

# Natural Resource Damage Assessment: Mesophotic and Deep Benthic Communities Restoration – Habitat Assessment and Evaluation

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## Overview

Mesophotic and deep benthic communities (MDBC) are vast and complex ecosystems on the ocean floor that are a foundation of Gulf of Mexico food webs. More than 770 square miles of deep-sea habitat and 4 square miles of mesophotic habitat were injured by the *Deepwater Horizon* (DWH) oil spill.

Open Ocean Restoration Plan 2<sup>1</sup> has developed four projects that will focus on protecting, managing and restoring MDBC. The projects will be implemented on hard and soft substrates in mesophotic (50-300m) and deep (300-2500m) habitats within the 50m isobath and north of 27 degree latitude of the northern Gulf of Mexico (Figure 1).

The overall goals for MDBC restoration include:

- 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

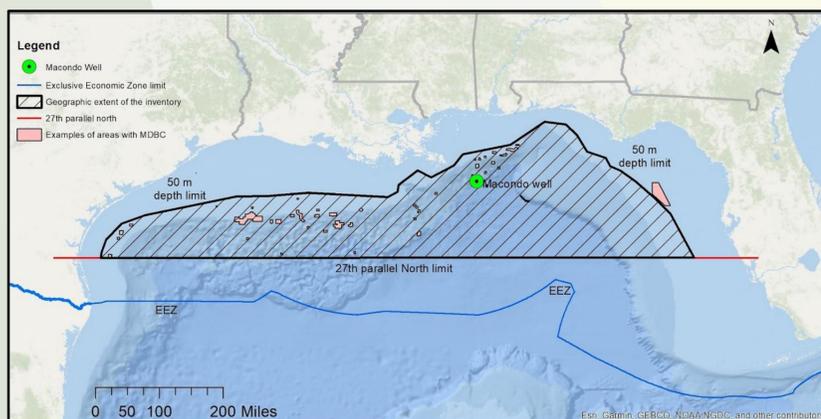


Figure 1. Area of interest for NRDA MDBC Activities

## MDBC Project Objectives

Proposed project activities will be developed in a two year planning phase (started in 2020), followed by a five year field and lab based phase and a final year for evaluation and reporting. A key aspect of the planning phase is stakeholder awareness

Our knowledge of these communities are poorly known and project outcomes will increase understanding by addressing:

### Mapping, Ground-Truthing and Predictive Habitat Modeling

- Mapping (Moderate and high resolution) to inform predictive models for greater efficiency of future restoration and mapping
- Quantifying the abundance and distribution of MDBC
- Informing protection and management activities.

### Habitat Assessment and Evaluation

- Designing surveys to fill gaps of taxa life history, diversity and population structure
- Determining age, growth and reproduction of corals
- Assessing coral genetic diversity and connectivity

### Coral Propagation Technique Development

- Testing propagation techniques to enhance recruitment
- Developing coral cultivation techniques
- Exploring potential surfaces for transplantation

### Active Management and Protection

- Developing education and outreach plans for stakeholders and the public
- Addressing threats to MDBC, such as marine debris and invasive species
- Assessing risks associated with abandoned and leaking oil and gas infrastructure

## Habitat Assessment and Evaluation

The Habitat Assessment and Evaluation project team is currently summarizing relevant literature and conducting data discovery to identify informational and spatial gaps. The team is developing summaries that will be used to focus field work in 2022 and beyond. These summaries will identify:

- Best practices for sampling approaches and sufficiency to assess fish and invertebrate (infauna, corals, crustaceans, sponges) communities, indicator species and community structure.
- Known species habitat interactions and preferences for fish and invertebrate taxa
- Environmental and oceanographic patterns that influence communities
- Coral and fish metapopulation dynamics and genetic diversity
- Information on coral larval dispersal
- Anthropogenic and natural threats impacting MDBC
- Species recovery trajectories and restoration targets



## 2022 Field Work - Preliminary

Fieldwork associated with this project will be performed at priority locations identified across the northern Gulf of Mexico, with initial high-priority targets to include documented sites of injury with ongoing monitoring efforts and sites currently designated or under consideration for protected area designations (e.g., Habitat Areas of Particular Concern or National Marine Sanctuaries). The project will operate in mesophotic and deep zones, in coral and sediment communities, in documented sites of injury in the Pinnacles Trend region and Mississippi Canyon region, as well as in reference sites and in active restoration or protection sites in MDBC across the northern Gulf of Mexico.



NOAA Ship Nancy Foster (33 Days at Sea)

- Mesophotic (50-300m) multibeam mapping
- Water column echo-sounding for fish and deep scattering layer
- CTD water column casts
- Sediment cores
- ROV operations – seafloor imagery; sample collection; lander deployment
- AUV operations – high resolution bathymetry and backscatter, photo imaging



NOAA Ship Pisces (34 Days at Sea)

- Mesophotic (50-300m) multibeam mapping
- Water column echosounding for fish and deepscattering layer
- CTD water column casts
- Sediment cores
- Trawl samples
- ROV operations – seafloor imagery; sample collection; lander deployment
- AUV operations – high resolution bathymetry and backscatter, photo imaging



NOAA Ship Hassler (Days at Sea TBD)

- Mesophotic (50-300m) multibeam mapping
- Underway CTD profiling

## References

<sup>1</sup>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

<https://www.gulfspillrestoration.noaa.gov/sites/default/files/DWH-ARZ003947.pdf>

## Acknowledgements and Contact Information

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