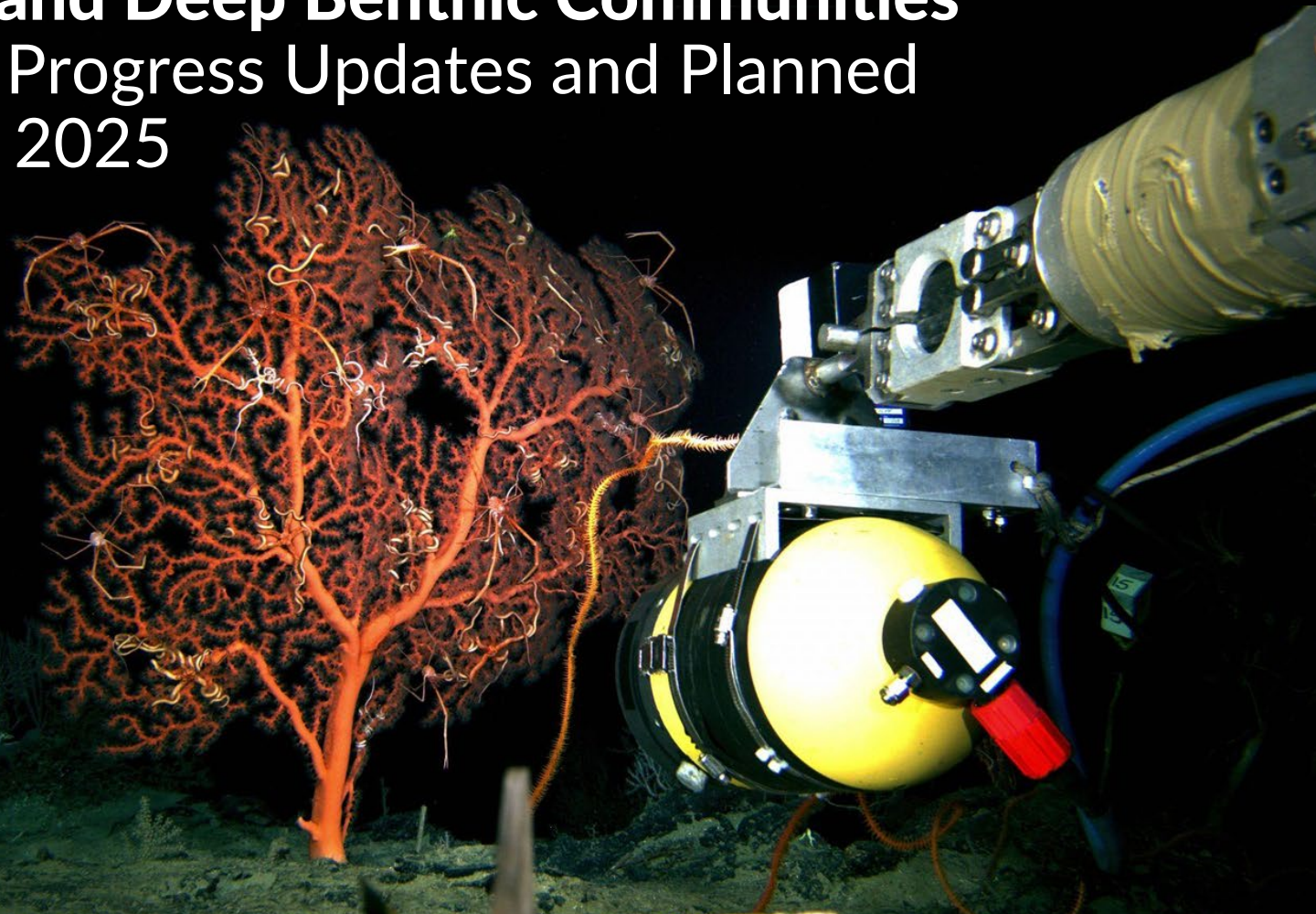


Mesophotic and Deep Benthic Communities Restoration: Progress Updates and Planned Activities for 2025

May 6th, 2025

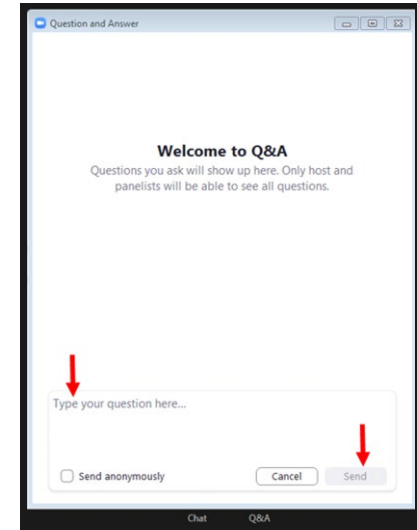
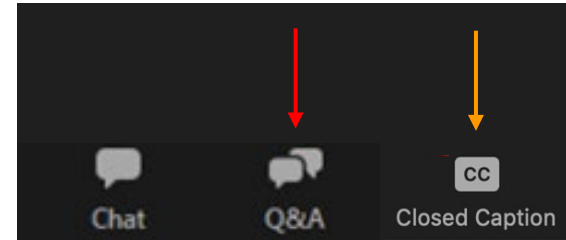
DWH 
**Mesophotic &
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Benthic
Communities
Restoration**

Photo: NOAA, Oceaneering International, Inc.



Webinar Participation

- Please use the “Q&A” box to type questions for the Q&A session at the end 
- Auto-generated closed captions are available 
- Webinar recording and slides will be posted on www.gulfspillrestoration.noaa.gov
- A link to the recording will be sent to all registrants



Thank You Webinar Partners!

University of Rhode Island InnerSpace Center

- **Mission:** The Inner Space Center connects diverse audiences to a global network of exploration in real time. We enable scientists and students to participate remotely in expeditions while engaging with the general public to enhance the broader impacts of their research.
- Partnered with NOAA & MDBC Restoration portfolio via the Ocean Exploration Cooperative Institute
 - Collaborating to help connect the public with the restoration work and the team members that make it happen through livestreams, public presentations, videos, and more



OCEAN EXPLORATION COOPERATIVE INSTITUTE



EXPLORING THE NATION'S BLUE FRONTIER

MDBC Webinar Overview

- *Deepwater Horizon* Oil Spill Background
- Overview of 2024 Field Activities
- Planned 2025 Field Activities
- Individual Project Updates
 - Mapping, Ground-Truthing, & Predictive Habitat Modeling
 - Habitat Assessment and Evaluation
 - Coral Propagation Technique Development
 - Active Management & Protection
- Accessing MDBC Portfolio Products & Resources
- Q&A Session

