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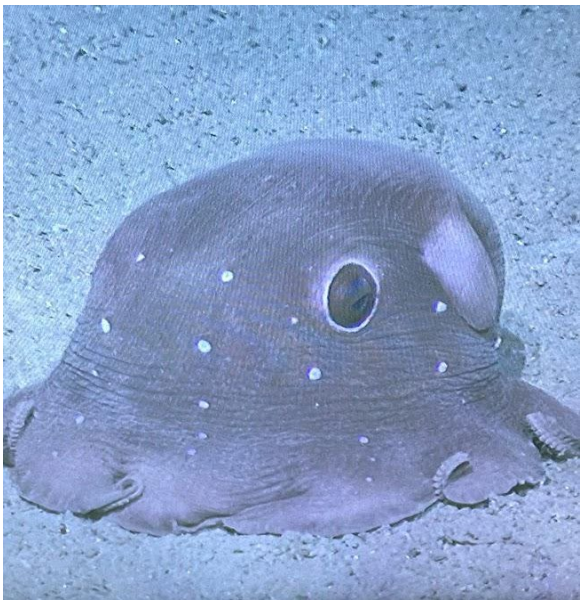
# Cruise Report:
# MDBC Expedition NOAA Ship *Nancy Foster*, August 9–29, 2022



**September 2023**

**DWH MDBC Cruise Report 2023-03**

DWH Mesophotic & Deep Benthic Communities Restoration

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For more information on MDBC Restoration, please visit:

https://coastalscience.noaa.gov/project/scientific-support-for-mesophotic-and-deep-benthic-community-restoration-in-the-gulf-of-mexico/

and

https://www.fisheries.noaa.gov/southeast/habitat-conservation/mesophotic-and-deep-benthic-communities-restoration

## Disclaimer

# Cruise Report:
# MDBC Expedition NOAA Ship *Nancy Foster*, August 9–29, 2022

## Habitat Assessment and Evaluation Project
## and
## Mapping, Ground-Truthing, and Predictive Habitat Modeling Project

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**September 2023**

## DWH MDBC Cruise Report 2023-03

DWH Mesophotic & Deep Benthic Communities Restoration

## ***Deepwater Horizon*** **Mesophotic and Deep Benthic Communities Restoration**

This report is part of the NOAA Mesophotic and Deep Benthic Communities (MDBC) Series of publications that share the results of work conducted by the *Deepwater Horizon* MDBC restoration projects.

The 2010 *Deepwater Horizon* oil spill was an unprecedented event. Approximately 3.2 million barrels of oil were released into the deep ocean over nearly three months. The plume of oil moved throughout the water column, formed surface slicks that cumulatively covered an area the size of Virginia, and washed oil onto at least 1,300 miles of shoreline habitats. More than 770 square miles (2,000 square kilometers) of deep benthic habitat were injured by the oil spill, including areas surrounding the *Deepwater Horizon* wellhead and parts of the Pinnacles Trend mesophotic reef complex, located at the edge of the continental shelf.

Under the Oil Pollution Act, state and federal natural resource trustees conducted a Natural Resource Damage Assessment (NRDA). The Trustees assessed damages, quantifying the unprecedented injuries to natural resources and lost services. They also developed a programmatic restoration plan to restore injured resources and compensate the public for lost services.

In April 2016, a settlement was finalized that included up to $8.8 billion in funding for the *Deepwater Horizon* Trustees to restore the natural resource injuries caused by the oil spill as described in their programmatic restoration plan, Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. The *Deepwater Horizon* Open Ocean Trustee Implementation Group is responsible for restoring natural resources and their services within the Open Ocean Restoration Area that were injured by the oil spill. The Open Ocean Trustees include NOAA, U.S. Department of the Interior, U.S. Environmental Protection Agency, and U.S. Department of Agriculture.

In 2019, the Open Ocean Trustee Implementation Group committed more than $126 million to implement four restoration projects to address the injury to MDBC. The MDBC projects are: Mapping, Ground-Truthing, and Predictive Habitat Modeling; Habitat Assessment and Evaluation; Coral Propagation Technique Development; and Active Management and Protection. NOAA and the Department of the Interior are implementing the projects, in cooperation with a range of partners, over eight years.

Together, the projects take a phased approach to meet the challenges involved in restoring deep-sea habitats. Challenges to restoration include a limited scientific understanding of these communities, limited experience with restoration at the depths at which these communities occur, and remote locations that limit accessibility.

More information about *Deepwater Horizon* restoration and the MDBC restoration projects is available at: www.gulfspillrestoration.noaa.gov.

# Table of Contents

# Acronyms

| | |
|---|---|
| CTD | Conductivity, temperature, and depth |
| DWH | Deepwater Horizon |
| eDNA | Environmental DNA |
| HAE | Habitat Assessment and Evaluation |
| MDBC | Mesophotic and Deep Benthic Communities |
| MGM | Mapping, Ground-truthing, and Predictive Habitat Modeling |
| MBARI | Monterey Bay Aquarium Research Institute |
| MBES | Multibeam echosounder |
| NOAA | National Oceanic and Atmospheric Administration |
| POM | Particulate organic matter |
| PRS | Pelagic Research Services |
| ROV | Remotely operated vehicle |
| URI | University of Rhode Island |
| USBL | Ultra-short baseline |
| USGS | United States Geological Survey |
| USM | University of Southern Mississippi |

# Background

Between 9 August and 1 September, 2022, the Mesophotic and Deep Benthic (MDBC) Habitat Assessment and Evaluation (HAE) and Mapping, Ground-truthing, and Predictive Habitat Modeling (MGM) projects implemented remotely operated vehicle (ROV) dives, multibeam surveys, and conductivity, temperature, depth (CTD) operations at deep-sea sites in the northern Gulf of Mexico. The primary sites selected are a region of known deep-sea coral habitats, including Deepwater Horizon (DWH) injured and reference sites at depths of 1,100–2,000 m.

The cruise (NOAA Ship *Nancy Foster* NF-22-06) includes objectives from MGM and HAE projects. Habitat characterization and analysis of biological samples collected with ROV *Odysseus* maintain long-term data flows and fill critical data gaps on the biology and ecology at impacted and reference sites, assess potential ongoing impacts from threats, refine predictive habitat models, help target locations for direct restoration and protection, and determine a baseline for health and condition. Multibeam echosounder data can help document the broadscale abundance and distribution of MDBC, characterize benthic habitats, and provide information that can help guide future ROV surveys.

# Objectives of Mission

1. Conduct high-resolution multibeam echosounder surveys for bathymetry and backscatter
2. Define water column oceanographic properties and sound velocity through underway CTD profiles
3. Conduct ROV transects and collect imagery, sediment samples, and biological samples at deep-coral injured and reference sites
4. Deploy markers with the ROV for repetitive sampling
5. Conduct total water column CTD rosette casts and water sampling at ROV sites
6. Retrieve and deploy short-term benthic landers

# Science Team

The objectives of the cruise were carried out by scientists from the National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey, University of Rhode Island (URI), Monterey Bay Aquarium Research Institute, and University of Southern Mississippi (USM) (Table 1). ROV services were provided by Pelagic Research Services using their ROV *Odysseus*.

**Table 1.** Participant list for NOAA Ship *Nancy Foster* NF-22-06. CTD = conductivity, temperature, and depth; eDNA = environmental DNA; ROV = remotely operated vehicle; NOAA = National Oceanic and Atmospheric Administration; USGS = U.S. Geological Survey; URI = University of Rhode Island; MBARI = Monterey Bay Aquarium Research Institute; USM = University of Southern Mississippi; PRS = Pelagic Research Services.

| Name | Role | Affiliation |
|---|---|---|
| Randy Clark | FPC-Co-Chief Scientist | NOAA |
| Amanda Demopoulos | FPC-Co-Chief Scientist | USGS |
| Andy Davies | Landers/ROV CTD | URI |
| Jay Farlow | Lander Engineer | USM |
| Stephanie Farrington | Data Manager | TESA, LLC under contract to NOAA |
| Jennifer McClain-Counts | Sediment Sampling | USGS |
| Siyah Yongue | Sediment Sampling | Student contractor to USGS |
| Fanny Girard | Coral Imagery | MBARI |
| Alexis Weinnig | Water Sampling - eDNA | USGS |
| Hannah Joss | Water Sampling - Nutrients | Humboldt University |
| Paul Sanacore | ROV Dive Supervisor/Pilot | PRS |
| Erik Hodges | ROV Technician/Pilot | PRS |
| Rudy Schlepp | ROV Technician/Pilot | PRS |
| Melinda Bartlett | Navigation Technician | PRS |

# Operations

NF-22-06 was conducted with two legs (Table 2). Leg 1 operated at two mesophotic sites for retrieval of benthic landers. Leg 2 focused on four DWH impact sites (Biloxi Dome [MC294], Gloria Dome [MC297], Dauphin Dome [MC344], and Horn Dome [MC036]) and two DWH reference sites (St Tammany Basin Rim [GC852] and Henderson Ridge South [AT357]). See Figure 1 for map of sites. At-sea operations included CTD casts for sound velocity profiles for multibeam mapping and thermoclines for water sampling. The CTD was equipped with 12 5-L Niskin bottles for water sampling. Water was processed for environmental DNA (eDNA), nutrients, and particulate organic matter (POM). The ROV was equipped with 4K video for video transects, high-resolution still camera for coral imaging, downward-facing benthic stills while on transect, a CTD, five 5-L Niskin bottles for water samples, eight push cores, two manipulator arms, and a slurp tube for collecting samples. URI developed two benthic mini-landers, equipped with an acoustic Doppler current profiler and CTD that could be deployed for days/weeks. During the cruise, deployment occurred at select sites to look at short-term (days) environmental variability.

