high-resolution data during survey operations, which minimizes the risk for a ship strike.
- To further mitigate the potential for a ship strike a lookout observer will be present on the vessel to alert the vessel operator if a marine mammal or sea turtle appears in the path of the vessel during the survey. A designated lookout observer will be required to stand watch on the ship's bridge during transit and survey operations, scanning the water for humans, animals, vessels, and other objects.
- Personnel on board NOAA and contractor vessels are required to monitor and report locations of marine mammal sightings as part of their regular operational protocol. Currently, the lookout records any sightings of marine mammals on either a paper marine mammal log or by an automated marine mammal report logging system such as AMVER/SEAS, which many NOAA ships also use for weather reporting. The observation report records the species, number of animals, behavior, time, and location of the sighting *Mitigation Measures*:
- The sampling conducted during each cruise will be limited to minimize impacts. For example, operators using ROVs for sample collection control the altitude of the ROV above the seabed using thrusters to avoid contact with benthos and select soft-bottom sites for landing to perform collection to avoid impacts to sensitive benthic resources. The altitude above the sea floor of AUVs collecting remotely sensed data is controlled by navigational algorithms that respond to sensors for obstacle detection and collision avoidance, and force the vehicle to surface in the event of hardware or software failure.

## 8. Compliance with other environmental laws and regulations

### Compliance Complete at Issuance of Final OO RP2/EA

OORP2/EA documented the evaluation of potential environmental consequences and compliance requirements of the MDBC portfolio. The following regulatory compliance reviews were determined not applicable to the projects in the portfolio:

- Bald and Golden Eagle Protection Act (USFWS)
- Endangered Species Act Section 7 (USFWS)
- Marine Mammal Protection Act (MMPA) (USFWS)
- Migratory Bird Treaty Act (MBTA) (USFWS)
- Rivers and Harbors Act/Clean Water Act (USACE permit)

OORP2/EA documented determinations that the following projects do not require a consistency determination or a negative determination was made under the Coastal Zone Management Act (CZMA):

- Mapping, Ground-truthing, and Predictive Habitat Modeling (see update below)
- Habitat Assessment and Evaluation
- Coral Propagation Technique Development

For the Active Management and Protection project, CZMA consistency determinations were affirmed by the states bordering the Gulf of Mexico at the time OO RP2/EA was finalized.

For compliance reviews that were not completed at the time OO RP2/EA was issued, the status of reviews for the following statutes are discussed below:

- National Historic Preservation Act (NHPA)
- Endangered Species Act - Section 7 (NMFS)
- Magnuson Stevens Act (EFH) (NMFS)
- Marine Mammal Protection Act (MMPA) (NMFS)

### Compliance Reviews for ESA, EFH, MMPA and NHPA/106

Technical assistance reviews for compliance are ongoing at this time with NOAA and DOI. The status will be updated as technical assistance is completed and further compliance is identified as needed.

At the time the OO RP2/EA was finalized, environmental compliance under some statutes was deemed “not applicable” or “complete”, while others were determined to be “in progress” or “phased”. For “phased” compliance, the Open Ocean TIG determined that future activities would be evaluated further once methodologies and locations were developed. Table 4 below summarizes the statutes for MDBC projects that were noted as “in progress” or “phased” at the completion of OO RP2/EA.

Now that the locations and methodologies are known for the MDBC field operations, compliance reviews for the statutes in Table 4 can be completed. The outcomes of review by statute are described below.

Table 4. Status of environmental compliance at the time of the Final OO RP2/EA. Since then, the suite of MDBC projects were analyzed under NHPA/106, but only one of those reviews was completed. The remainder of outstanding compliance under these statutes is described below.