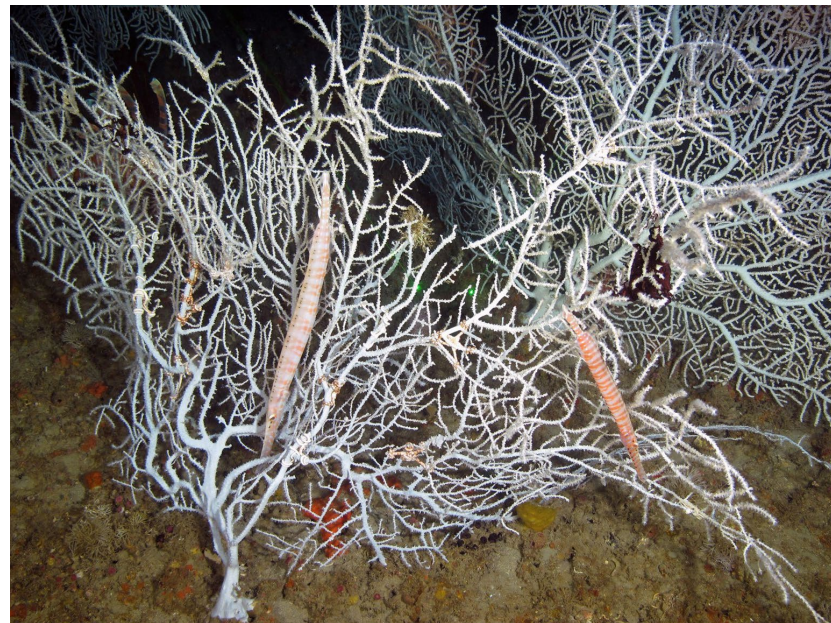


Photo: NOAA, UNCW Undersea Vehicles Program

Common Acronyms

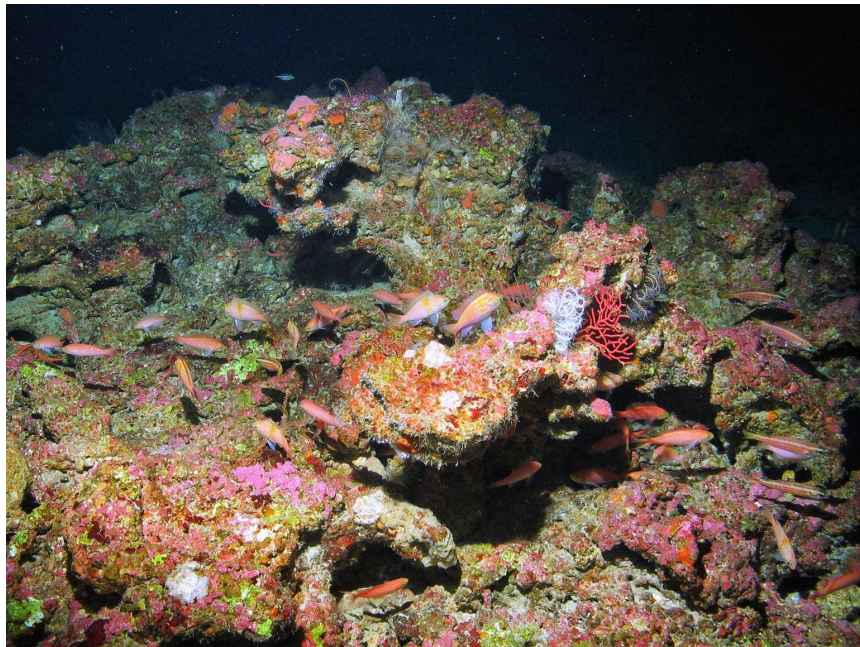
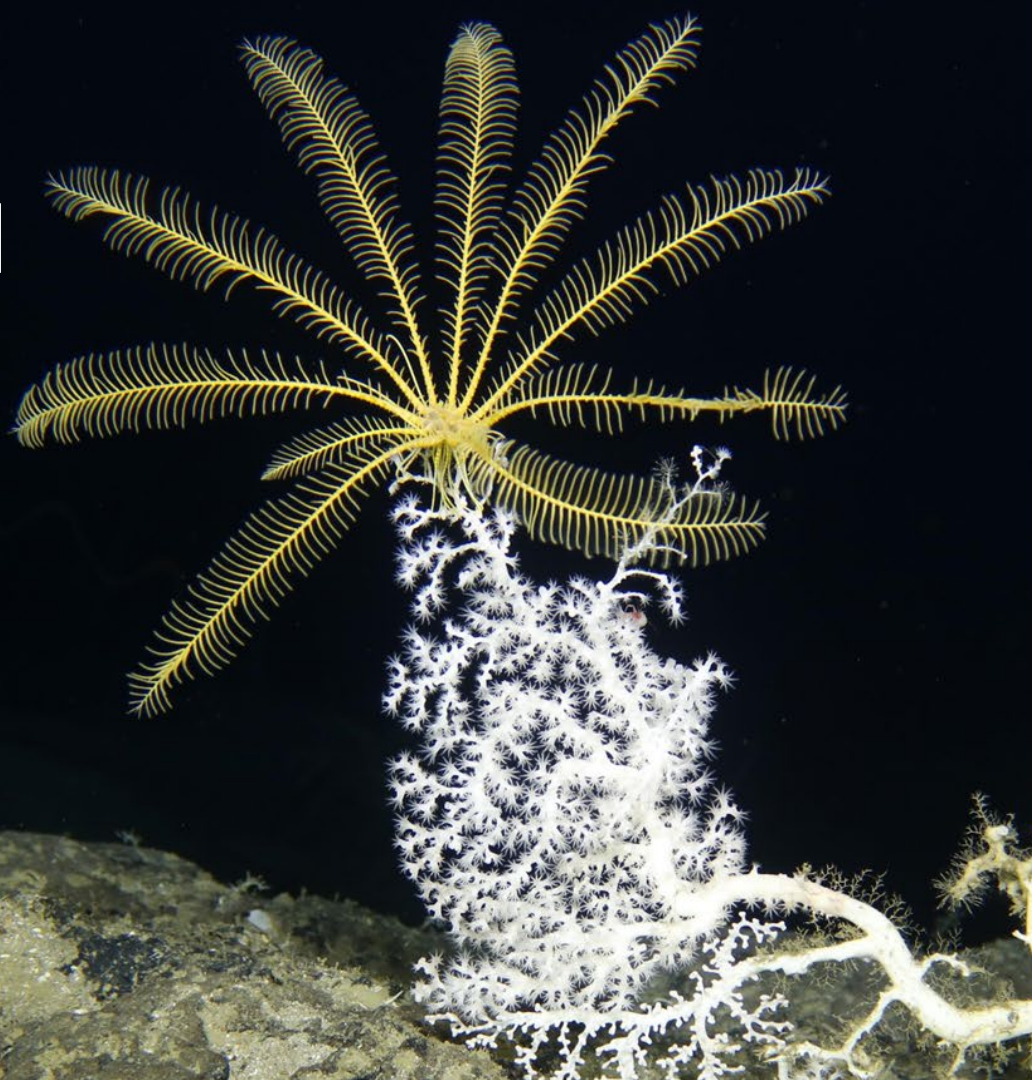


Photo: NOAA, Marine Applied Research & Exploration

- **MDBC** = Mesophotic & Deep Benthic Communities
- **MGM** = Mapping, Ground-Truthing, & Predictive Habitat Modeling
- **HAE** = Habitat Assessment and Evaluation
- **CPT** = Coral Propagation Technique Development
- **AMP** = Active Management & Protection

Deepwater Horizon Oil Spill Background



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Photo: NOAA, Oceaneering International, Inc.

Deepwater Horizon Incident



Photo: Georgia Department of Natural Resources

- Largest marine oil spill in U.S. history
- >1.5 million gallons of oil released into the ocean every day for 87 days
- Extensive impacts to organisms such as fish, sea turtles, dolphins, whales, birds, and seafloor communities
- Washed up onto more 1,300 miles of shoreline from Texas to Florida

Natural Resource Damage Assessment

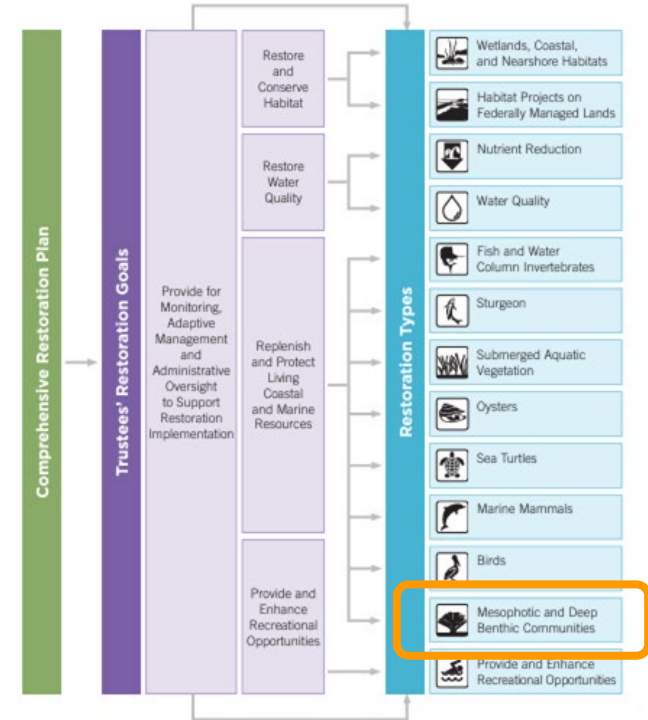


Photo: Lophelia II/Woods Hole Oceanographic Institution

- Federal and State agencies, as the Deepwater Horizon Natural Resource Damage Assessment Trustee Council, assessed natural resource injuries
- Injuries occurred at all trophic levels to virtually all species and habitats impacted by the oil
- Deep-sea habitats were impacted with oil deposited onto at least 400mi² of seafloor
- Quantified injury to over 770mi² of benthic habitat, substantial losses to corals and other deep-sea species

Settlement & Programmatic Restoration Plan

- 2016 settlement: up to \$8.8 billion to make the public whole for injuries to natural resources
- Programmatic Restoration Plan guides all subsequent restoration work
- 13 Restoration Types identified in the plan
→ Mesophotic and Deep Benthic Communities
- \$273 Million designated for MDBC restoration



Restoring Mesophotic & Deep Benthic Communities

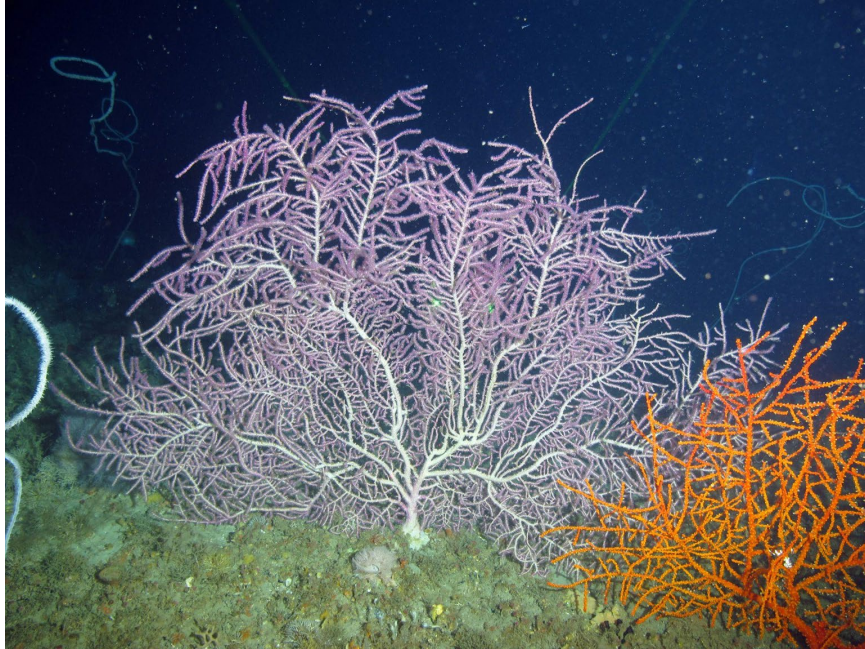


Photo: NOAA, UNCW Undersea Vehicles Program

Long-term Restoration Goals:

- Restore mesophotic and deep benthic invertebrate and fish abundance and biomass for injured species.
- 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.