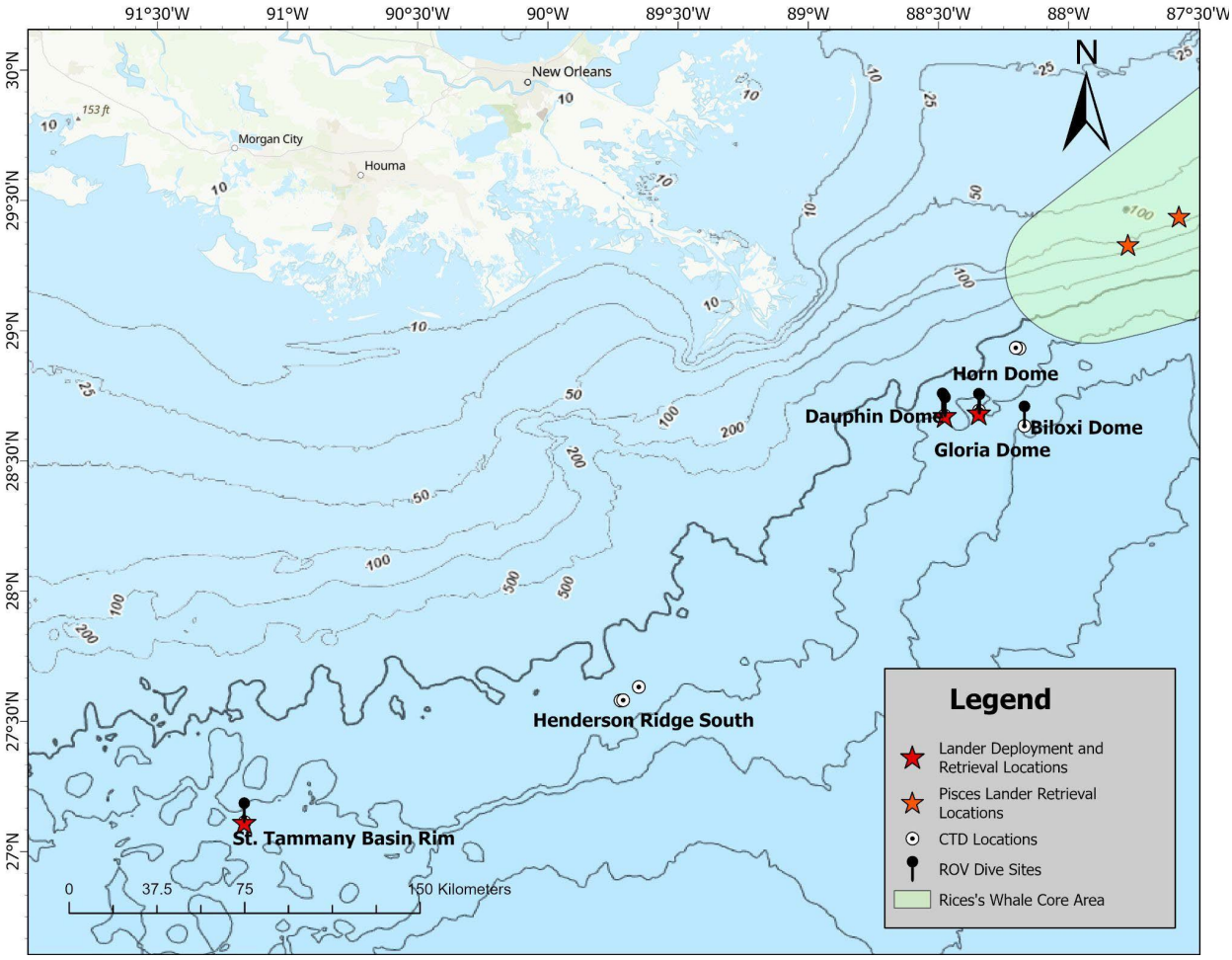


**Figure 1.** Map of ROV, CTD, and lander deployments on the NOAA Ship *Nancy Foster*.

**Table 2.** Itinerary for NF-22-06. ROV = remotely operated vehicle; CTD = conductivity, temperature, and depth; USBL = ultra-short baseline; MBES = multibeam echosounder.

| Date | Operations | Comment |
|---|---|---|
| 08/08/2022 | Leg 1. Pick up scientists and retrieve benthic landers | Science team: Andy Davies, Jay Farlow |
| 08/09/2022 | Ship docks at Gulf Marine Support Facility, Pascagoula, MS | |
| 08/13/2022–08/16/2022 | ROV mobilization | Ship moved to Singing River dock for ROV and Science mobilization |
| 08/15/2022 | Science team mobilization | |
| 08/16/2022 | Planned departure from Pascagoula | Delayed to 08/17; ROV not fully ready |
| 08/17/2022 | Departed Pascagoula, Multibeam | Departure at 1145 hr; Arrive at Horn Dome at 2000; Begin MBES |
| 08/18/2022 | CTD, Multibeam, USBL Calibration | ROV navigation issues; No ROV launch |
| 08/19/2022 | Ship heads to Pascagoula for at-sea transfer; Multibeam | Crew member tests positive for Covid; Transit to Pascagoula for at-sea transfer with U.S. Coast Guard; After transfer, transit to area west of Biloxi Dome for mapping |
| 08/20/2022 | CTD, ROV, Multibeam | ROV navigation issues fixed; ROV launch at Gloria Dome; Mapping target area west of Biloxi Dome |
| 08/21/2022 | CTD, ROV, Lander, Multibeam | Operations at Gloria Dome; Deployed lander; Retrieved on 08/25; Mapping area north of Horn Dome |
| 08/22/2022 | CTD, ROV, Lander, Multibeam | Operations at Biloxi Dome; Lander deployed; Another crew member tests Covid-positive; Pick up landers, recover ROV, and transit to Pascagoula |
| 08/23/2022 | Crew transfer, Multibeam | Mapping activity northwest of Biloxi Dome |
| 08/24/2022 | CTD, ROV, Lander | Operations at Biloxi Dome; Mapping activity west of Biloxi Dome |
| 08/25/2022 | CTD, ROV | Operations at Dauphin Dome; Transit to Henderson Ridge South |
| 08/26/2022 | CTD, Mapping | Currents too strong for ROV operations; Mapping operations around Henderson Ridge, then transit-mapped en route to St Tammany Basin Rim |
| 8/27/2022 | CTD, ROV, Lander, Multibeam | Operations at St Tammany Basin Rim; Another crew member tests Covid-positive; Recover lander and ROV; No transit-mapping to Biloxi Dome; MBES system down. |
| 08/28/2022 | CTD, ROV | Operations at Biloxi Dome; Full dive day; Recover lander; Transit to Pascagoula; Arrival at 0800 hr on 08/29 |
| 08/29/2022 | Arrive at Pascagoula | Science team and ROV demobilization; Early arrival causes delay in ROV truck schedule |
| 8/30/2022–09/01/2022 | Pascagoula | ROV and Navigation team demobilization |

# Results and Discussion

NF-22-06 was moderately successful in its objectives. The original cruise plan intended to have 15 ROV dives to image corals, collect sediment core samples and water samples, conduct transects, and collect biological samples at impact and reference sites. ROV dives were reduced to eight due to delays in ROV mobilization and issues with navigational offset, heavy currents, and crew members testing positive for Covid. Three positive Covid tests from crew members resulted in two transits to Pascagoula to transfer crew members, and the final positive test was a critical loss to the overall staffing of the vessel and forced the mission to end three days early. Despite these obstacles, the cruise was successful in recovering two landers deployed during a previous cruise (NOAA Ship *Pisces* PC-22-02), imaging of octocorals, collecting sediment core and water samples, and video transects at four of five targeted sites. Mini-landers deployed at the deep-coral sites over the short term provided new environmental data, including temperature, salinity, dissolved oxygen, chlorophyll *a* fluorescence, turbidity, acoustic backscatter, and current speed and direction. Multibeam mapping was a success as over 850 $km^2$ were covered.

The obstacles limited the success in the remaining objectives. Four multi-day deployments of benthic landers were planned. Only one multi-day deployment and three multi-hour deployments were achieved. The reduction in dive days significantly impacted biological sample collection and video transects.

**Table 3.** ROV dive list for NOAA Ship *Nancy Foster* cruise NF-22-06. Dive numbers are consecutive. Coordinates (decimal degree) and depths are for ROV on-bottom positions. Duration is total time on the seafloor.

| Date | Dive | Dive_Site | Time (UTC) | Latitude | Longitude | Depth (m) | Duration (hr:min) |
|---|---|---|---|---|---|---|---|
| 08/20/2022 | Dive-01 | Gloria Dome | 13:25 | 28.68041 | −88.34202 | 1,562 | 7:05 |
| 08/21/2022 | Dive-02 | Gloria Dome | 13:43 | 28.68188 | −88.34519 | 1,580 | 6:47 |
| 08/22/2022 | Dive-03 | Biloxi Dome | 15:24 | 28.67222 | −88.47658 | 1,369 | 2:28 |
| 08/22/2022 | Dive-04 | Gloria Dome | 22:05 | 28.68232 | −88.34502 | 1,575 | 0:34 |
| 08/24/2022 | Dive-05 | Biloxi Dome | 13:40 | 28.67225 | −88.47649 | 1,367 | 8:21 |
| 08/25/2022 | Dive-06 | Dauphin Dome | 13:14 | 28.63382 | −88.16983 | 1,846 | 7:48 |
| 08/27/2022 | Dive-07 | St Tammany Basin Rim | 13:32 | 27.10987 | −91.16612 | 1,394 | 7:35 |
| 08/28/2022 | Dive-08 | Biloxi Dome | 14:09 | 28.67218 | −88.44309 | 1,366 | 7:15 |

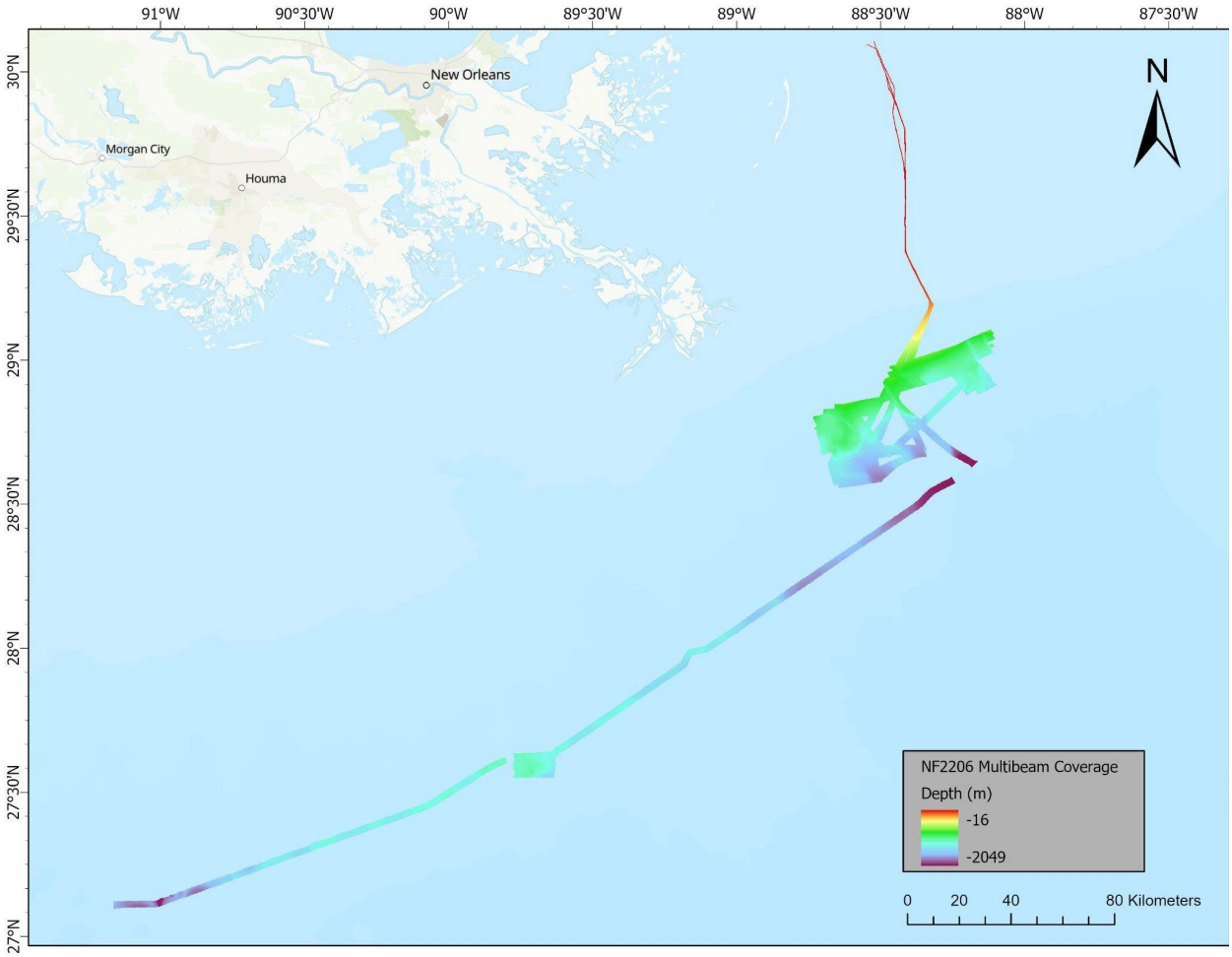


**Figure 2.** Preliminary bathymetry data (rainbow color ramp) collected on NOAA Ship *Nancy Foster* NF-22-06 using the EM710 Multibeam Echosounder.