Project Name	Statute			
	NMFS – ESA	NMFS - EFH	NMFS - MMPA	NHPA/106
Mapping, Ground-truthing, and Predictive Habitat Modeling	Phased	Phased	Phased	Complete (since OO RP2/EA was finalized)
Habitat Assessment and Evaluation	Phased	Phased	Phased	In Progress
Coral Propagation Technique Development	Phased	Phased	Phased	In Progress
Active Management and Protection	Phased	Phased	Phased	In Progress

### ESA Under NMFS Jurisdiction

All field operations, as described in Section 5 above, were evaluated for potential for effects to ESA-listed species and habitat under NMFS’ jurisdiction. None of the corals to be collected are protected under the ESA. Based on the NOAA RC’s review and through technical assistance with NMFS Southeast Region, the NOAA Restoration Center made the following determinations:

For mapping and survey work carried out by NOAA’s Office of Coastal Survey (OCS), operations will follow the conditions set forth in the ESA Section 7 consultation with Office of Protected Resources issued to NOAA OCS. At the time of the field operations a new biological opinion may be in place, but if it is not NOAA OCS will rely on their 2013 biological opinion and the conditions therein. Any project activities taking place in the Rice’s whale core distribution area identified by NMFS/SERO/PRD will follow all BMPs determined necessary in consultation with NMFS/SERO/PRD.

For work carried out by other NOAA offices, an ESA Section 7 consultation with NMFS will be completed by the NOAA RC and any BMPs or conditions set forth in the consultation will be followed during field operations. Initial technical assistance indicates that the project activities described in Section 5 above are not likely to adversely affect species and habitats listed under the ESA.

### EFH Under NMFS Jurisdiction

The project field operations, as described in Section 5 above, were evaluated for potential for effects to essential fish habitat (EFH) under NMFS’ jurisdiction. Work that will take place in any National Marine Sanctuary, Habitat Area of Particular Concern (HAPC), or other designated marine protected area will follow all permitting and BMP requirements of the relevant management authority (NOAA/ONMS/FGBNMS and/or NOAA/NMFS/SERO). Based on the NOAA RC’s review and through technical assistance with NMFS, the NOAA RC determined that the project activities described in Section 5 above may have minor and temporary effects from sediment sampling and coral collection, but will not have adverse effects on EFH. Scientific collection of corals is not disallowed in HAPCs, and successful development of coral propagation techniques would lead to additional restoration and management opportunities in the future. Therefore, the cumulative project activities will provide additional information about the mesophotic and deep benthic communities in the project area, and propagation and eventual planting of corals will provide a long term restoration benefit to designated EFH.

### MMPA Under NMFS Jurisdiction

The project field operations, as described in Section 5 above, were evaluated for potential for effects to marine mammal protected under the Marine Mammal Protection Act and under NMFS' jurisdiction. Any project activities taking place in the Rice's whale core distribution area identified by NMFS/SERO/PRD will follow all BMPs determined necessary in consultation with NMFS/SERO/PRD. Initial technical assistance indicates that the project activities described in Section 5 will not result in take of marine mammals protected under the MMPA.

### National Historic Preservation Act

The project field operations, described in Section 5 above, were evaluated for the potential to effect known and unknown historic or cultural resources protected under the NHPA. The operations will be performed in a deep water, offshore area where few known cultural or historic resources are present on the sea floor. There are a number of historically significant shipwrecks known to exist throughout the area planned for MDDB field operations, and project activities will be avoided in proximity to these shipwrecks. Project activities (e.g., sediment core collection, lander deployment, ROV landing) will only minimally disturb the bottom and are unlikely to potentially impact any unknown, buried cultural or historic resources. Technical assistance for NHPA/106 on the project activities described in Section 5 is ongoing.

### Coastal Zone Management Act

At the conclusion of OO RP2/EA as noted above, it was determined the MGM project either did not require a consistency determination or a negative determination was made under the Coastal Zone Management Act (CZMA). However, in preparing for this phase of implementation, NOAA determined that a portion of the planned mapping operations to be conducted by NOAA's Office of Coastal Survey (OCS) may take place in state waters. Therefore, NOAA OCS will request consistency determinations from each Gulf state, in collaboration with the Open Ocean TIG, for this work. The balance of activities are not anticipated to occur within state waters. As such, additional consistency determinations for those activities are not necessary. The CZMA compliance records will be provided to the Open Ocean TIG and submitted to the DWH administrative record.