2024 Field Activities Overview

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2024 Field Activities Overview



10 ships used, including the R/V *Point Sur* and NOAA ships *Nancy Foster* and *Pisces*

35

public livestreams at sea or in labs



14 missions



~200

days spent at sea

500

at-sea transects completed with remotely operated vehicles (ROVs)

6,000+

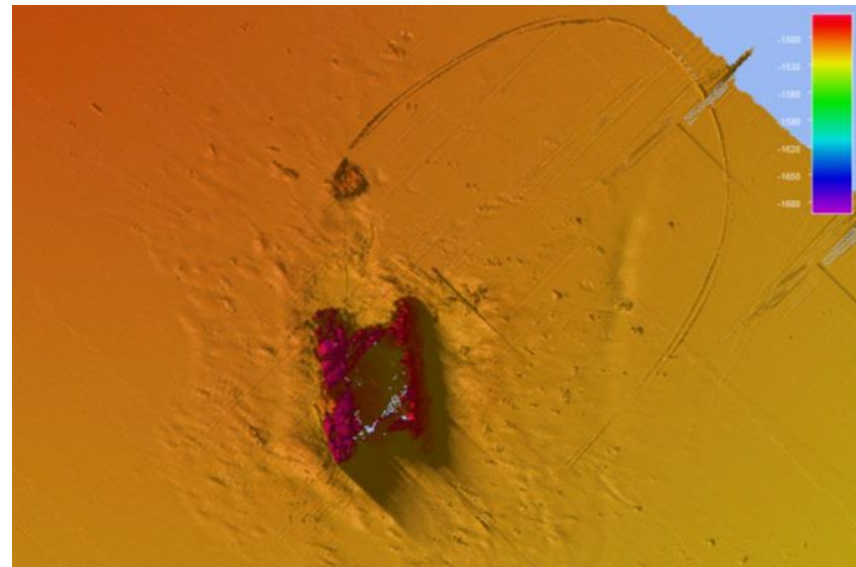
square kilometers of seafloor mapped with ship-based tech and autonomous underwater vehicles (AUVs)



2024 Field Activities Overview

Mapping, Ground-Truthing, and Predictive Habitat Modeling

- Mapped seafloor around *Deepwater Horizon* wreck and nearby habitat at 1m resolution
- Collected more than 2,300 square miles of seafloor bathymetry data
- Trialed new sensors to improve detail of seafloor data collected by AUVs
- Collected imagery and sediment sample data to validate and refine predictive habitat models



Credit: NOAA, University of Southern Mississippi

2024 Field Activities Overview

Habitat Assessment and Evaluation

- Video transects, still images, and coral colony images support characterization of habitat and assessment of coral growth and recovery
- Collected biological, water, and sediment samples
- Deployed ARMS and landers on the seafloor to better understand organisms that inhabit MDWC and collect long-term environmental data

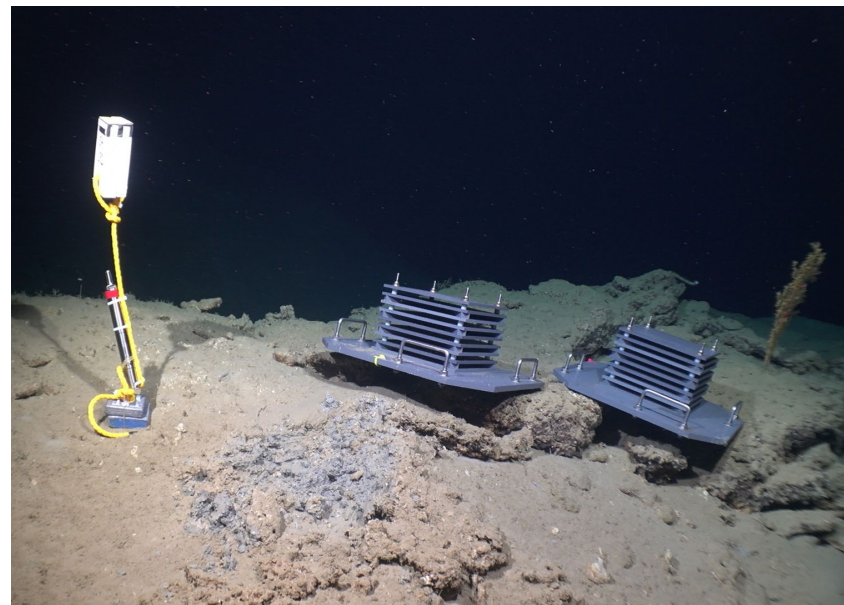


Photo: NOAA, Pelagic Research Services

2024 Field Activities Overview

Coral Propagation Technique Development

- Live coral samples collected by ROV, technical, and saturation divers and transported to labs/aquariums for further study to support restoration
- Continued coral propagation tests, including first *in situ* fragmentation
- Technical divers monitored health and growth of coral fragments, settlement on artificial substrates



Photo: Sophia Melville/University of Rhode Island InnerSpace Center

2024 Field Activities Overview

Active Management and Protection

- Collaborative NOAA - Navy saturation diving mission to remove or mitigate threats to MDBC
 - Mooring installations
 - Marine debris removal
 - Invasive lionfish removal
- Telepresence capabilities installed on the 3 ships resulting in 35 livestream programs for the public



Photo: NOAA, C-Innovation, LLC.

2025 Planned Field Activities

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2025 Planned Field Activities

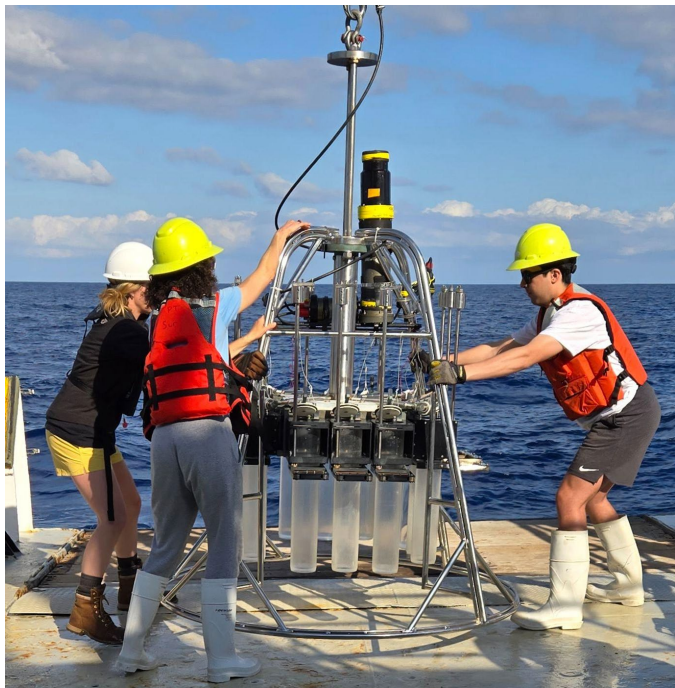


Photo: Kaitlin Kovacs/USGS

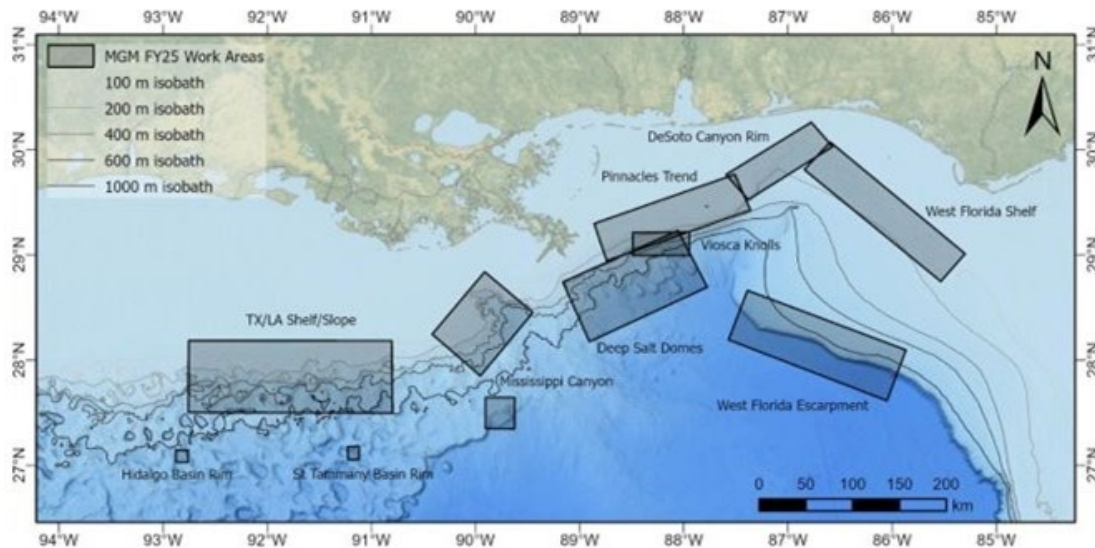
Partners

- United States Geological Survey
- Marine Applied Research & Exploration
- National Marine Sanctuary Foundation
- Ocean Exploration Cooperative Institute
- Woods Hole Oceanographic Institute
- U.S. Navy, Naval Surface Warfare Center
- Pelagic Research Services
- Ryan Marine Services, Inc.
- Civilian Tech Diver Corps (coordinated by Moody Gardens Aquarium)
- NOAA Office of Marine and Aviation Operations
- Florida Institute of Oceanography
- and many more...

2025 Field Activities Overview

Mapping, Ground-Truthing, and Predictive Habitat Modeling:

- Priority areas selected based on data needs of HAE and CPT teams
- Deployed *Eagle Ray* AUV
- Deploy new REMUS 620 AUVs
- Ship-based multibeam mapping
- ROV transects to ground-truth predictive habitat models

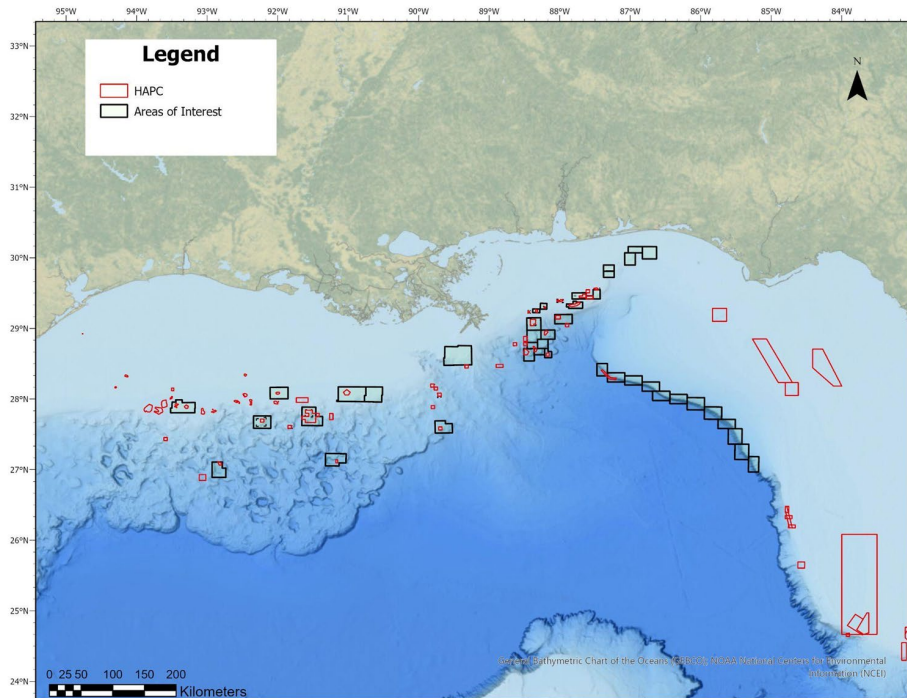


Credit: NOAA

2025 Field Activities Overview

Habitat Assessment and Evaluation:

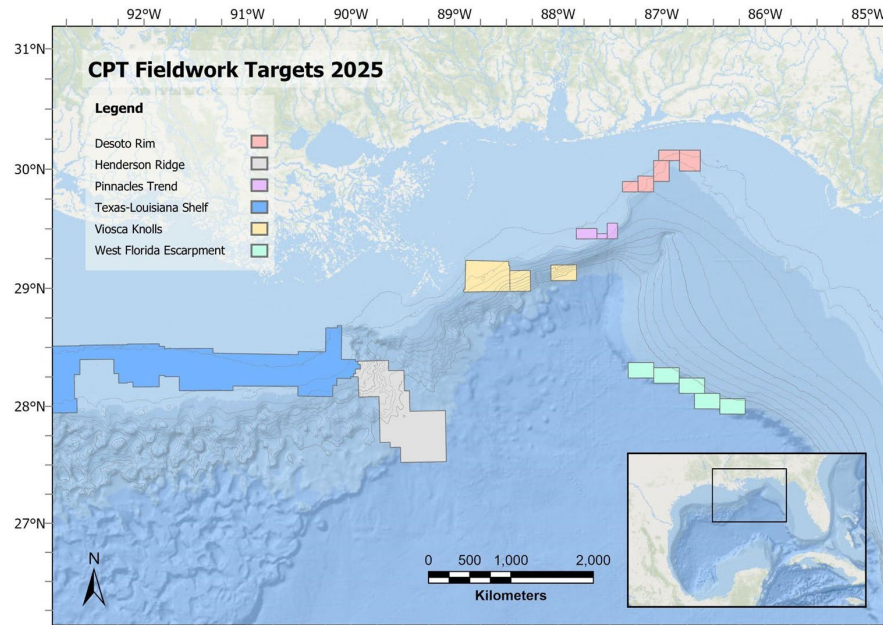
- ROV transects
- Conductivity, temperature, depth (CTD) casts, & collect water samples
- Deploy and recover landers and ARMS
- Collect biological samples
- Collect sediment samples
- Survey DWH wreck and collect images of marked coral colonies



2025 Field Activities Overview

Coral Propagation Technique Development:

- Monitor health of propagated corals
- Monitor settlement to artificial substrates
- Collect new coral samples for labs and for further analyses
- Conduct additional propagation tests via
 - fragmentation
 - deployment of artificial substrates



Credit: NOAA

2025 Field Activities Overview

Active Management and Protection:

- Support Flower Garden Banks National Marine Sanctuary marine debris removal mission
- Support remote monitoring and enforcement technology demonstration mission
- Monitor threat reduction objectives from 2024
- Coordination on education, outreach, and livestream programs

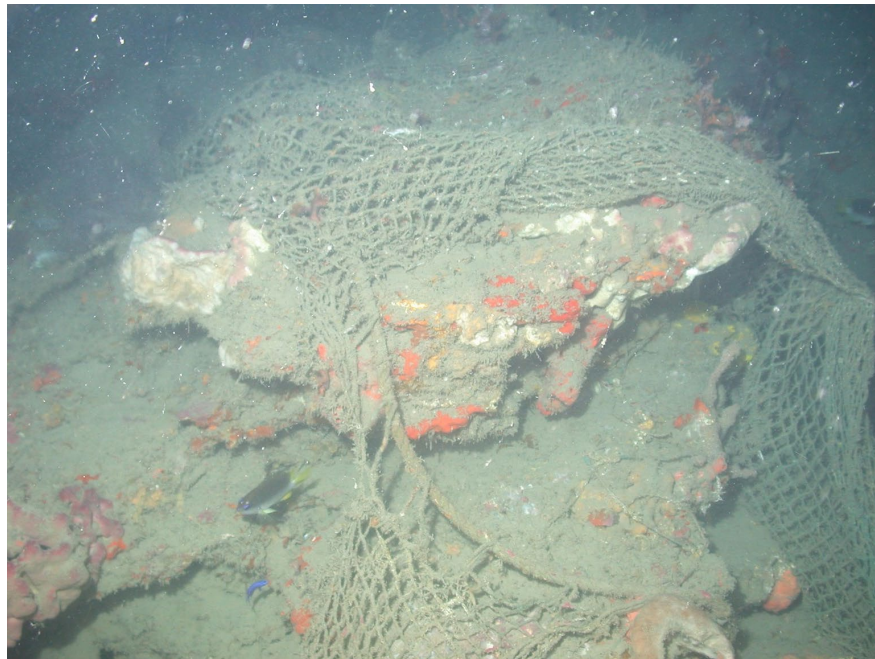
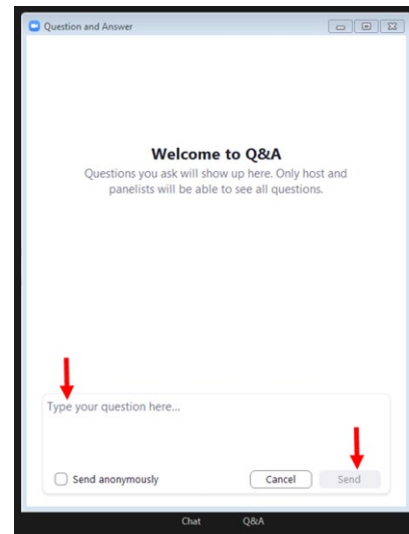
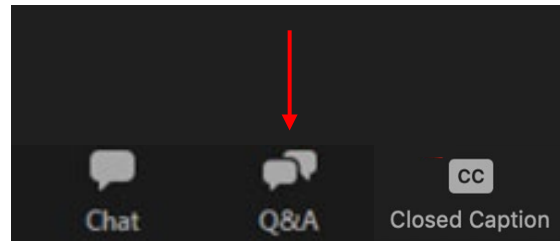


Photo: NOAA

Webinar Participation

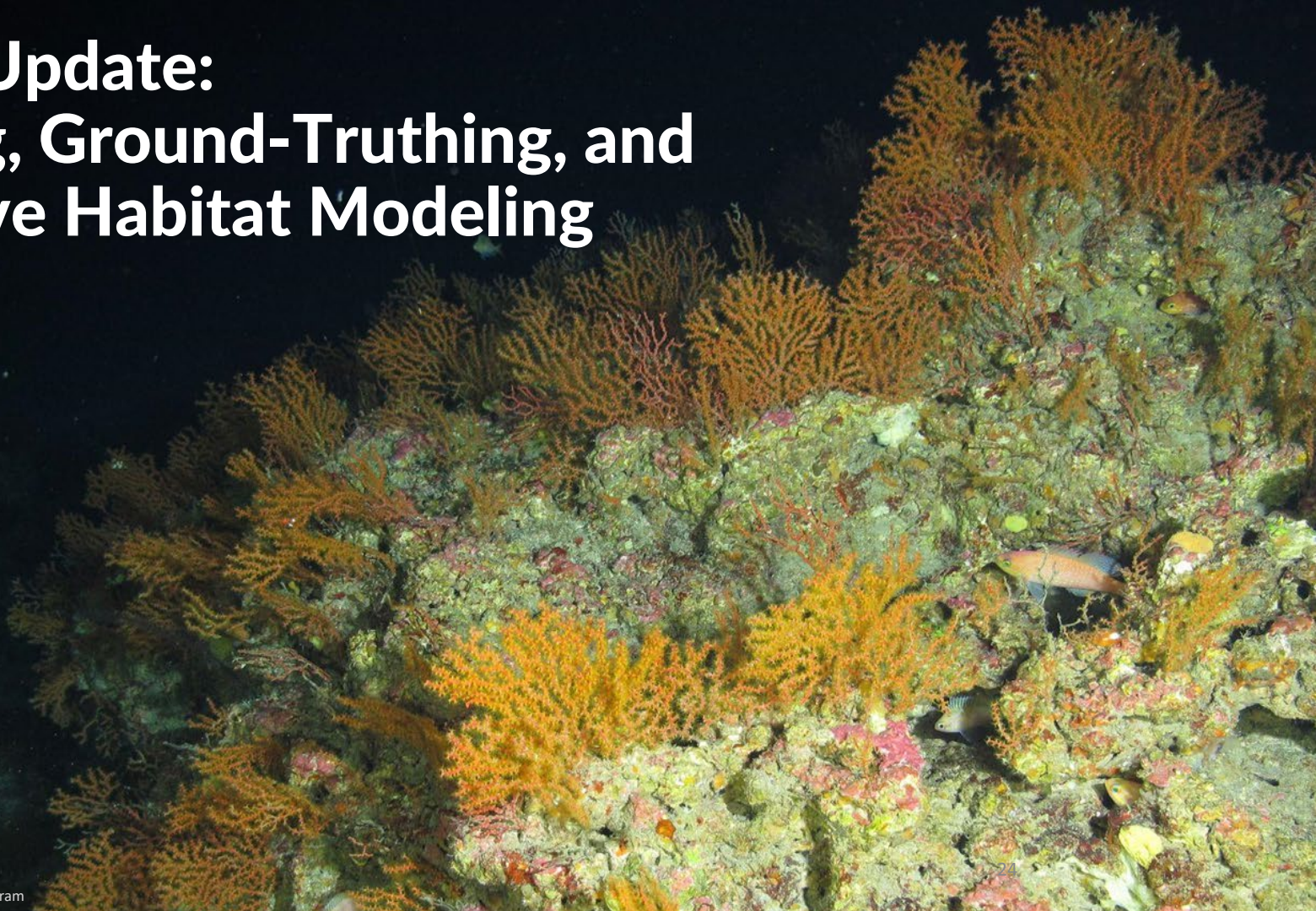
- Please use the “Q&A” box to type questions for the Q&A session at the end
- We’ll get to as many questions as we can!