# Data Accessibility

Processed, detailed, and quality-controlled information on coral occurrences will be reported to NOAA's National Database of Deep-Sea Corals and Sponges. Information about the biological samples is available upon direct request by email to the Chief Scientist. Seafloor mapping data will be archived and made freely available at the National Centers for Environmental Information and submitted to the Office of Coast Survey to use in charting as external source data.

Data and other products from this field mission will soon be available on the Data Integration Visualization Exploration and Reporting web page: Mesophotic and Deep Benthic Communities Portfolio.

# Biological Samples

**Table 4.** Sample list for NOAA Ship *Nancy Foster* cruise NF-22-06. Sample IDs are truncated for the table; the full ID appends cruise and dive number. Date and time are UTC. vou = voucher specimen; Pop gen = samples for populations genetics; Iso = samples for isotope analysis.

| ID | Scientific Name | Collection Timestamp | Latitude | Longitude | Depth (m) | vou | Pop gen | Iso |
|---|---|---|---|---|---|---|---|---|
| 001B | *Nymphaster arenatus* | 8/24/2022 19:05:41 | 28.67901 | −88.48064 | 1,356 | x | x | x |
| 002B | *Nymphaster arenatus* | 8/24/2022 20:26:26 | 28.68344 | −88.48448 | 1,361 | x | x | x |
| 003B | *Nymphaster arenatus* | 8/24/2022 20:37:14 | 28.68356 | −88.48428 | 1,359 | x | x | x |
| 004B | *Isididae* sp. | 8/27/2022 21:19:34 | 27.10997 | −91.16623 | 1,400 | x | x | |
| 005B | *Geodia neptuni* | 8/27/2022 21:29:57 | 27.10993 | −91.16624 | 1,398 | x | x | |
| 006B | *Madrepora* sp. | 8/27/2022 21:53:38 | 27.11000 | −91.16624 | 1,399 | x | x | |
| 007B | *Trachythela* sp. | 8/28/2022 17:06:42 | 28.66949 | −88.47448 | 1,373 | x | x | |
| 008B | *Actiniaria* sp. | 8/28/2022 18:22:00 | 28.66783 | −88.47463 | 1,389 | x | x | |

# CTD Casts and Water Samples

CTD casts were conducted to address a number of objectives: 1) to collect sound velocity data for multibeam mapping; 2) to collect total water column oceanographic parameters; and 3) to collect water samples for eDNA, nutrient, and POM analysis. Locations of deck and ROV CTD casts are shown in **Table 5**, and an example of a water column profile is shown in **Figure 3** below. The ROV CTD IDs correspond to the dive IDs. For example, ROV CTD-01 belongs to dive 01 in Table 3. The timestamps corresponding to ROV CTD IDs represent the ROV launch times.

**Table 5.** CTD cast list for NOAA Ship *Nancy Foster* cruise NF-22-06. sou vel = sound velocity; tot wat col = total water column; nut = nutrients; POM = particulate organic matter; eDNA = environmental DNA; Chl = Chlorophyll; SPM = suspended particulate matter. Deck CTD-01 was conducted for equipment calibration purposes.

| ID | Timestamp (UTC) | Latitude | Longitude | Depth (m) | eDNA | POM | nut | s_vel | Chl | SPM |
|---|---|---|---|---|---|---|---|---|---|---|
| Deck CTD-01 | 8/18/2022 09:56 | 28.93200 | −88.189 | 1,084 | | | | | | |
| Deck CTD-02 | 8/18/2022 20:50 | 28.93500 | −88.202 | 1,100 | | x | x | | x | x |
| Deck CTD-03 | 8/18/2022 22:40 | 28.93400 | −88.203 | 1,108 | x | | x | | | |
| Deck CTD-04 | 8/20/2022 08:58 | 28.69300 | −88.344 | 1,522 | x | | x | | | |
| Deck CTD-05 | 8/21/2022 10:03 | 28.68000 | −88.345 | 1,600 | | x | x | | | |
| Deck CTD-06 | 8/24/2022 10:05 | 28.67400 | −88.477 | 1,377 | x | x | x | | | |
| Deck CTD-07 | 8/25/2022 10:07 | 28.63400 | −88.170 | 1,862 | x | x | x | | | |
| Deck CTD-08 | 8/26/2022 10:30 | 27.63200 | −89.651 | 1,077 | x | x | x | | | |
| Deck CTD-09 | 8/26/2022 14:39 | 27.58000 | −89.721 | 1,043 | | x | x | | | |
| Deck CTD-10 | 8/26/2022 16:30 | 27.58100 | −89.711 | 1,062 | x | | x | | | |
| Deck CTD-11 | 8/27/2022 10:20 | 27.11300 | −91.165 | 1,430 | x | x | x | | | |
| ROV CTD-01 | 8/20/2022 13:17 | 28.68041 | −88.34202 | 1,356 | | | x | | | |

| ID | Timestamp (UTC) | Latitude | Longitude | Depth (m) | eDNA | POM | nut | s_vel | Chl | SPM |
|---|---|---|---|---|---|---|---|---|---|---|
| ROV CTD-02 | 8/21/2022 13:28 | 28.68188 | −88.34519 | 1,361 | | | x | | | |
| ROV CTD-03 | 8/22/2022 15:13 | 28.67222 | −88.47658 | 1,359 | | | x | | | |
| ROV CTD-04 | 8/22/2022 21:14 | 28.68232 | −88.34502 | 1,400 | | | x | | | |
| ROV CTD-05 | 8/24/2022 13:04 | 28.67225 | −88.47649 | 1,398 | | | x | | | |
| ROV CTD-06 | 8/25/2022 13:07 | 28.63382 | −88.16983 | 1,399 | | | x | | | |
| ROV CTD-07 | 8/27/2022 13:17 | 27.10987 | −91.16612 | 1,373 | | x | x | | | |
| ROV CTD-08 | 8/28/2022 13:57 | 28.67218 | −88.44309 | 1,389 | | x | x | | | |

# Sediment Core Samples

Sites with identified injury and reference sites have had recurring monitoring of marked corals and adjacent sediment communities, establishing a long-term data flow to provide information on recovery and resiliency. Overall, 39 sediment cores (Table 6) were taken and subsampled for chemistry (n = 12), grain size/isotopes (n = 34), hydrocarbons (n = 35), metals (n = 35), and microbial analysis (n = 36); and 34 subsamples were frozen for future grain size analysis.

**Table 6.** List of sediment core samples taken on NF-22-06 cruise. ch = core chemistry; gr_f = core grain size frozen; gr_i = core grain size isotope; hy = core hydrocarbon; ma = core macrofauna, me = core metal; mi = core microbial.

| ID | Collection Timestamp (UTC) | Latitude | Longitude | Depth (m) | ch | gr_f | gr_i | hy | ma | me | mi |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 001G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | x | x | | | | x |
| 002G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | | x | | |
| 003G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | x | | | |
| 004G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | | | x | |
| 005G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | | x | | |
| 006G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | | x | | |
| 007G | 2022-08-20 | 28.6799 | −88.3423 | 1,568 | | | | | x | | |
| 008G | 2022-08-21 | 28.6822 | −88.3449 | 1,583 | | | | | x | | |
| 009G | 2022-08-21 | 28.6822 | −88.3450 | 1,583 | | | | | | x | |
| 010G | 2022-08-21 | 28.6822 | −88.3450 | 1,584 | | | | | x | | |
| 011G | 2022-08-21 | 28.6822 | −88.3449 | 1,583 | | | | | x | | |
| 012G | 2022-08-21 | 28.6822 | −88.3449 | 1,583 | | x | x | | | | x |
| 013G | 2022-08-21 | 28.6822 | −88.3450 | 1,583 | x | | | | | | |
| 014G | 2022-08-21 | 28.6822 | −88.3450 | 1,583 | | | | | x | | |
| 015G | 2022-08-21 | 28.6822 | −88.3449 | 1,583 | | | | x | | | |
| 016G | 2022-08-24 | 28.6722 | −88.4765 | 1,369 | | | | | x | | |
| 017G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | | | | x | | | |
| 018G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | | | | | | x | |
| 019G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | | | | | x | | |
| 020G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | x | | | | | | |
| 021G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | | x | x | | | | x |
| 022G | 2022-08-24 | 28.6722 | −88.4765 | 1,369 | | | | | x | | |
| 023G | 2022-08-24 | 28.6722 | −88.4765 | 1,370 | | | | | x | | |
| 024G | 2022-08-25 | 28.6335 | −88.1695 | 1,851 | | | | | x | | |

| ID | Collection Timestamp (UTC) | Latitude | Longitude | Depth (m) | ch | gr_f | gr_i | hy | ma | me | mi |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 025G | 2022-08-25 | 28.6335 | −88.1695 | 1,851 | | | | x | | | |
| 026G | 2022-08-25 | 28.6335 | −88.1695 | 1,852 | | | | | x | | |
| 027G | 2022-08-25 | 28.6334 | −88.1695 | 1,852 | | | | | x | | |
| 028G | 2022-08-25 | 28.6335 | −88.1695 | 1,852 | | | | | x | | |
| 029G | 2022-08-25 | 28.6335 | −88.1695 | 1,852 | | x | x | | | | x |
| 030G | 2022-08-25 | 28.6335 | −88.1695 | 1,852 | | | | | | x | |
| 032G | 2022-08-27 | 27.1099 | −91.1663 | 1,398 | | | | x | | | |
| 033G | 2022-08-27 | 27.1099 | −91.1663 | 1,398 | | | | | | x | |
| 034G | 2022-08-27 | 27.1099 | −91.1663 | 1,397 | | x | x | | | | x |
| 035G | 2022-08-27 | 27.1099 | −91.1663 | 1,398 | | | | | x | | |
| 036G | 2022-08-27 | 27.1098 | −91.1663 | 1,397 | | | | | x | | |
| 037G | 2022-08-27 | 27.1098 | −91.1663 | 1,398 | | x | | | | | |
| 038G | 2022-08-27 | 27.1099 | −91.1663 | 1,398 | | | | | x | | |
| 039G | 2022-08-27 | 28.6337 | −88.1699 | 1,397 | | | | | x | | |

# Coral Imaging

Seven ROV dives (Table 7) focused on imaging corals at impact or reference sites to assess recovery or resilience.