## Additional Permits

### Scientific Research Permits

The project field operations, as described in Section 5 above, may require a scientific research permit under the Magnuson-Stevens Fishery Conservation and Management Act for research activities such as coral collections. This permit will be obtained from NMFS Southeast Region Office prior to the commencement of field operations.

### National Marine Sanctuary Permits

The project field operations, as described in Section 5 above, will require a permit from the Flower Garden Banks National Marine Sanctuary (FGBNMS) for field operations that take place within the boundaries of the FGNMS. This permit will be obtained prior to the commencement of field operations.

### U.S. Army Corps of Engineers Permits

Should project field operations, as described in Section 5 above, require a permit from the U.S. Army Corps of Engineers (USACE), permits will be obtained from the appropriate USACE District Office prior to the commencement of field operations.

### Compliance Review for Future Activities

Future field operations to support the suite of mesophotic and deep benthic projects in OO RP2/EA will take place beyond 2022. If these future operations are using the same methods and are within the same locations as described in Section IV it is likely that those operations will fall within the NEPA, ESA, EFH, NHPA/106, and MMPA reviews completed within this document. Those future operations will be reviewed against the evaluation here and will be documented with a short memo to affirm consistency.

For future operations that do not fall within the methods and locations described in this document, those operations will be evaluated when they are proposed to determine if they fit within existing analyses, or if additional environmental compliance reviews under one or more statutes are necessary.

Completed consultations and final compliance memos will be provided to the Open Ocean TIG and submitted to the Administrative Record once available.

## 10. Conclusions

In OO RP2/EA, the MDBC projects are described as “long-range activities” structured to include a full lifecycle of activities and evaluated from a programmatic perspective. Therefore the Open Ocean TIG committed to review site-specific actions to be conducted by the MDBC projects to affirm their consistency with the environmental compliance provided in the OO RP2/EA. Through the review described in this document, the Open Ocean Trustees found the following for the planned field operations:

- The planned field operations are consistent with the OPA findings per the OO RP2/EA and fully meet OPA NRDA evaluation criteria. There is no new or additional information to consider that alters the OPA NRDA evaluation of each project alternative in the OO RP2/EA.
- The potential environmental effects of the planned field operations, including anticipated methods and geographic locations, are consistent with the environmental review in the OO RP2/EA and with other relevant NOAA NEPA documents that are incorporated by reference for specific field operations not described in detail in OO RP2/EA, there are no substantial changes that are relevant to environmental concerns, and there are no significant new circumstances or information relevant to environmental concerns not addressed in the OO RP2/EA impact analysis.
- Technical assistance reviews for compliance are ongoing at this time with NOAA and DOI. The Implementing Trustees (NOAA and DOI) will complete environmental compliance prior to initiating regulated field operations.

No further analyses under OPA or NEPA are necessary and modifications to the final restoration plan are not required. In addition, the original public comment period conducted for the OO RP2/EA solicited public input on the project and comments were supportive with no controversial issues identified. The Open

Ocean TIG will inform the public of the planned field operations and the Trustees' review through an Open Ocean TIG web story, at TIG annual meetings, and through an update to the project DIVER record.

## 11. Citations

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

Open Ocean Trustee Implementation Group. 2019. *Deepwater Horizon Oil Spill Natural Resource Damage Assessment, Open Ocean Trustee Implementation Group, Final Restoration Plan 2/ Environmental Assessment: Fish, Sea Turtles, Marine Mammals, and Mesophotic and Deep Benthic Communities*. (OO RP2/EA)

Final Programmatic Environmental Assessment for the Office of Coast Survey Hydrographic Survey Project (NOAA 2013);

Integrated Ocean Observing System Program Programmatic Environmental Assessment (NOAA 2016);

Final Programmatic Environmental Assessment for Fisheries and Ecosystem Research Conducted and Funded by the Southeast Fisheries Science Center (NOAA 2020).