Project Update: Mapping, Ground-Truthing, and Predictive Habitat Modeling (MGM)

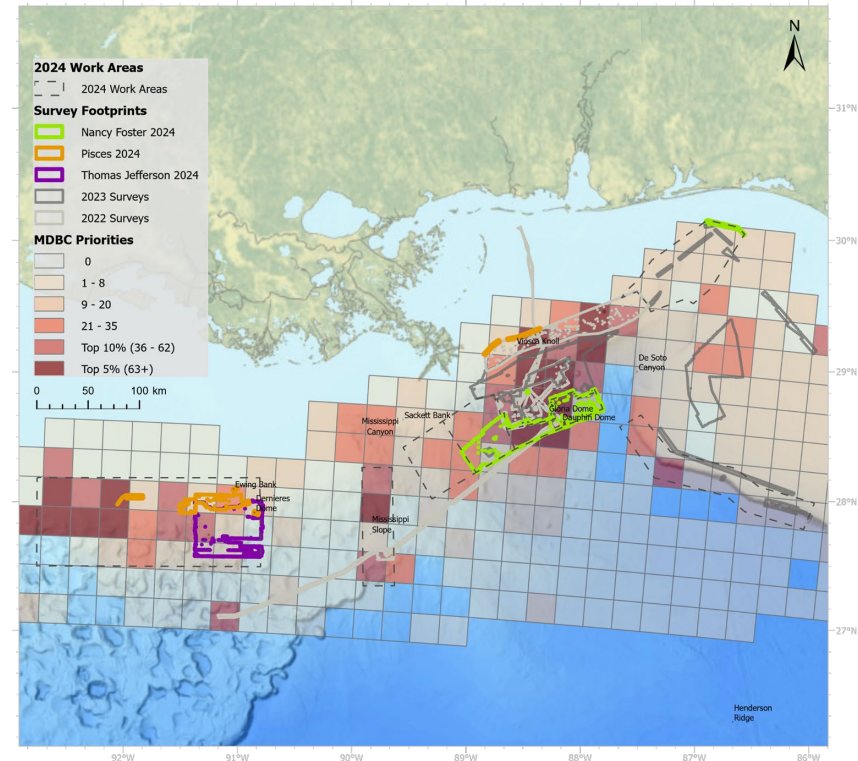
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Photo: NOAA, UNCW Undersea Vehicles Program



Project Update - MGM

- Over 7,500 square miles of the seafloor mapped to date, continue to align with stakeholder prioritization completed in 2021
- Predictive habitat modeling (PHM)
 - Inventory of existing PHM studies
 - Publication of sampling design simulation study technical report
 - Exploring application of synthetic aperture sonar data for PHM

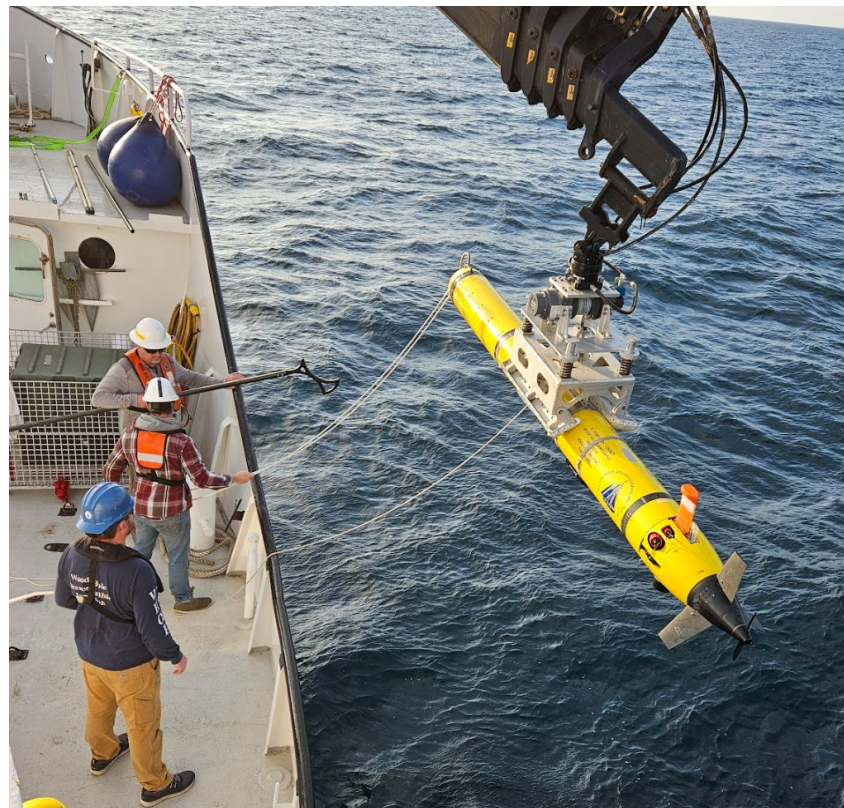


Credit: NOAA

Project Update - MGM

- Heavy investment in deploying new Remus 620s in partnership with Navy
- Filling broad gaps in ground-truthing in mesophotic and depths to 600m
- Synthetic aperture sonar revealing new details on seafloor substrates
- New imaging and laser profiling providing unprecedented views of MDBC
- Providing very high resolution seafloor maps to guide restoration activities

May 2025

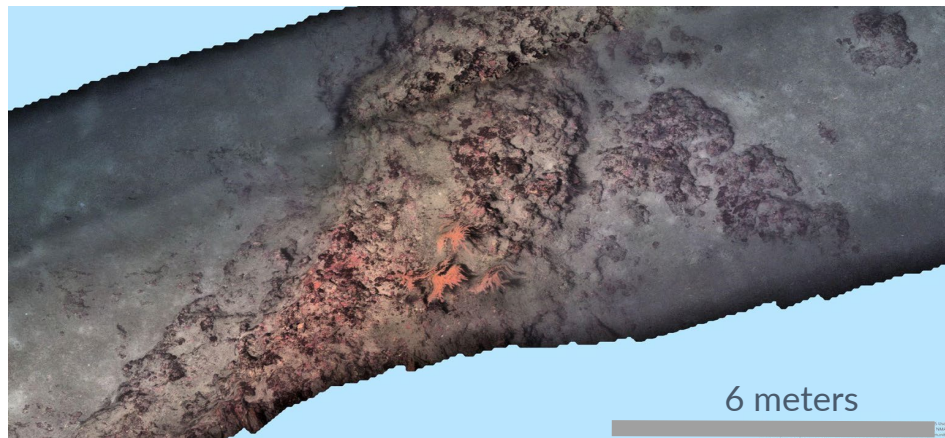
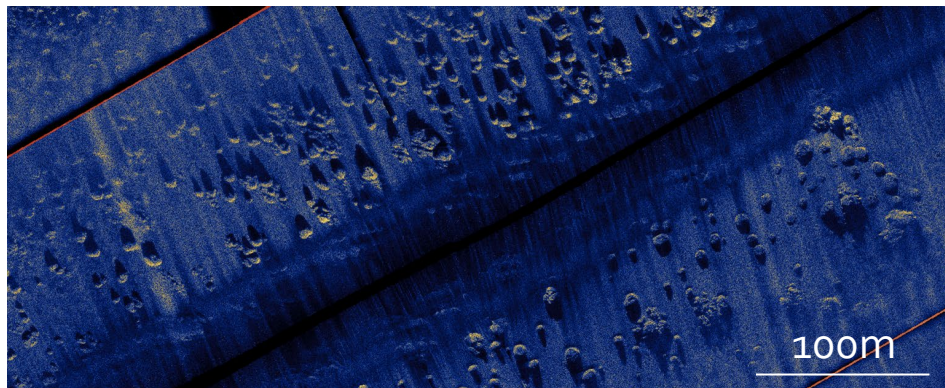


Credit: Erik Ebert/NOAA

Project Update - MGM

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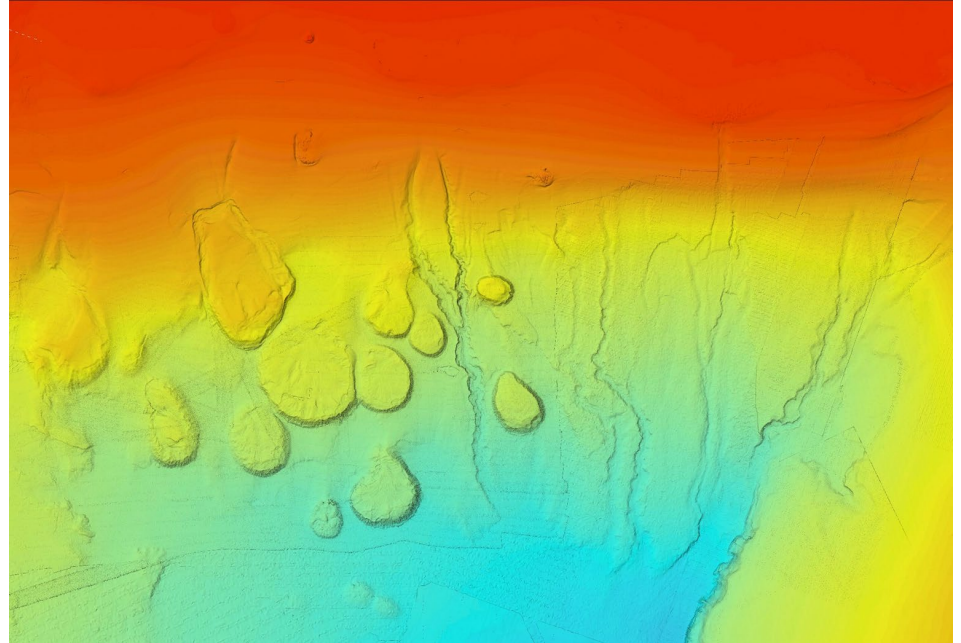
May 2025



Project Update - MGM

Synthesis products to be developed by the end of the project:

- Regional and local mapping surfaces
- Annotated seafloor image library
- High resolution habitat characterizations
- Regional and local predictive coral species models



Credit: NOAA

Project Update: Habitat Assessment and Evaluation (HAE)

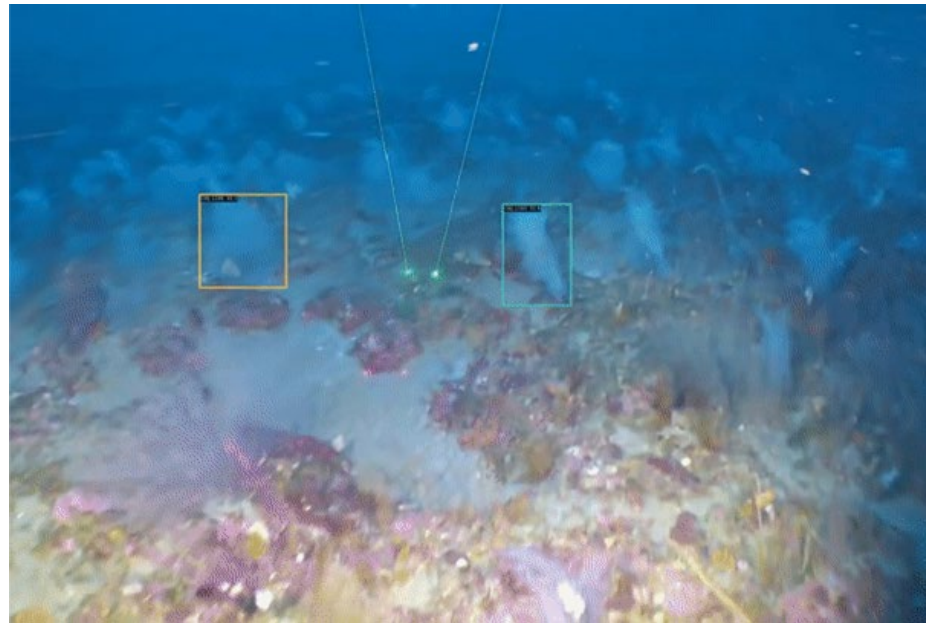
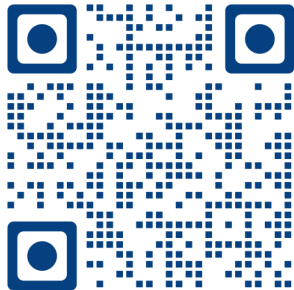
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Photo: NOAA, UNCW Undersea Vehicles Program



Project Update - HAE

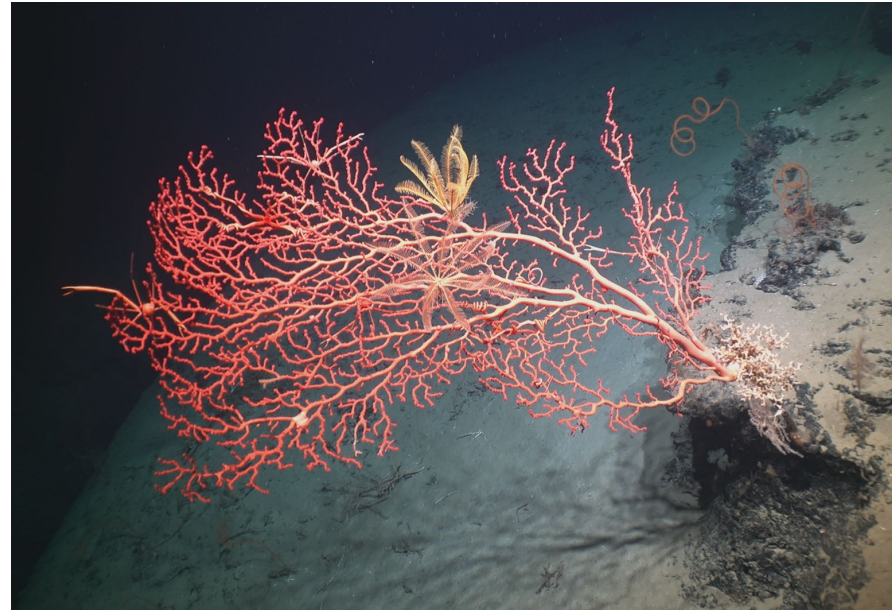
- Imagery annotation from 2022, 2023, and 2024 field seasons
- “Click-a-Coral” citizen science project to support the development of an AI model that can identify coral species
- Want to get involved? Scan the QR code:



Credit: NOAA

Project Update - HAE

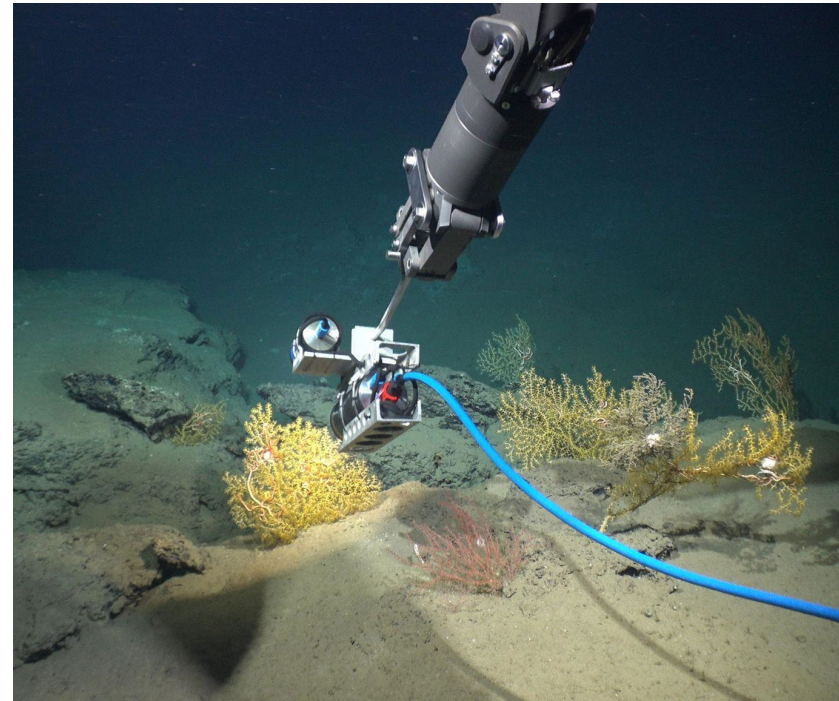
- Extensive, multi-partner effort to analyze data
 - Population genetics and connectivity
 - Environmental baselines and changes
 - Food availability and density of organisms
 - Microbiome characterization
 - Comparison of sediment communities
 - Physical oceanographic modeling
 - ... and much more!
- Collaboration with other DWH restoration projects to describe connections between deep-sea communities and marine mammals, fish, etc.



Credit: NOAA, Pelagic Research Services, Florida Institute of Oceanography

Project Update - HAE

- Gap analysis and partner input to inform field work
- Published or forthcoming results of data analysis
 - Long-term time series of environmental data from landers
 - Characterizing reproductive potential of sites based on coral size
 - Longest existing time series of images to monitor coral health
 - Identification of 30+ new species
 - ...and more to come



Credit: NOAA, Pelagic Research Services

Project Update - HAE

- Synthesis products to be developed by the end of the project:
 - Synthesis of all data based on core subject areas identified in the project planning phase
 - Spatial structure to synthesis - overlaying habitat and environmental data with mapping and models data provided by mapping team
 - Priority site characterizations and long-term monitoring plan

Habitat Characterization
• Sediment Community Composition and Associated Environmental Geochemistry
• Demersal Fish, Corals, and Macroinvertebrate Community Composition
• Coral Health and Condition
• Water Column Fish and Macroinvertebrate Characterization
• Environmental and Oceanographic Characterization
• Sentinel Sites (e.g. Priority Long-Term Monitoring Sites)
Biodiversity
• Genetics and Taxonomy
• Coral Age and Growth
Connectivity
• Coral, Fish, and Other Invertebrate Trophic Ecology
• Coral Genetic Connectivity and Larval Dispersal Models

Project Update: Coral Propagation Technique Development (CPT)

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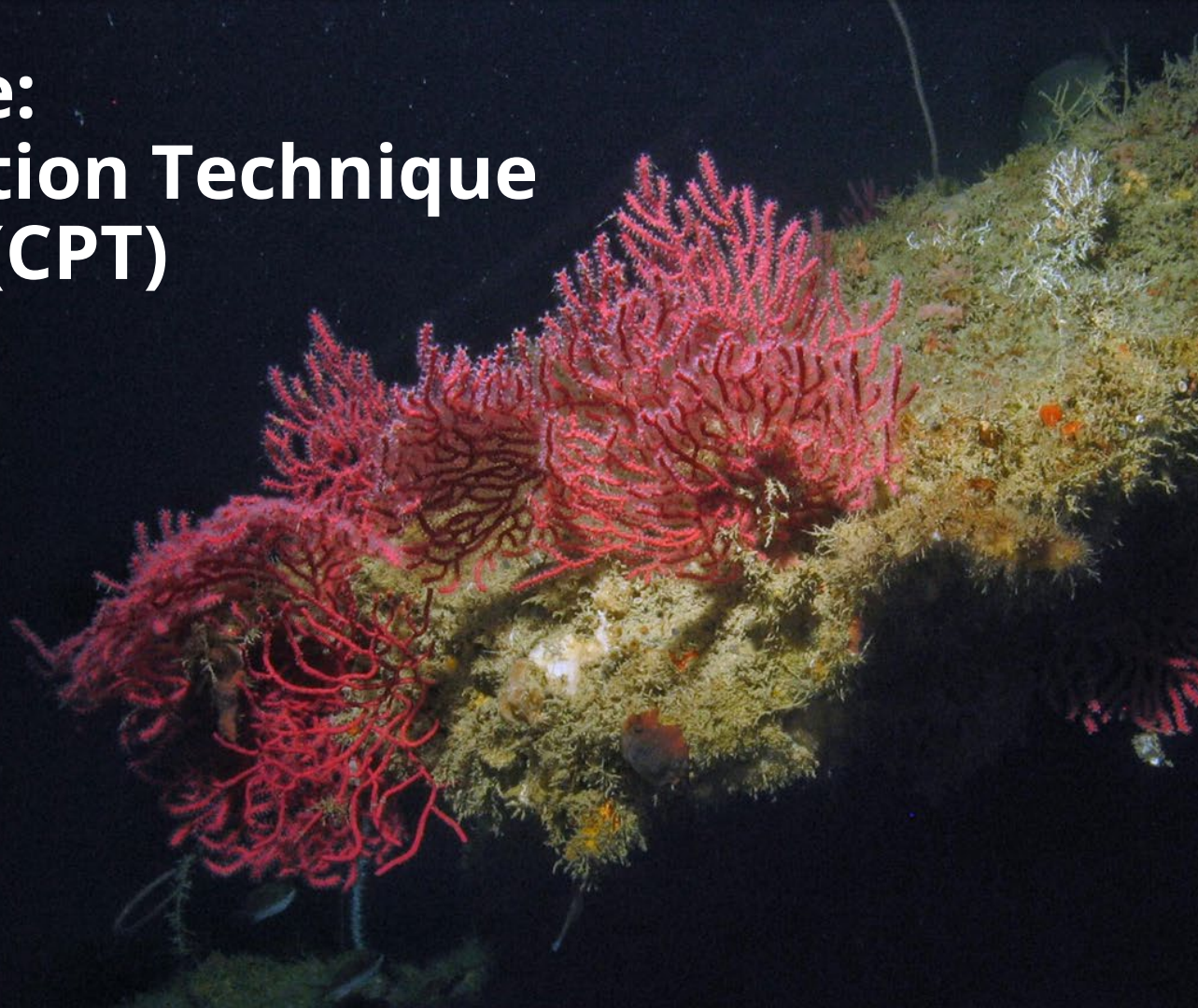