**Table 7.** Dates and number of coral markers visited on each ROV dive. Detailed list is in Appendix A.

| Date | Number of Markers | Site(s) |
|---|---|---|
| 2022-08-20 | 15 | Gloria Dome (MC297) |
| 2022-08-21 | 26 | Gloria Dome (MC297) |
| 2022-08-22 | 24 | Biloxi Dome (MC294) |
| 2022-08-24 | 17 | Biloxi Dome (MC294) |
| 2022-08-25 | 34 | Dauphin Dome (MC344) |
| 2022-08-27 | 37 | St. Tammany Basin (GC852) |
| 2022-08-28 | 5 | Gloria Dome (MC297) |

# Benthic Landers

Benthic frames equipped with environmental sensors were deployed to assess short-term variability. Two landers, provided by USM, that were deployed during a previous cruise (NOAA Ship *Pisces*-PC-22-02) were retrieved. In addition, two landers provided by URI were frequently deployed and retrieved on the Nancy Foster cruise (Table 8). The USM landers were equipped with sensors to monitor temperature, salinity, pressure, turbidity, fluorescence, current velocity, and acoustic backscatter. The URI landers were equipped with sensors to monitor temperature, salinity, turbidity, fluorescence, current velocity, and dissolved oxygen.

**Table 8.** Deployment of benthic landers. *Deployed on Pisces leg 1 (PC-22-02) but retrieved on Nancy Foster leg 1 (NF-22-06).

| Lander | Date/Time Deployed (UTC) | Date/Time Retrieved (UTC) | Latitude | Longitude | Deployment Depth (m) |
|---|---|---|---|---|---|
| **USM1** | 7/6/22 03:45* | 8/9/22 17:00 | 29.43820 | −87.5760 | 72.60 |
| **USM2** | 7/10/22 03:30* | 8/9/22 11:30 | 29.32945 | −87.7719 | 109.00 |
| **URI1** | 8/21/22 03:20 | 8/22/22 23:25 | 28.68232 | −88.3452 | 1,580.38 |
| **URI2** | 8/22/22 16:38 | 8/22/22 18:43 | 28.67228 | −88.4762 | 1,367.73 |
| **URI1** | 8/24/22 14:17 | 8/28/22 23:50 | 28.67228 | −88.4762 | 1,368.49 |
| **URI2** | 8/27/22 15:02 | 8/27/22 22:09 | 27.11011 | −91.1664 | 1,398.96 |

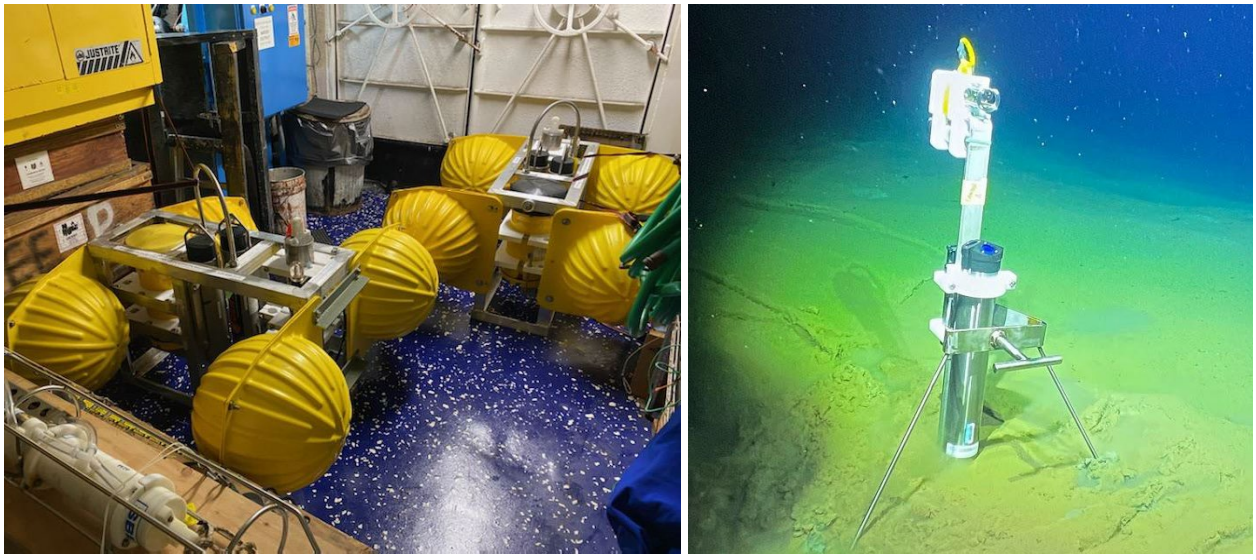

**Figure 3.** Benthic landers for mesophotic (left) and deep (right). Photo credit: Leo Macelloni, USM (left); Randy Clark NOAA/NCCOS (right).

# NF-22-06 Daily Summaries

(Times are UTC)

Site names correspond to those in Appendix A.

## Day 1: Transit and multibeam mapping, Horn Dome on 08/17/2022

Objectives for the day included transiting to Horn Dome and conducting multibeam mapping. The ship left Pascagoula at 1645 hr and arrived at Horn Dome at approximately 0100 hr (8/18/2022), whereby multibeam mapping commenced at 0130 hr. The ROV navigation team had trouble with the ultra-short baseline (USBL) system, and they subsequently planned a calibration site to drop an acoustic beacon and test on 8/18.

## Day 2: ROV Navigation testing, Horn Dome on 08/18/2022

Daily objectives included collecting water samples, testing USBL navigation, and conducting multibeam mapping. Overall operations conducted today included an early-morning CTD cast for the sound velocity file required for USBL calibration, followed by an attempt at calibrating the Sonardyne USBL system. However, issues with resolving the moon pool position relative to the GPS and other navigational instrument offsets resulted in an unsuccessful calibration. This was despite several hours of checking offsets and discussions with shore-side experts. By 1400 hr, operations transitioned to conducting ship drills and then completing 2 CTD casts with water samples for eDNA, nutrients, SPM, chlorophyll, and POM. The planned mapping target was an area north of Horn Dome, where there is a gap between the recently mapped Hassler data and Horn Dome.

## Day 3: USBL calibration, Horn Dome on 08/18/2022

Objectives included USBL calibration and, if successful, CTD and water samples; ROV operations to image corals, collect biological samples, and conduct video transects. Early in the morning, a crew member tested positive for Covid. This person was isolated, and all close contacts were to be tested in 5 days. Masks were required inside. The ship headed to shore for an at-sea transfer, which was completed at 1945 hr. After the transfer, the ship headed back to the area west of Biloxi Dome for mapping. Mapping commenced around 0000 hr. Pelagic Research Services sent calibration instructions for the navigation technician.

## Day 4: ROV Dive 1, Gloria Dome on 08/20/2022

Objectives included USBL calibration and, if successful, CTD and water samples; ROV operations to image corals, collect biological samples, and conduct video transects. Navigation calibration was successful with a beacon, with calculated offset resolution at about 3–5 m. At 0558 hr, a CTD cast was made, and water samples for nutrients and eDNA were collected. The ROV was launched at 1315 hr with a target depth of 1,569 m. The ROV landed at 1450 hr and began imaging corals at M6 and M2. The ROV collected two water samples at M2 (1516) and three at M06 (1713). At 2030 hr, eight push cores were collected at M2. Starting at 2104 hr, two 300-m video transects (MC297a sections 1 and 2) were conducted and ended at 2156 hr. Transects were predominantly over

softbottom environments, with a few scattered carbonate blocks with tubeworm casings. No octocorals were observed along the transects away from the primary site. Due to time constraints, no biological collections were made. The ROV left bottom at 2158 hr and arrived on deck at approximately 2300 hr. The Chief Survey Tech informed the science team that the flow-through fluorometer system was not working properly.

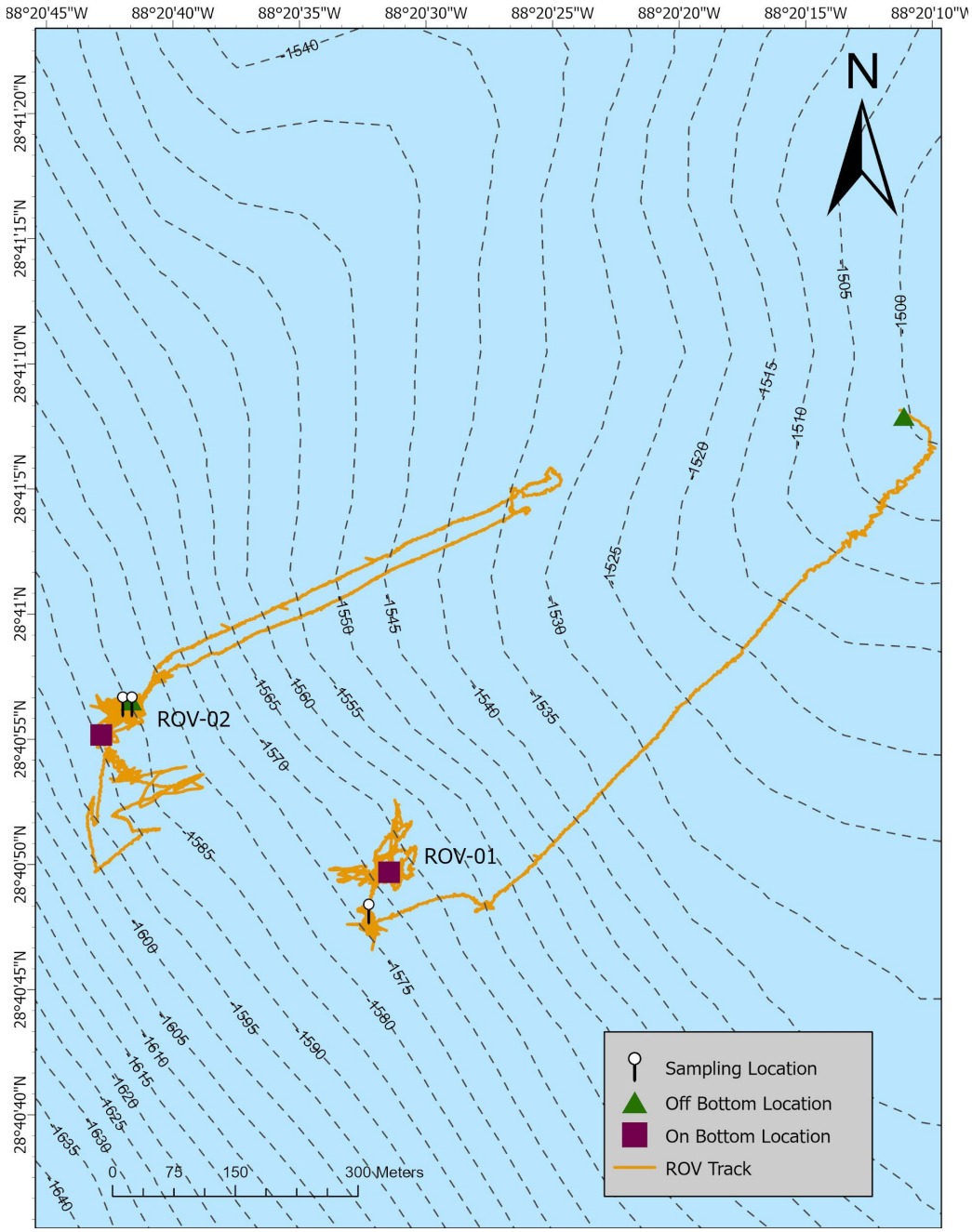


**Figure 4.** ROV track for dives 1 and 2 conducted on 08/20–8/21/2022 at Gloria Dome. Black dashed lines are depth contours in meters.

## Day 5: ROV Dive 2, Gloria Dome on 08/21/2022

Objectives included CTD and water sampling, ROV operations including coral imaging, water sampling, sediment core sampling, biological collection, benthic lander deployment, and video transects. Target depth was 1,580 m. A CTD cast was made at 1003 hr; water samples were collected for POM and nutrient analysis. The ROV launched at 1327 hr and arrived on bottom at 1511 hr. The ROV headed to coral imaging site M3 and deployed a benthic lander approximately 27 m west of the M3 marker, with a plan to retrieve the lander on 8/25. At 1605 hr, two water samples were taken at M3. Target coral colonies were imaged at M3. At 1908 hr, eight push cores were taken at M3. Transects MC297K and MC297Z were started at 1933 hr and concluded at 2125 hr. No hardbottom was observed during the transects despite traversing areas of predicted highly suitable habitat for *Paramuricea biscaya*. Following transects, corals were imaged at site MM1. Three water samples were collected at MM1 at 2142 hr. The ROV concluded operations at depth at 2,238 m, having imaged 14 colonies. The ROV was back on deck at 2345 hr. Four of the five Niskin bottles were empty, so the team replaced components to prevent future leakage. The multibeam target was an area between Horn Dome and the Pinnacles.

## Day 6: ROV Dive 3, Biloxi Dome on 08/22/2022

Objectives included retrieval of the USBL calibration beacon at Horn Dome; ROV operations including coral imaging, water sampling, sediment core sampling, biological collection, benthic lander deployment, and video transects at Biloxi Dome. Target depth was 1,369 m. The ROV launched at 1448 hr and arrived on bottom at 1628 hr. The ROV headed to imaging station marker 44 and deployed the benthic lander at 1645 hr. The ROV headed to AA for water samples and coral imaging. At 1658 hr, two water samples were taken, and coral colonies were imaged until 1818 hr. During imaging, the crew advised the co-chief scientists that another crew member had tested positive for Covid and would need to be transported back to Pascagoula. At 1837 hr, three water samples were collected at station marker 44, and the benthic lander was retrieved. At 1856 hr, the ROV left the bottom and arrived on the deck at 1956 hr. The crew and science team collectively decided to pick up the benthic lander deployed at Gloria Dome prior to heading back to Pascagoula. The ship headed to Gloria Dome at 2000 hr.

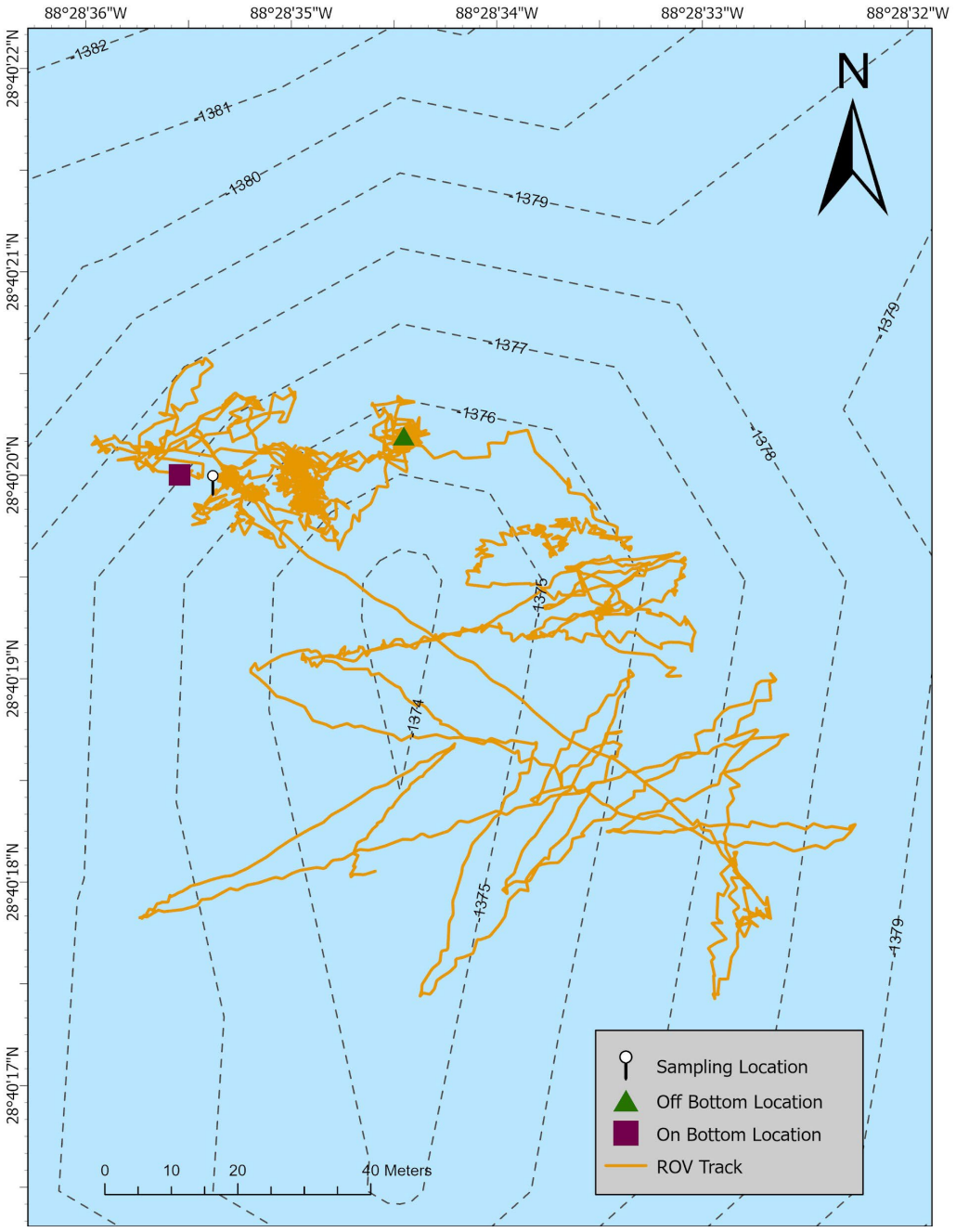


**Figure 5.** ROV track for dive 3 conducted on 8/22/2022 at Biloxi Dome**.** Black dashed lines are depth contours in meters.

## Day 6: ROV Dive 4, Gloria Dome on 08/22/2022

Objectives of this dive included ROV operations to retrieve benthic lander and collection of water samples. Target depth was 1,575 m. The ROV was deployed at 2113 hr and arrived on bottom at 2227 hr. Five water samples were collected above the benthic lander before it was retrieved and brought to the surface. The ROV was on deck at 2301 hr. Multibeam surveys were conducted west of Gloria Dome until 0100 (8/23) when the ship headed to Pascagoula for crew member transfer.

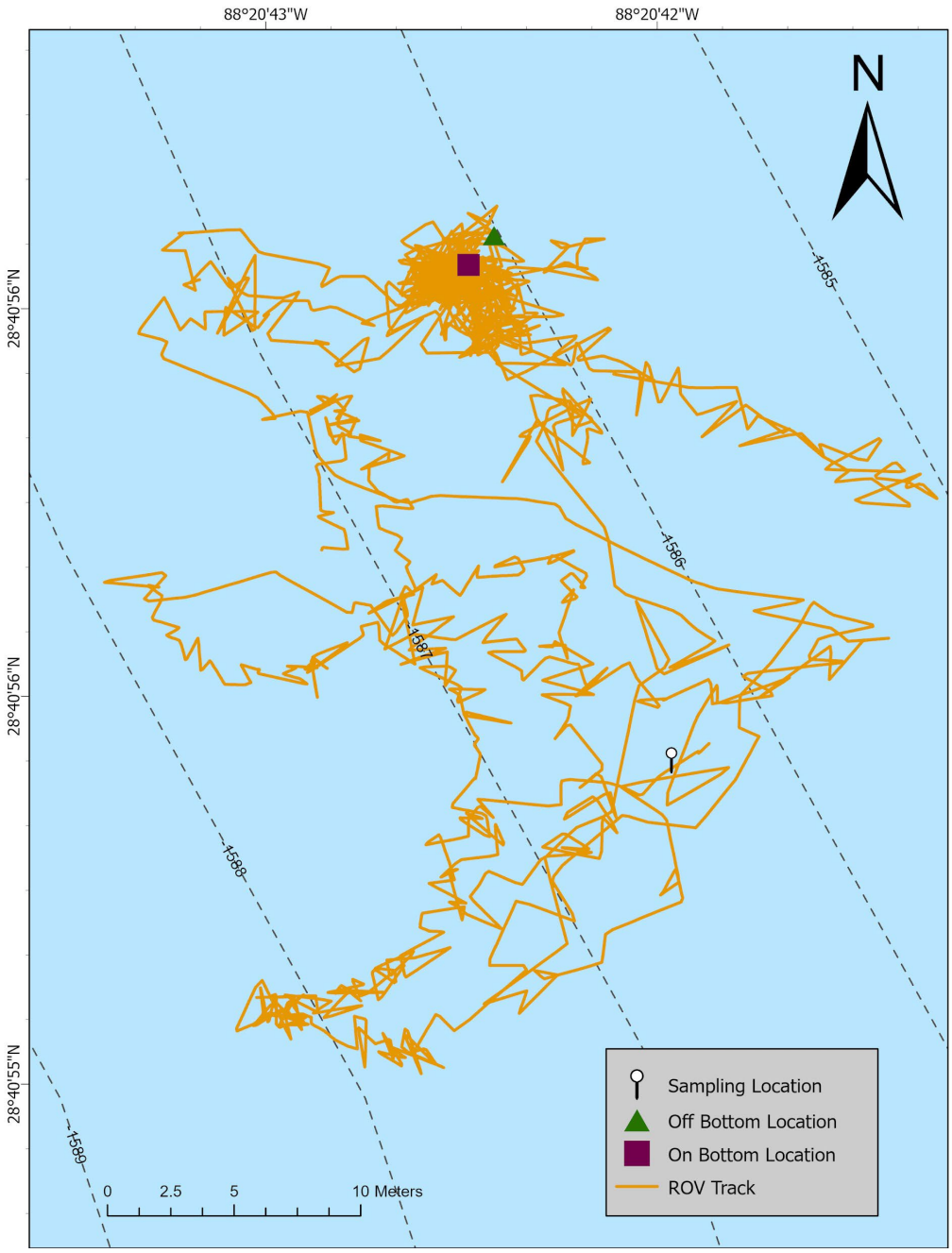


**Figure 6.** ROV track for dive 4 conducted on 8/22/2022 at Gloria Dome**.** Black dashed lines are depth contours in meters.