Photo: NOAA, Marine Applied Research & Exploration

Project Update - CPT

- Continued coordination across federal and partner labs
- Ongoing studies of coral biology and physiology, resulting in peer-reviewed publications
- Spawning success in lab settings
- Building capacity and best-practices for deep corals
- Analysis of monitoring data from coral fragment racks

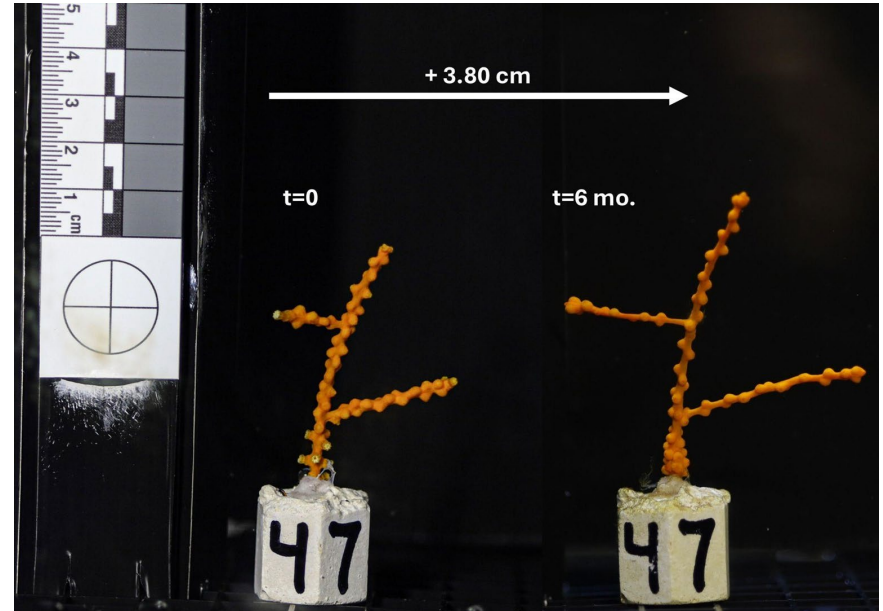


Photos: Ben Higgins/NOAA



Project Update - CPT

- Optimization of mesophotic octocoral husbandry techniques through various lab-based studies:
 - Cross institutional comparison of husbandry practices
 - Coral diet studies
 - Assessing the importance live rock
 - Evaluating artificial vs. natural water sources
- Planning for coral outplanting



Credit: Kassidy Lange & Matthew Rojano, NOAA

Project Update - CPT

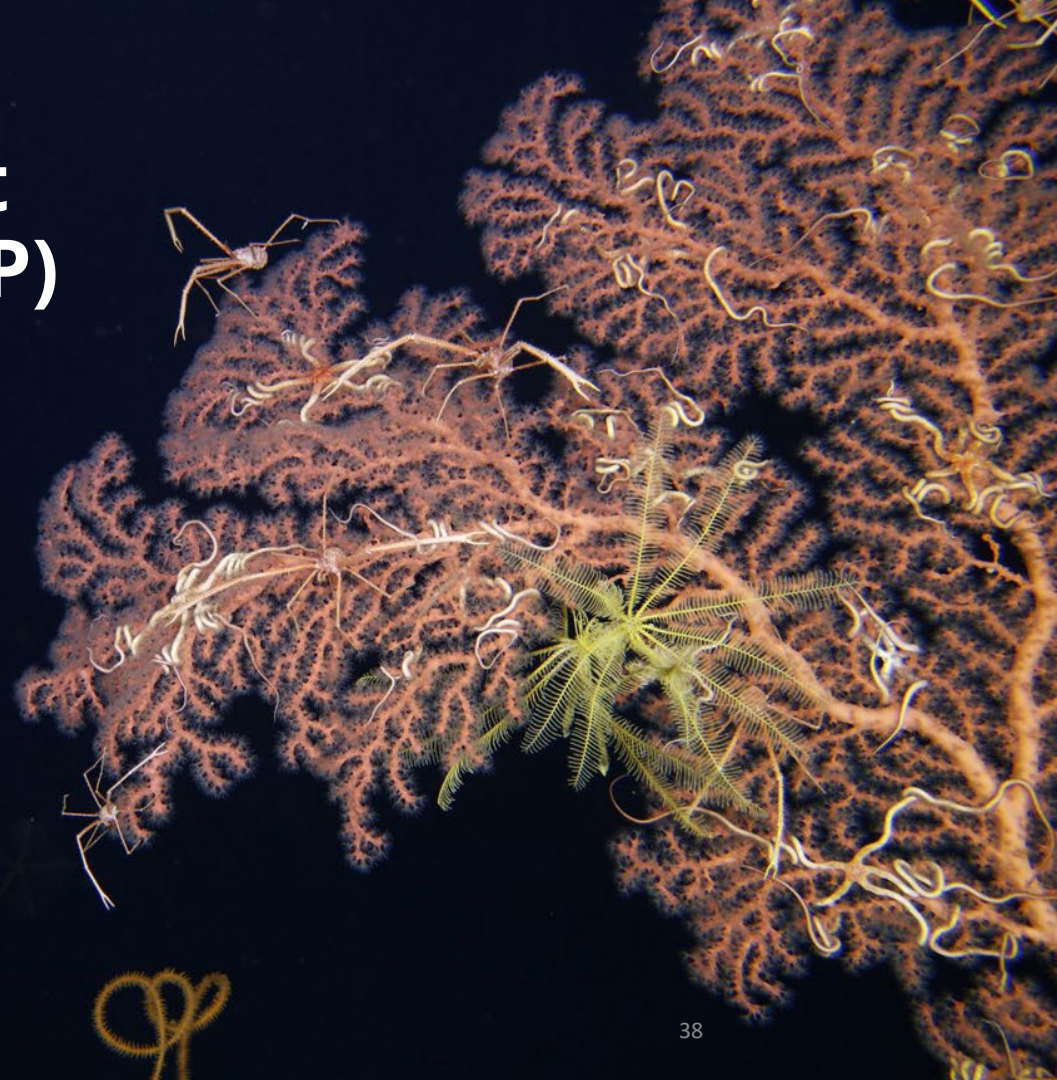
- Synthesis products to be developed by the end of the project:
 - Publications contributing to increased baseline knowledge of deep-sea coral biology
 - Best-practices for deep-sea coral husbandry
 - Annotations of corals across MDBC cruises
 - Data and publications to support selection of successful propagation methods



Photo: NOAA, Marine Applied Research & Exploration

Project Update: Active Management and Protection (AMP)

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Restoration**



Project Update - AMP

- Exhibit openings at:
 - Audubon Aquarium (New Orleans, LA)
 - Mississippi Aquarium (Gulfport, MS)
 - Man in the Sea Dive Museum (Panama City Beach, FL)
- Traveling art exhibit featuring 370 Gulf species: April 12 - July 6th (Galveston, TX)
- Free educational resources available online
- More than 60 articles and web stories published in 2024
- Continued efforts to compile data related to MDBC threats, inform future field work



Photo: Sasha Francis/National Marine Sanctuary Foundation

Project Update - AMP

- Additional educational resources coming in 2025
- Distribution of resources at teacher conferences, outreach events, public venues, etc.
- Two more exhibits coming in 2025:
 - Frost Science Museum (Miami, FL)
 - Moody Gardens Aquarium (Galveston, TX)
- Collecting evaluation data on education and outreach efforts
- Threat reduction prioritization workshop



Credit: Gulf Reach Institute, Grayling Education LLC.

Project Update - AMP

- Synthesis products to be developed by the end of the project:
 - Education and outreach evaluation data compilation
 - Threats database & monitoring data
- Support the dissemination of other team's synthesis products to the public and natural resource managers
- Coordinate with natural resources managers to assess utility of portfolio products for decision-making



Credit: National Marine Sanctuary Foundation

MDBC Portfolio Products & Resources

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Restoration**

Photo: NOAA, Marine Applied Research & Exploration

MDBC Webpages

- [Gulf Spill Restoration](#)
- [NOAA Fisheries Office of Habitat Conservation - MDBC Webpage](#)
- [NOAA National Centers for Coastal Ocean Science - MDBC Webpage](#)



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HABITAT CONSERVATION

Mesophotic and Deep Benthic Communities Restoration

Vital seafloor habitats were damaged by the 2010 Deepwater Horizon oil spill. NOAA and partners are building a network of experts and resources to restore this underexplored area in the Gulf of Mexico.

Southeast

Table of Contents

- Mesophotic and Deep Benthic Communities: Where the Light Fades
- How Are We Restoring Deep-Sea Habitats?
- Explore the Projects
- Why We are Restoring Habitat: The Deepwater Horizon Oil Spill
- Planning for Restoration
- Dive Deeper
- More Information

Mesophotic and Deep Benthic Communities: Where the Light Fades

The sun is powerful, but its intensity dwindles as it passes through the depths of the sea. Yet even the ocean's dim middle reaches—the "mesophotic zone"—and its deepest, sunlight-free areas—the deep sea—host an abundance of life.



Mesophotic corals and crinoids on Bright Bank, near the Flower Garden Banks National Marine Sanctuary. Credit: Marine Applied Research and Exploration, NOAA

MDBC Data & Publications

GULF SPILL RESTORATION

Website maintained by NOAA on behalf of the Deepwater Horizon Natural Resource Damage Assessment Trusts

Home About Us How We Restore Restoration Areas Data Story Archive

Restoration Areas / Open Ocean

Open Ocean Restoration Area

Restoration work in the Open Ocean Restoration Area focuses on restoring the living marine resources and their services that were injured by the spill. The Open Ocean Trustee Implementation Group, comprised of the federal trustees, works together to restore wide-ranging and migratory species, including birds, Gulf sturgeon, fish and water column invertebrates, sea turtles, marine mammals, and deep-sea coral communities.

We work to restore these species throughout their life stages and geographic ranges, including inland, coastal, and offshore areas. Therefore, we may use some funds for restoration outside of the Gulf of Mexico. We coordinate with state trustees, especially when proposed projects overlap their jurisdictions.

Together, we develop project-specific restoration plans that are consistent with the **programmatic restoration plan** (see chart below). As part of the restoration planning process, we accept restoration project ideas from the public. The public also has the opportunity to review and comment on proposed project-specific restoration plans for the Open Ocean Restoration Area. Once plans are approved, we begin implementation and monitoring of the selected projects.

Projects

Projects led by the trustees for the Alabama Restoration Area are below. Use the filters below to search for specific projects. Learn more about individual projects below or view them in our **interactive map**. You can also learn about the **environmental compliance** for each of these projects.

Search Filter by restoration type Status

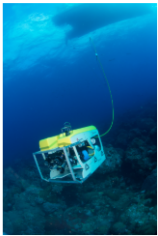
Types	Project name	Status
	Mesophotic and Deep Benthic Communities - Active Management and Protection	In Progress
	Mesophotic and Deep Benthic Communities - Coral Propagation Technique Development	In Progress
	Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation	In Progress
	Mesophotic and Deep Benthic Communities - Mapping, Ground-truthing, and Predictive Habitat Modeling	In Progress

Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation

Overview Activities Monitoring and Adaptive Management Env Compliance Budget Contacts Documents

Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation

Project ID: 232 | Project Status: In Progress [Print Last Annual Report](#)



Description:
The life histories, diversity, and population structures of Mesophotic and Deep Benthic Community (MDBC) species in the Gulf of America 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 will 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 will 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 will maximize the effectiveness of MDBC restoration and protection efforts through the use of population genetic analysis methods. The project results will 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 Deepwater Horizon spill. This project will be adaptively managed throughout its seven to eight year timeframe.

Recent Update:
In 2023, the project completed ~150 days at sea, collecting and analyzing data to assess seafloor habitats, potential threats, and baseline conditions guiding restoration and protection activities.

Trustee Implementation Group(s):

- Open Ocean

Implementing Trustee(s):

- Department of the Interior (DOI); National Oceanic and Atmospheric Administration (NOAA)

Site Location(s):



MDBC Data & Publications

“MDBC Data Accessions and Publications”



GULF SPILL RESTORATION
Website maintained by NOAA on behalf of the Deepwater Horizon Natural Resource Damage Assessment Trustees

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Home / Project

Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation

Overview Activities Monitoring and Adaptive Management Env Compliance Budget Contacts Documents

Documents [Expand All](#) [Collapse All](#)

☐ Monitoring and Adaptive Management Documents (2)

Document Title	Document Type	Modified Date	File Size	Description
HAE MAM Plan From OOTIG RP2EA - PublicFinal 2019.pdf	Monitoring and Adaptive Management Plan	05/19/2021	285 kB	Habitat Assessment and Evaluation project MAM plan from OORP2/EA.
MDBC Data Accessions and Publications.pdf	Other Monitoring and Adaptive Management Files	03/05/2025	291 kB	Listing of data and publications by the Mesophotic and Deep Benthic Communities projects through 2024.

☐ Progress Reports (5)

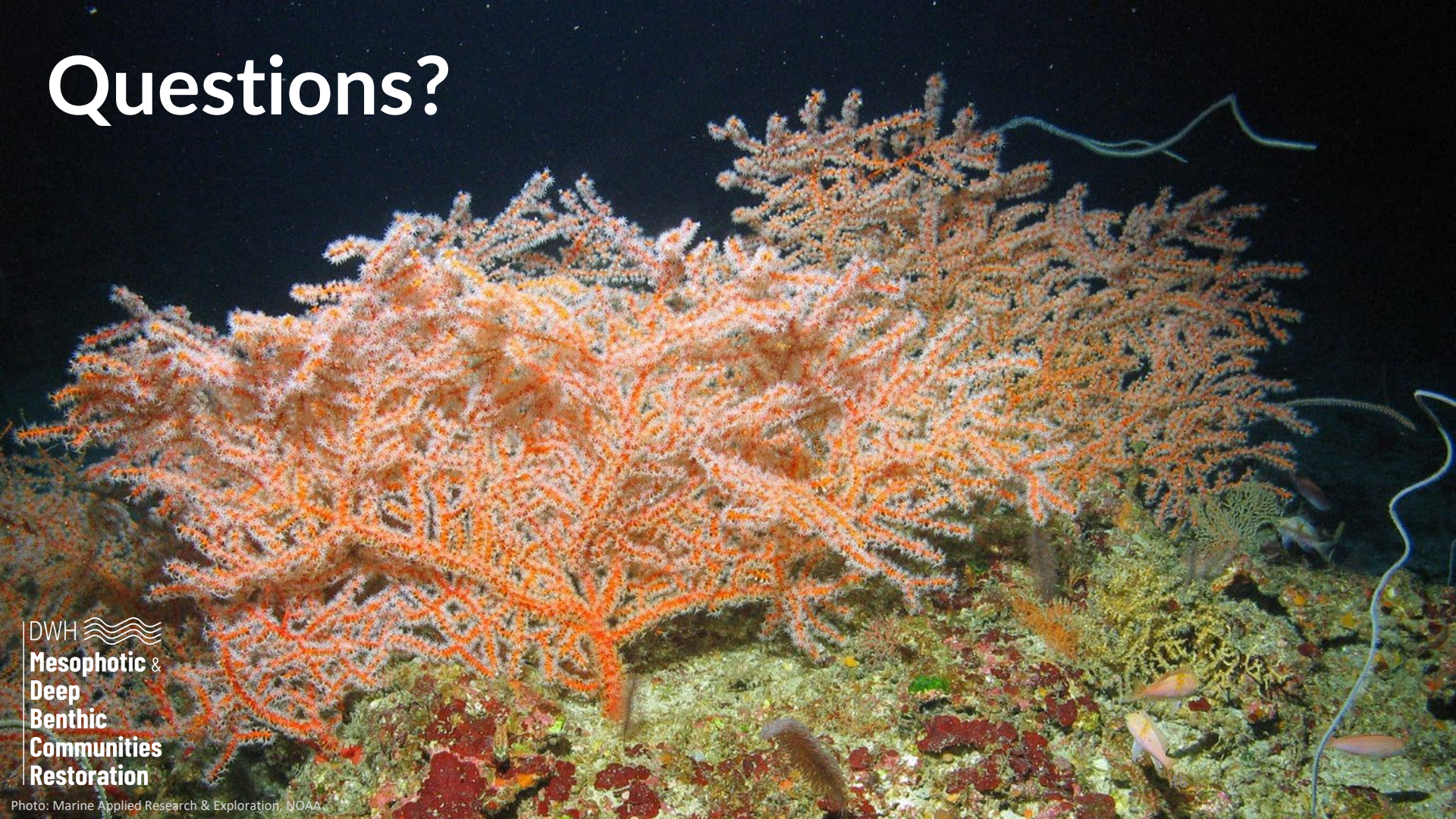
Document Title	Document Type	Modified Date	File Size	Description
Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation ID232 2019 Annual Report.pdf	Annual	06/01/2020	1524 kB	
Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation ID232 2020 Annual Report.pdf	Annual	07/09/2021	1670 kB	
Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation ID232 2021 Annual Report.pdf	Annual	05/31/2022	1538 kB	
Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation ID232 2022 Annual Report.pdf	Annual	05/31/2023	1524 kB	
Mesophotic and Deep Benthic Communities - Habitat Assessment and Evaluation ID232 2023 Annual Report.pdf	Annual	05/30/2024	1535 kB	

Annual Project Report

Questions?

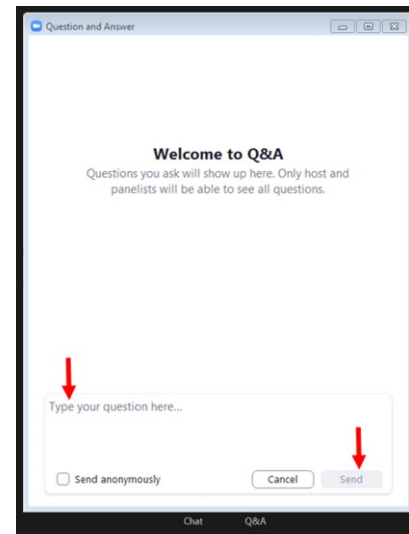
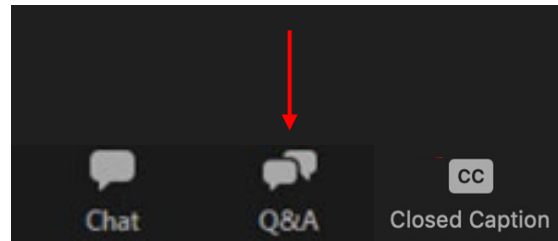
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Restoration**

Photo: Marine Applied Research & Exploration, NOAA



Webinar Participation

- Please use the “Q&A” box to type questions for the Q&A session at the end
- We’ll get to as many questions as we can!
- Keep your eye on the chat, we may answer some questions there.



Thank you for tuning in!

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Photo: NOAA, Oceaneering International, Inc.