## Day 7: Transit on 8/23/2022

Completed transit to Pascagoula to drop off Covid-positive crew member. All other crew and science team members tested negative. The crew sail at 1645 hr to resume multibeam mapping near Biloxi Dome.

## Day 8: ROV Dive 5, Biloxi dome on 8/24/2022

Objectives for the day included CTD and water sampling, ROV operations with coral imaging, water sampling, sediment core sampling, biological collection, benthic lander deployment, and video transects. A CTD cast and water samples for eDNA, POM, and nutrient analysis were conducted at 1005 hr. The ROV was launched at 1300 hr and on bottom at 1409 hr, with a target depth of 1,367 m. The lander was deployed at 1418 hr at coral imaging marker AA and scheduled to be retrieved on 8/31. Two water samples were taken at coral imaging marker 44 and corals were imaged until 1553 hr. Three water samples and eight push cores were collected at coral imaging marker AA. From 1704 hr to 2230 hr, the ROV conducted video transects (MC294H, sections 1 and 2; MC294J, sections 1 and 2; MC294Z). Fish observed included rattails, cusk eels, halosaurs, and tripodfish. Mobile invertebrates observed included sea stars and crabs (*Chaecon*). Three sea stars (*Nymphaster arenatus*) were collected. ROV left bottom at 2230 hr and was on deck at approximately 2345 hr.

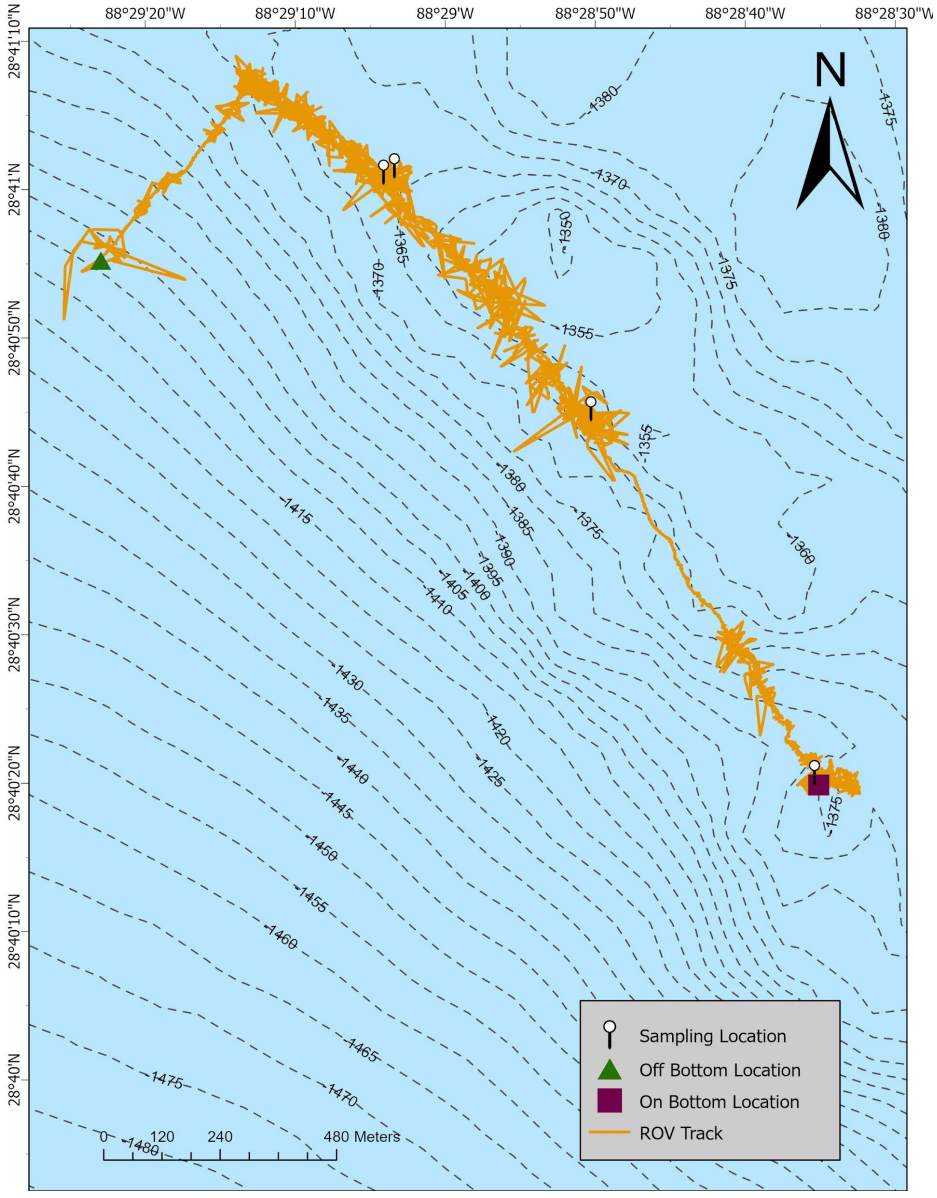


**Figure 7.** ROV track and sampling locations for dive 5 conducted on 8/24/2022 at Biloxi Dome.

## Day 8: ROV Dive 6, Dauphin Dome on 8/25/2022

Objectives for the day included CTD and water sampling, ROV operations with coral imaging, water sampling, sediment core sampling, biological collection, and video transects. The target depth for the dive was 1,862 m. A CTD cast and water sampling for eDNA, POM, and nutrient analysis were taken at 1007 hr. The ROV launched at 1310 hr and landed on bottom at 1427 hr. The ROV transited to marker AA and took two water samples. Corals were imaged at S20 from 1440 hr to 1748 hr; however, not all priority colonies were imaged. *Bathypathes*, *Clavium*, *Stichopathes*, and bamboo corals were observed. A few *P. biscaya* colonies were overgrown with Stoloniferans. Three water samples and eight push cores were taken at marker M09. Video transects were conducted from 1957 hr until 2117 hr (MC344A sections 1 and 2). Few organisms were observed, but several sea cucumbers were present on and off transect. The ROV began its ascent at 2113 hr and was on deck at 2322 hr. No multibeam target was planned due to the long transit required for next-day operations at Henderson Ridge South.

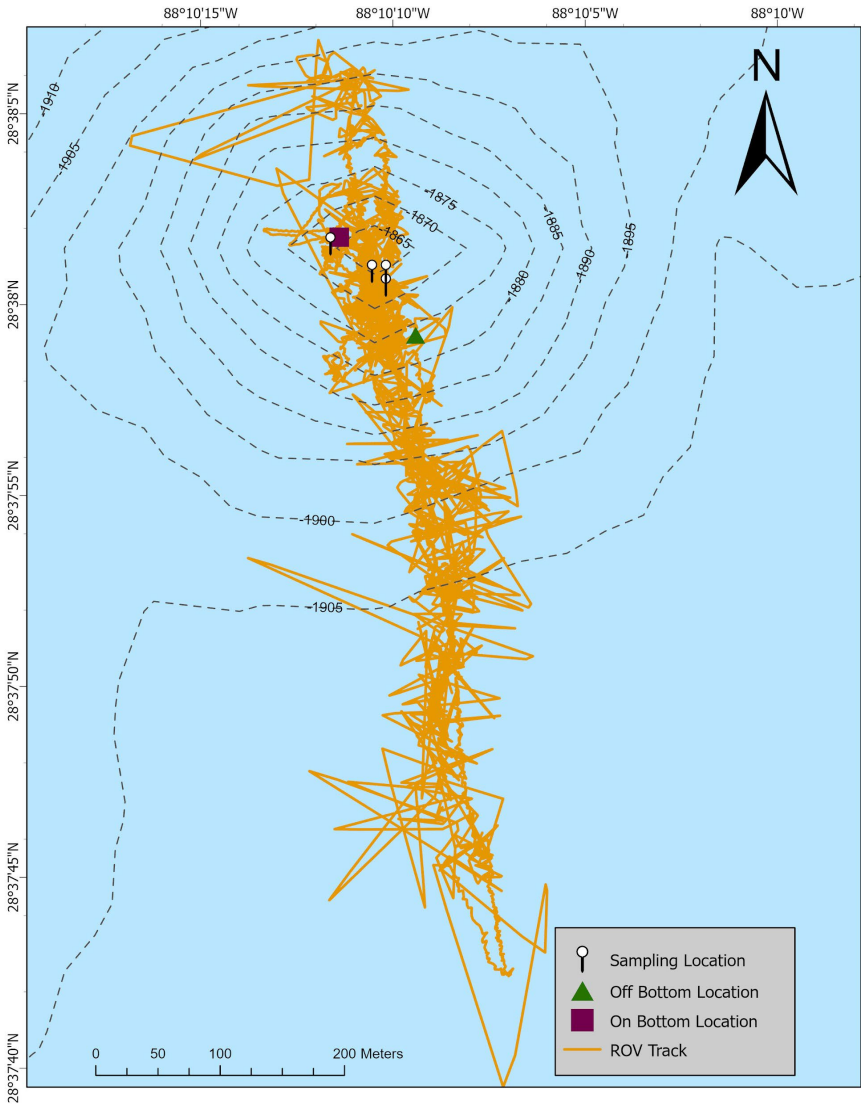


**Figure 8.** ROV track and sampling locations for dive 6 conducted on 8/25/2022 at Dauphin Dome. Black dashed lines are depth contours in meters.

## Day 9: Henderson Ridge South on 8/26/2022

At approximately 1030 hr, the ship arrived on station at Henderson Ridge South. The transit was lengthy as strong currents limited speed to approximately 7 kt. Unfortunately, the dive target was in a zone of the loop current with surface current speeds >2 kt. A CTD cast and water samples for eDNA, POM, and nutrients were made at 1030 hr, and the ship had significant challenges maintaining position and minimizing wire angle throughout the operation. The ROV and ship determined that they would attempt a dive, with the option to recover if the currents were too strong. After launch, the ROV was unable to maneuver, so the dive was canceled, and the ROV was recovered. Two additional CTDs and water samples were conducted: one cast was dedicated to POM and nutrients, and the other for eDNA and nutrients. This was followed by multibeam mapping in the area. The ship then transit-mapped to St. Tammany Basin Rim for operations on 8/27.

## Day 10: ROV Dive 7, St. Tammany Basin Rim on 8/27/2022

Objectives for the day included CTD and water sampling, along with ROV operations with coral imaging, water sampling, sediment core sampling, lander deployment, biological collection, and video transects. A CTD cast and water sampling for eDNA and nutrients analysis were made at 1020 hr. The ROV was launched at 1311 hr and on bottom at 1426 hr. The lander was deployed near coral imaging marker S23 at 1505 hr. Two water samples were collected above marker S24 at 1528 hr, coral colonies were imaged from 1532 hr to 1849 hr, and eight push cores were collected at 2012 hr. Sponge/rock, bamboo coral, and *Madrepora* were collected. No transects were conducted because another crew member tested positive for Covid, at which time the lander was recovered (2209 hr), and the ROV headed to the surface. The ship transited back to Biloxi Dome to recover the lander that was deployed on 8/24 and conduct video transects. Survey technicians noted that the multibeam system was not working.

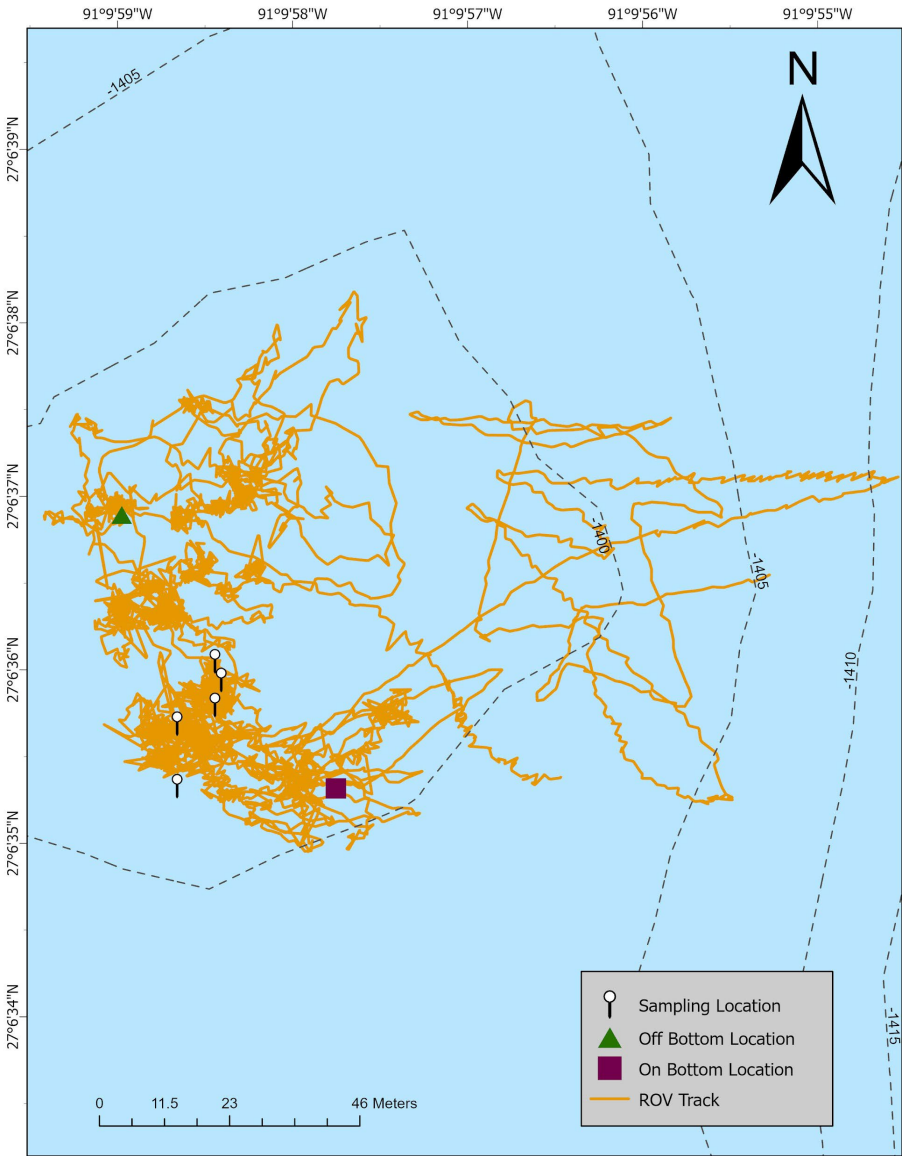


**Figure 9.** ROV track and sampling locations for dive 7 conducted on 8/27/2022 at St. Tammany Basin Rim.

## Day 11: ROV Dive 8, Biloxi Dome on 8/28/2022

Objectives for the day included ROV operations with coral imaging, water sampling, lander retrieval, biological collection, and video transects. Target depth for the dive was 1,396 m. No CTD casts or associated water samples were conducted. The ROV launched at 1359 hr and was on bottom at 1504 hr. Two water samples were collected near coral imaging marker AA at 1507. Coral imaging occurred from 1514 hr to 1524 hr then transitioned to video transects. The ROV transited to a known *Madrepora* site, which was located at 1608 hr. The *Madrepora* condition was poor, with approximately 99% of it dead. Prior survey markers and fishing line were present. Also present were colonies of *Trachathelya* and *Stolonifera* and numerous anemones and urchins. Video transect (MC294B) began at 1736 hr, during which a rare dumbo octopus was observed. The transect was completed at 2011 hr. On transit to MC294X, video of mating squid was captured. Transect MC294X was started at 2023 hr and ended at 2118 hr. A strong current was noted by the ROV crew. Following imaging, the ROV transited to the benthic lander near marker AA, where three water samples were collected above the lander at 2207 hr. The lander was then recovered at 2218 hr, followed by the ROV leaving bottom at 2219 hr and arriving on deck at 2315 hr. The ship then transited to Pascagoula whereby the cruise ended.

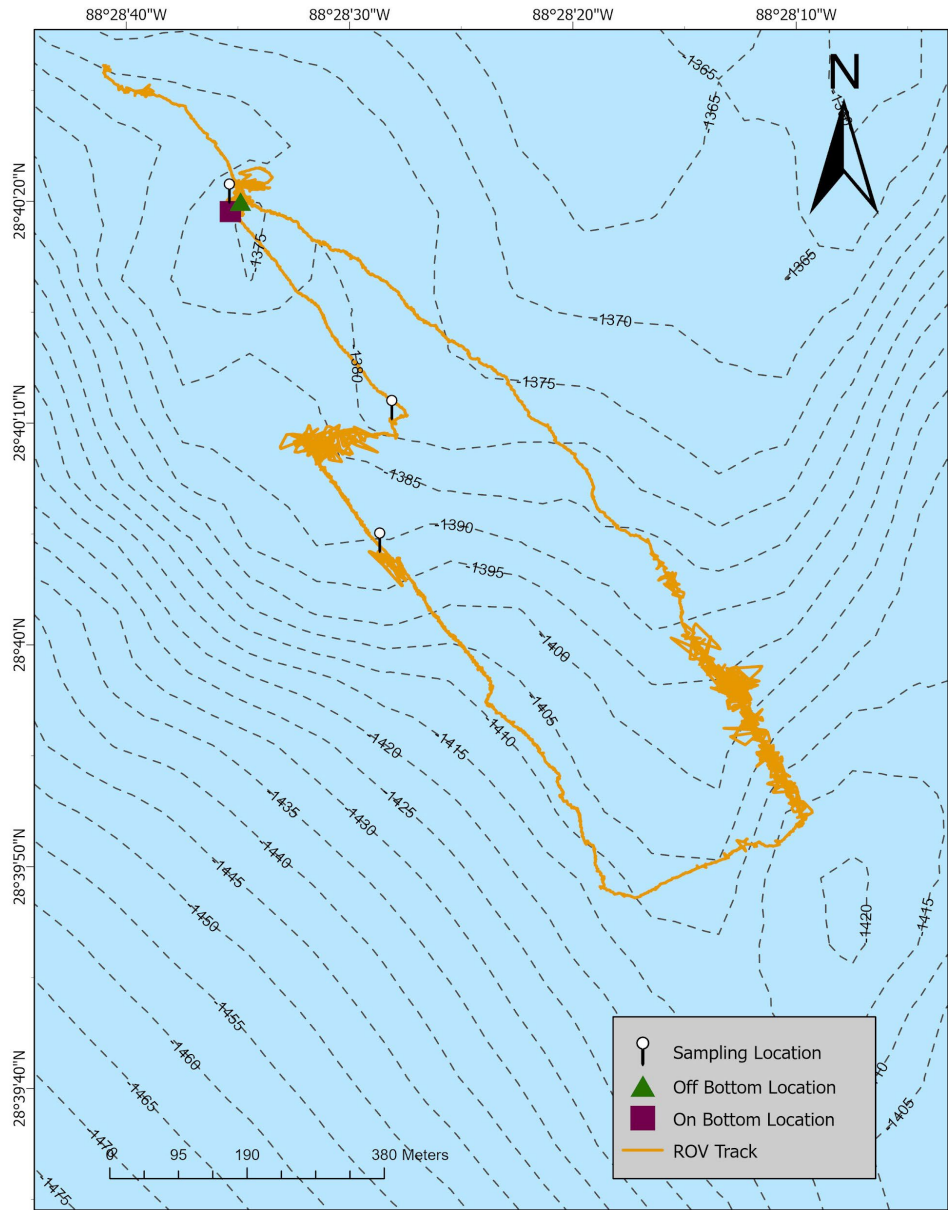


**Figure 10.** ROV track and sampling locations for dive 8 conducted on 8/28/2022 at Gloria Dome. Black dashed lines are depth contours in meters.

# Appendix A: Coral Imagery Details

**Table A1.** Coral imagery details, including marker names, species, and location.

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-20 15:29:19 | M2-2 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6800 | −88.3423 | 1,568.83 |
| 2022-08-20 15:36:35 | M2-1 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6800 | −88.3423 | 1,568.71 |
| 2022-08-20 15:45:47 | S24-1 | *Paramuricea biscaya* | Gloria Dome (MC297 | 28.6800 | −88.3423 | 1,569.02 |
| 2022-08-20 15:46:59 | S24-2 | *Paramuricea biscaya* | Gloria Dome (MC297 | 28.6800 | −88.3423 | 1,569.01 |
| 2022-08-20 15:46:59 | S24-3 | *Paramuricea biscaya* | Gloria Dome (MC297 | 28.6800 | −88.3423 | 1,569.01 |
| 2022-08-20 16:22:22 | M2-3 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6800 | −88.3423 | 1,569.67 |
| 2022-08-20 16:30:36 | M2-4 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6800 | −88.3423 | 1,569.07 |
| 2022-08-20 17:34:15 | M6-8 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.42 |
| 2022-08-20 18:09:16 | M6-9 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.73 |
| 2022-08-20 18:10:22 | M6-1 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.40 |
| 2022-08-20 18:41:14 | M6-7 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.48 |
| 2022-08-20 18:43:32 | M6-6 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.43 |
| 2022-08-20 18:44:54 | M6-4 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.27 |
| 2022-08-20 19:09:39 | M6-5 | *Zoantharia* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.08 |
| 2022-08-20 19:13:56 | M6-2 | *Keratoisidinae* | Gloria Dome (MC297) | 28.6798 | −88.3423 | 1,569.50 |
| 2022-08-21 16:25:12 | M3-32 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.64 |
| 2022-08-21 16:27:47 | M3-31 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.62 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-21 16:29:38 | M3-29 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.96 |
| 2022-08-21 16:31:04 | M3-30 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,585.20 |
| 2022-08-21 16:36:27 | M3-28 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,582.85 |
| 2022-08-21 16:47:53 | M3-6 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6823 | −88.3450 | 1,584.67 |
| 2022-08-21 16:56:00 | M3-24 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3450 | 1,584.50 |
| 2022-08-21 17:31:08 | M3-9 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.39 |
| 2022-08-21 17:38:06 | M3-14 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.19 |
| 2022-08-21 17:43:23 | M3-15 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.79 |
| 2022-08-21 17:46:20 | M3-17 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.01 |
| 2022-08-21 17:47:29 | M3-18 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,584.06 |
| 2022-08-21 17:49:05 | M3-8 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.65 |
| 2022-08-21 18:08:08 | M3-11 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.24 |
| 2022-08-21 18:09:33 | M3-12 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.69 |
| 2022-08-21 18:10:43 | M3-13 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6822 | −88.3449 | 1,583.66 |
| 2022-08-21 21:57:38 | MM1-1 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3450 | 1,583.15 |
| 2022-08-21 21:59:22 | MM1-2 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3450 | 1,583.20 |
| 2022-08-21 22:00:39 | MM1-3 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3450 | 1,582.75 |
| 2022-08-21 22:11:12 | MM1-4 | *Keratoisidinae* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.68 |
| 2022-08-21 22:12:48 | MM1-7 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.69 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-21 22:16:31 | MM1-9 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.49 |
| 2022-08-21 22:18:03 | MM1-8 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.71 |
| 2022-08-21 22:24:58 | MM1-10 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.38 |
| 2022-08-21 22:27:59 | MM1-11 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.63 |
| 2022-08-21 22:34:32 | MM1-12 | *Paramuricea biscaya* | Gloria Dome (MC297) | 28.6824 | −88.3449 | 1,582.23 |
| 2022-08-22 17:11:18 | B8 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.76 |
| 2022-08-22 17:12:00 | A17 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.62 |
| 2022-08-22 17:12:00 | A6 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.62 |
| 2022-08-22 17:13:00 | A5 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.48 |
| 2022-08-22 17:19:00 | B9 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,370.68 |
| 2022-08-22 17:22:55 | A8 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.11 |
| 2022-08-22 17:26:00 | A10 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.76 |
| 2022-08-22 17:28:08 | A14 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.29 |
| 2022-08-22 17:35:00 | A9 | *Paragorgia regalis* | Biloxi Dome (MC294) | 28.6722 | −88.4763 | 1,368.09 |
| 2022-08-22 17:37:00 | A15 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,370.22 |
| 2022-08-22 17:37:00 | A2 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,370.22 |
| 2022-08-22 17:42:32 | F5 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.42 |
| 2022-08-22 17:44:12 | F2 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,370.24 |
| 2022-08-22 17:44:20 | S16-10 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,370.27 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-22 17:52:18 | F6 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.30 |
| 2022-08-22 17:53:20 | F12 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.13 |
| 2022-08-22 17:54:50 | F1 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.66 |
| 2022-08-22 17:59:20 | F10 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.04 |
| 2022-08-22 18:01:19 | F3 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.62 |
| 2022-08-22 18:03:26 | F7 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4764 | 1,369.49 |
| 2022-08-22 18:09:25 | F4 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6723 | −88.4764 | 1,370.33 |
| 2022-08-22 18:16:03 | D7 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.79 |
| 2022-08-22 18:17:05 | D8 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,370.18 |
| 2022-08-22 18:18:32 | D3 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.74 |
| 2022-08-24 14:45:04 | D5 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,369.07 |
| 2022-08-24 14:47:03 | D4 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,369.11 |
| 2022-08-24 14:50:00 | D1 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,369.74 |
| 2022-08-24 14:52:34 | D2 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,369.79 |
| 2022-08-24 15:01:52 | C4 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,370.14 |
| 2022-08-24 15:03:11 | C2 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6721 | −88.4766 | 1,369.95 |
| 2022-08-24 15:09:25 | C1 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,370.08 |
| 2022-08-24 15:19:49 | C8 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,368.28 |
| 2022-08-24 15:21:50 | C5 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6721 | −88.4766 | 1,369.08 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-24 15:23:05 | C7 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6721 | −88.4767 | 1,368.99 |
| 2022-08-24 15:33:59 | B7 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.54 |
| 2022-08-24 15:35:00 | B5 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.86 |
| 2022-08-24 15:39:38 | B10 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4766 | 1,369.48 |
| 2022-08-24 15:41:06 | B4 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.69 |
| 2022-08-24 15:47:51 | B2 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.19 |
| 2022-08-24 15:50:34 | B1 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,370.10 |
| 2022-08-24 15:52:00 | B6 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.92 |
| 2022-08-25 14:52:53 | M42-4 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1698 | 1,849.33 |
| 2022-08-25 14:53:05 | M42-5 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1698 | 1,849.36 |
| 2022-08-25 14:55:52 | M42-3 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1699 | 1,849.44 |
| 2022-08-25 15:00:00 | M42-11 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1698 | 1,849.36 |
| 2022-08-25 15:01:50 | M42-12 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1698 | 1,849.19 |
| 2022-08-25 15:02:46 | M42-10 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1698 | 1,849.50 |
| 2022-08-25 15:13:13 | M42-6 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6339 | −88.1699 | 1,849.20 |
| 2022-08-25 15:26:04 | M42-8 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1699 | 1,849.69 |
| 2022-08-25 15:29:14 | M42-9 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6338 | −88.1699 | 1,849.45 |
| 2022-08-25 15:40:08 | M8-10 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,849.00 |
| 2022-08-25 15:40:15 | M8-9 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.98 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-25 15:41:06 | M8-8 | *Paramuricea biscaya*; Dead colony | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.77 |
| 2022-08-25 15:56:00 | M8-12 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.55 |
| 2022-08-25 15:56:42 | M8-13 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.38 |
| 2022-08-25 16:04:03 | M8-7 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.02 |
| 2022-08-25 16:04:42 | M8-6 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.04 |
| 2022-08-25 16:05:46 | M8-5 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,848.08 |
| 2022-08-25 16:07:03 | M8-1 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,847.90 |
| 2022-08-25 16:20:41 | M8-18 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6337 | −88.1699 | 1,847.84 |
| 2022-08-25 16:27:42 | M10-3 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1697 | 1,851.80 |
| 2022-08-25 16:28:52 | M10-2 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1697 | 1,852.36 |
| 2022-08-25 16:40:48 | M10-4 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6336 | −88.1697 | 1,849.74 |
| 2022-08-25 16:45:04 | M10-6 | *Mala Alcyonacea* | Dauphin Dome (MC344) | 28.6336 | −88.1697 | 1,850.38 |
| 2022-08-25 16:52:03 | M10-5 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6336 | −88.1697 | 1,849.68 |
| 2022-08-25 16:53:41 | M10-9 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6336 | −88.1697 | 1,850.07 |
| 2022-08-25 17:03:00 | M9-24 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1695 | 1,850.46 |
| 2022-08-25 17:05:34 | M9-2 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1695 | 1,851.11 |
| 2022-08-25 17:10:19 | M9-3 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1695 | 1,851.68 |
| 2022-08-25 17:14:41 | M9-6 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1695 | 1,852.90 |
| 2022-08-25 17:16:39 | M9-5 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1696 | 1,852.13 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-25 17:45:14 | MM2-1 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1696 | 1,852.02 |
| 2022-08-25 17:45:49 | MM2-2 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1696 | 1,851.99 |
| 2022-08-25 17:48:23 | MM2-4 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1696 | 1,851.64 |
| 2022-08-25 17:48:34 | MM2-5 | *Paramuricea biscaya* | Dauphin Dome (MC344) | 28.6335 | −88.1696 | 1,851.65 |
| 2022-08-27 15:48:19 | S24-9 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1103 | −91.1662 | 1,395.86 |
| 2022-08-27 15:53:42 | S24-5 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1103 | −91.1662 | 1,398.86 |
| 2022-08-27 15:55:35 | S24-4 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1103 | −91.1662 | 1,399.18 |
| 2022-08-27 15:59:59 | S24-6 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,397.68 |
| 2022-08-27 16:04:34 | S24-7 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,398.14 |
| 2022-08-27 16:10:32 | S24-8 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1103 | −91.1664 | 1398.78 |
| 2022-08-27 16:33:11 | 2-1 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1662 | 1,395.09 |
| 2022-08-27 16:42:36 | 2-2 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,397.68 |
| 2022-08-27 16:43:55 | 2-3 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1662 | 1,397.79 |
| 2022-08-27 16:47:15 | 2-4 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,398.80 |
| 2022-08-27 16:59:12 | 2-6 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,395.28 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-27 17:01:15 | 2-5 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1102 | −91.1663 | 1,395.46 |
| 2022-08-27 17:13:34 | S16-7 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1664 | 1,398.49 |
| 2022-08-27 17:21:51 | S16-1 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1663 | 1,397.73 |
| 2022-08-27 17:24:44 | S16-5 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1663 | 1,396.71 |
| 2022-08-27 17:34:39 | S16-2 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1663 | 1,396.76 |
| 2022-08-27 17:34:39 | S16-3 | *Paramuricea sp.* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1663 | 1,396.76 |
| 2022-08-27 17:34:39 | S16-4 | *Paramuricea sp.* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1663 | 1,396.76 |
| 2022-08-27 17:54:45 | S16-9 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1664 | 1,399.65 |
| 2022-08-27 17:59:01 | S16-8 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1101 | −91.1664 | 1,399.34 |
| 2022-08-27 18:14:00 | S20-19 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,397.01 |
| 2022-08-27 18:16:22 | S20-4 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.18 |
| 2022-08-27 18:16:37 | S20-20 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.23 |
| 2022-08-27 18:17:45 | S20-5 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.20 |
| 2022-08-27 18:18:29 | S20-1 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.36 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-27 18:19:50 | S20-2 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,400.04 |
| 2022-08-27 18:19:50 | S20-3 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,400.04 |
| 2022-08-27 18:43:00 | S20-21 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.06 |
| 2022-08-27 18:43:02 | S20-13 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.07 |
| 2022-08-27 18:44:54 | S20-14 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.56 |
| 2022-08-27 18:46:49 | S20-18 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,398.91 |
| 2022-08-27 18:46:59 | S20-16 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,398.96 |
| 2022-08-27 18:47:24 | S20-17 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.04 |
| 2022-08-27 18:48:53 | S20-15 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1099 | −91.1663 | 1,399.56 |
| 2022-08-27 20:36:18 | S20-12 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1100 | −91.1662 | 1,396.52 |
| 2022-08-27 20:45:03 | S20-10 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1100 | −91.1663 | 1,397.61 |
| 2022-08-27 20:56:33 | S20-11 | *Paramuricea biscaya* | St. Tamanny Basin Rim (GC852) | 27.1100 | −91.1662 | 1,399.10 |
| 2022-08-28 15:14:15 | A18 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6723 | −88.4764 | 1,368.80 |
| 2022-08-28 15:16:00 | A16 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.48 |
| 2022-08-28 15:22:01 | A3 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,368.46 |

| Timestamp (UTC) | Marker-Coral ID | Species | Site | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|---|---|
| 2022-08-28 15:23:00 | A7 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6722 | −88.4765 | 1,369.00 |
| 2022-08-28 17:45:46 | M3-16 | *Paramuricea biscaya* | Biloxi Dome (MC294) | 28.6686 | −88.4752 | 1,381.13 |


DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA


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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE