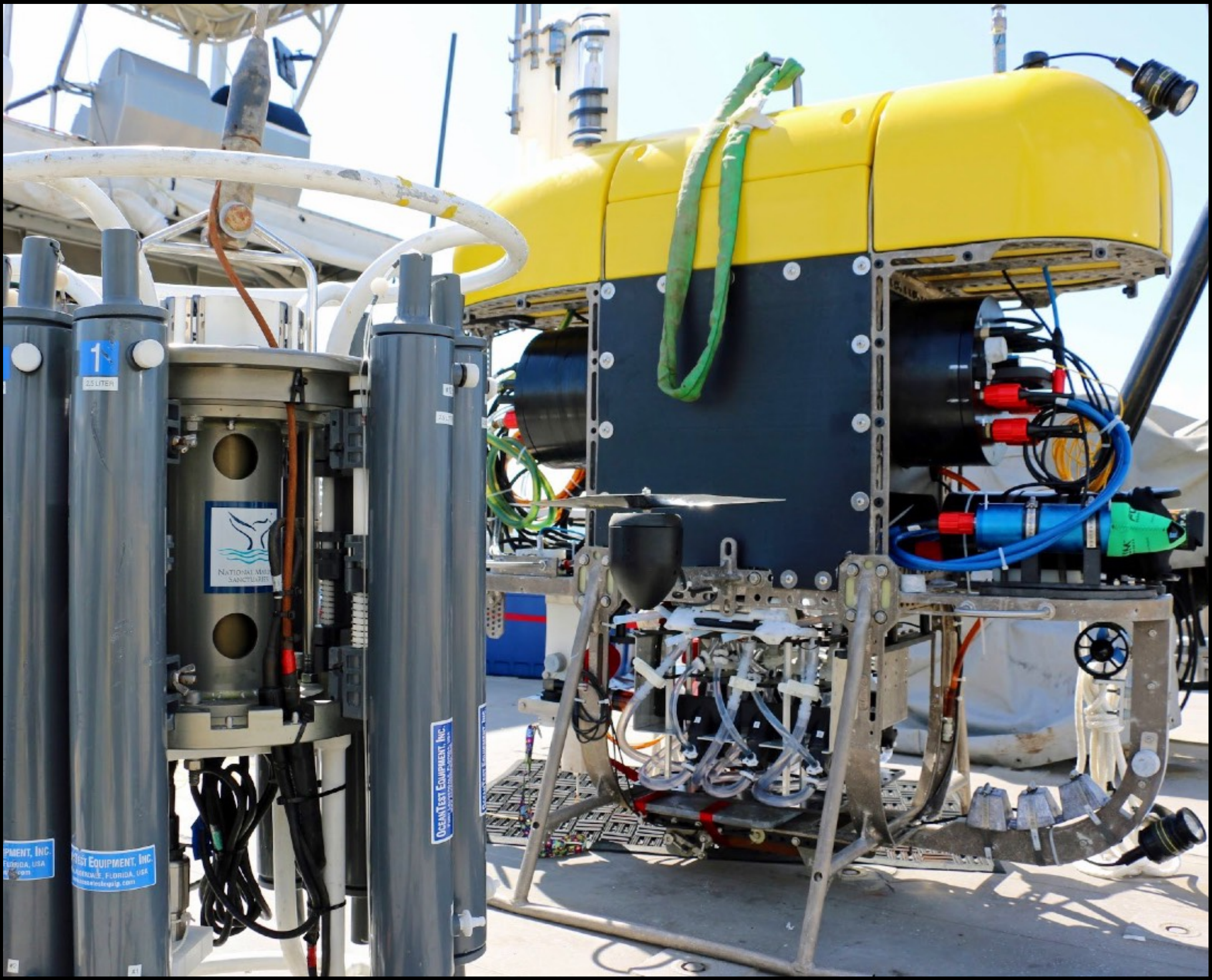

Alt Text: Oceanographic equipment onboard a research vessel featuring a CTD rosette sampler in the foreground and an autonomous underwater vehicle (AUV) with a yellow housing in the background.

ADVANCING eDNA METHODS FOR DEEP-SEA EXPLORATION

FINAL REPORT

NOAA OCEAN EXPLORATION GRANT NA18OAR0110289

LEHIGH OCEANS NATIONAL MUSEUM of NATURAL HISTORY Smithsonian HARVEY MUDD COLLEGE NOAA OCEAN EXPLORATION

TABLE OF CONTENTS

PROJECT DETAILS

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Emma Saso. Intern. Smithsonian Institution, Washington, DC.
Susan Ambrose. Master's Student. Lehigh University, PA.
Penny Demetriades. Undergraduate Student. Lehigh University, PA.

Award Period: 09/1/2018 to 08/31/2023

Alt Text: A satellite image map highlighting two research areas targed by the project indicated by dashed red circles—one in the Gulf of Mexico offshore from the southern United States, and the other near Puerto Rico in the Caribbean Sea.

AREAS OF OPERATION

FIELDWORK FUNDED BY THE GRANT

- MT19, R/V *Manta* with AUV *Mesobot*. September 23-27, 2019. Exploring Deepwater Ecosystems with eDNA. Gulf of Mexico Santiago Herrera Chief Scientist.

LEVERAGED FIELDWORK

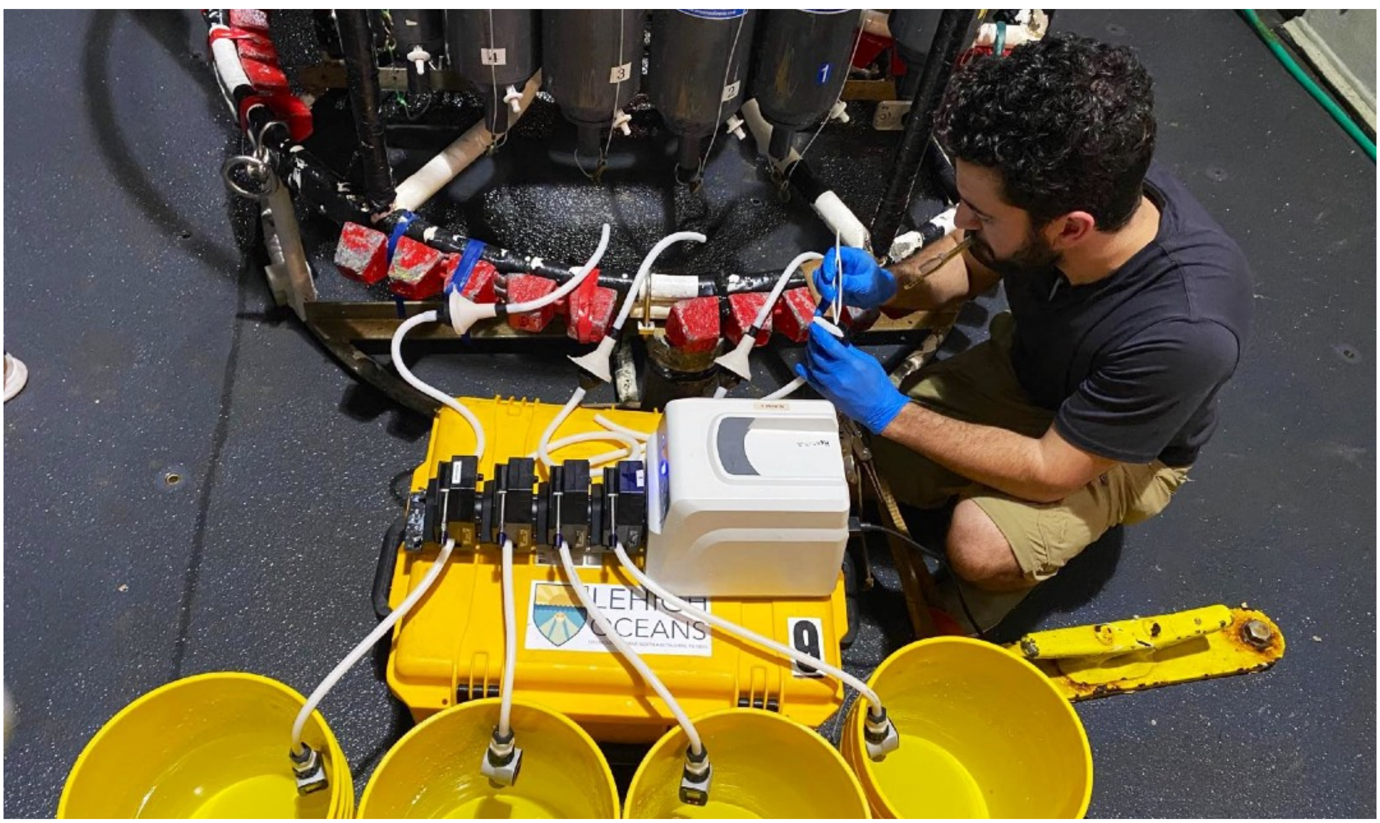
- PS21-04, R/V *Point Sur* with ROV *Global Explorer.* August 4-17, 2021. Connectivity of Coral Ecosystems. Gulf of Mexico. Santiago Herrera Chief Scientist. Funded by NOAA National Centers for Coastal Ocean Science, Competitive Research Program and Office of Ocean Exploration NA18NOS4780166 to Herrera.
- NF-22-02, NOAA Ship *Nancy Foster* with ROV *Global Explorer.* April 6-19, 2022. Illuminating pelagic and benthic biodiversity in deep waters off Puerto Rico. Puerto Rico. Andrea Quattrini Chief Scientist. Funded by NOAA Ocean Exploration NA21OAR0110202 to Quattrini.
- FkT230417, R/V *Falkor (too)* and ROV *SuBastian*. April 17- May 6, 2023. Health Diagnostics of Deep-Sea Coral. Puerto Rico. Colleeen Hansel Chief Scientist. Funded by Schmidt Ocean Institute to Hansel.

INTRODUCTION

Over the past six years, our team has pioneered the development of a framework for environmental DNA (eDNA) sampling, quantification, and sequencing to explore deep-sea ecosystems.

Through this project, the research team developed original methodologies, tested new technologies, populated reference databases, collected unparalleled datasets, built human capacity through education and training, and generated scientific knowledge that advances our capacity to explore, characterize, and monitor the deep sea. These accomplishments were achieved through partnerships with academic, non-profit, and federal institutions.

This project increased the observational and interpretative capabilities for exploration in deep-sea ecosystems. It generated biodiversity baselines in unknown or poorly known areas of the Gulf of Mexico and the southeastern US EEZ. This project has greatly enhanced our ability to explore the ocean, thereby supporting the primary mission of NOAA Ocean Exploration.



Alt Text: A researcher on deck carefully processing seawater samples using tubing, filters, and collection buckets, accompanied by specialized portable laboratory equipment labeled 'Lehigh Oceans'

Alt Text: A solitary deep-sea fish with dark skin and prominent teeth swimming in the open, dark waters of the deep ocean, surrounded by suspended particles. Image courtesy of the Schmidt Ocean Institute.

CHALLENGES

To realize the transformative potential of eDNA for ocean exploration of deep-sea environments, the project tackled the following critical challenges:

1. eDNA concentration declines exponentially with depth. Therefore, **conventional small-volume water sampling (1-5 liters) is insufficient** to capture representative samples of eDNA in the deep sea and can lead to underestimating biodiversity.
2. The **PCR primers** commonly used to enrich DNA barcode genes, like the metazoan COI or 18S, target regions that **lack sufficient variability** to differentiate genera or species of ecologically important animal taxa, such as corals and sponges. Further, these primers are often **not specific to taxa of interest**, limiting their efficiency.
3. Performing taxonomic classifications of eDNA sequences relies on good reference sequences matching them. **Most of these references do not exist**.
4. The **temporal and spatial scales** of biodiversity measured through eDNA sequencing **are unknown** in most deep-sea environments.

SUMMARY OF ACCOMPLISHMENTS

We **addressed these critical challenges** by creating new technologies and resources that can now be widely adopted to realize the transformative potential of eDNA.

1. Successfully **deployed a high-volume *in situ* eDNA sampler** to sample eDNA from the water column and near the seafloor, down to 1000 m, using Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs).

2. **Developed PCR primers that selectively enrich coral** 28S DNA from marine eDNA samples, enabling the identification of coral genera and species (including octocorals, scleractinians, and black corals), as well as medusozoans and ctenophores.

3. Built a **comprehensive reference DNA sequence database for corals** from the Gulf of Mexico and the Caribbean.

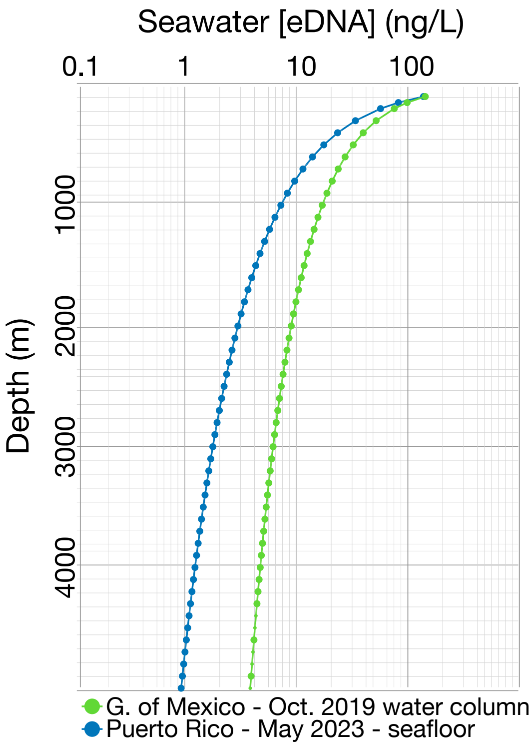
4. Developed a general empirical **model for predicting the degradation rate of eDNA** in diverse marine environments. This model is crucial for inferring eDNA signals' ages and source locations.

Alt Text: A smiling researcher aboard a ship wearing gloves, collecting clear seawater from scientific equipment into a large sample bag, with research apparatus labeled 'SuBastian' partially visible. Image courtesy of the Schmidt Ocean Institute.

Alt Text: A bright yellow autonomous underwater vehicle (AUV) floating at the ocean surface after surfacing from a mission, surrounded by gentle waves.

TECHNOLOGY TESTING

eDNA is conventionally sampled from small volumes of seawater (1-5 liters) obtained with Niskin bottles. However, this approach is inadequate to obtain representative eDNA samples from the deep sea. eDNA concentration in the ocean decreases exponentially with depth. Therefore, large-volume eDNA sampling (>40 liters) is necessary to achieve unbiased eDNA sampling in the deep sea.



To address this challenge, we **tested a prototype large-volume *in situ* eDNA sampler** [6], developed at the Woods Hole Oceanographic Institution (WHOI), during an expedition on the Research Vessel (R/V) *Manta* between September 23 - 27, 2019.

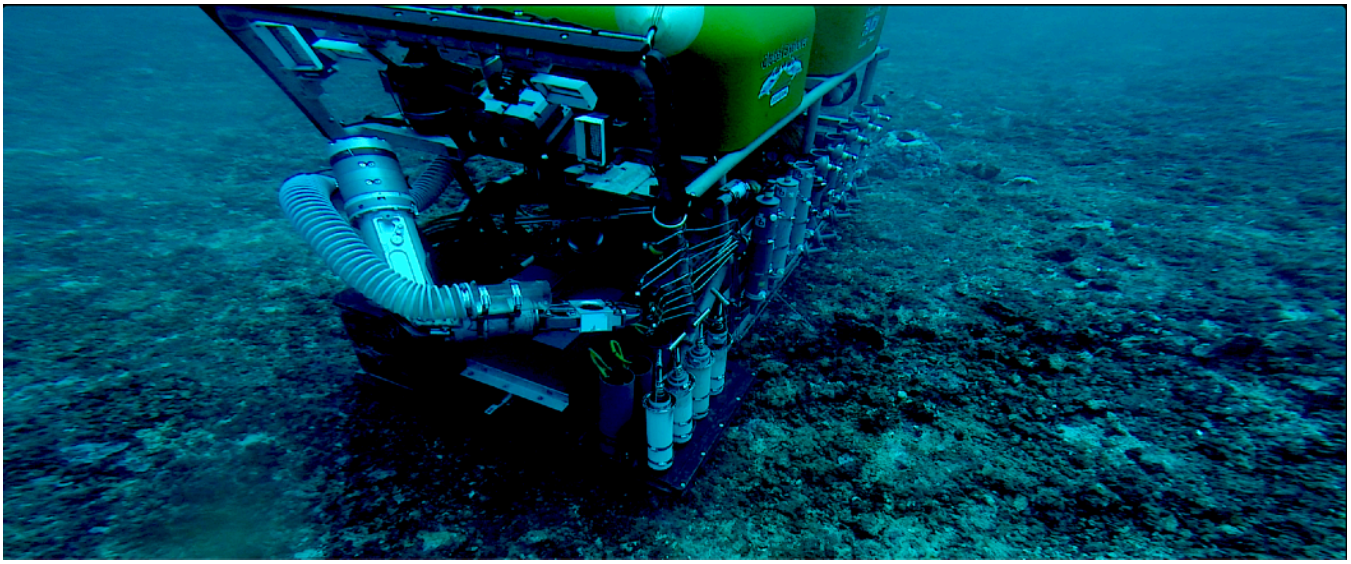
In this expedition, MT19, the team sampled eDNA through on-board filtration from water samples collected with a Niskin rosette and through the *in situ* eDNA sampler mounted on AUV *Mesobot* (developed as part of the Woods Hole Oceanographic Institution's Ocean Twilight Zone Project, funded as part of The Audacious Project housed at TED). This cruise targeted a relatively well-known setting: the deepwater coral and fish communities near the Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico. The expedition was a collaborative effort between the PIs of this grant (Herrera, McDermott - Lehigh University), colleagues at WHOI (Govindarajan and Yoerger), and the Sanctuary. This was the **first deployment of the *in situ* sampler on Mesobot in the deep sea, down to 400 meters**.

The expedition performed 17 CTD casts **[11]**, and 5 AUV *Mesobot* dives, totaling 14h 52 min in the water and reaching depths of 400 meters. Two hundred thirty-eight eDNA samples were collected during the expedition, including 42 samples taken with *Mesobot* and 196 taken from CTD/Niskin bottles deployed from the R/V *Manta*.

We amplified and sequenced the V9 region of the 18S rRNA, a DNA barcode for a broad range of invertebrates. While both Niskin and *in situ* **eDNA samples revealed depth-related biodiversity changes, the *in situ* large-volume samples detected 66% more taxa than the Niskin small-volume samples**. The number of unique taxa detected in the large-volume samples was almost four times bigger than those detected from Niskins. We demonstrated that large-volume eDNA sampling in the deep sea is possible with this new *in situ* filtering system, particularly when coupled with autonomous platforms **[3,6].**

We also performed the **first deployment of the *in situ* eDNA sampler on an ROV** during expedition FkT230417 that explored hard-bottom habitats off Puerto Rico using the R/V *Falkor (too)* and ROV *SuBastian* between April 17- May 6, 2023. This expedition was funded by the Schmidt Ocean Institute. The expedition performed 24 ROV *SuBastian* dives. We collected . One hundred forty-six eDNA samples were collected during the expedition, including 60 eDNA samples taken *in situ*, down to 950 meters, and 67 filtered onboard the *Falkor (too)* from Niskin bottles mounted on *SuBastian*. Nineteen additional eDNA samples were taken with the ship's CTD rosette.

Alt Text: A bright yellow autonomous underwater vehicle (AUV) floating at the ocean surface after surfacing from a mission, surrounded by gentle waves.



Alt Text: Deep-sea remotely operated vehicle (ROV) exploring the seafloor, equipped with multiple sampling instruments and mechanical arms, immersed in the dark blue underwater environment.

METHODS DEVELOPMENT

CORAL PRIMERS

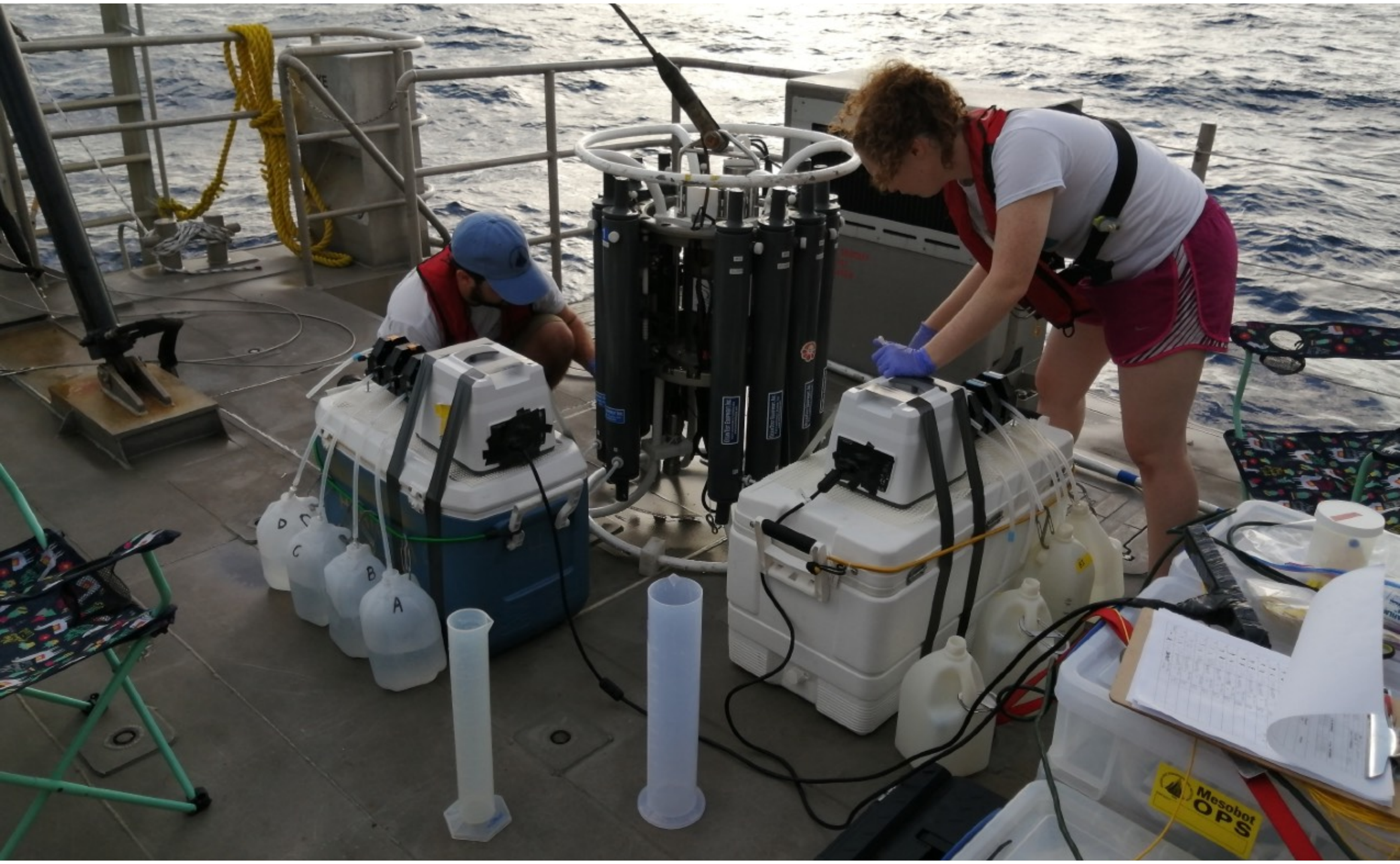
Deep-sea corals are important ecosystem engineers in the deep sea and create essential habitats for fish and invertebrate associates. We designed **new PCR primers** that efficiently enrich a variable region of the nuclear 28S DNA gene from anthozoans, encompassing all coral groups, including octocorals, black corals, and scleractinians. The 28S barcode region distinguishes anthozoan coral genera and, in many cases, species. One primer set enriches black coral, octocoral, and scleractinian coral eDNA; the second is highly specific to scleractinians. Preliminary evidence demonstrates that these primers are well-suited for enriching comb jelly and jellyfish DNA **[13]**. These novel primer sets significantly expand the scope of eDNA methodologies for corals and gelatinous deep-sea invertebrates.

We **validated** the performance of these new primer sets by combining DNA barcodes of animal specimens, eDNA sampling, and video annotations during remotely-operated vehicle (ROV) dives and CTD casts at Bright Bank, Stetson Bank, Green Canyon, and Viosca Knoll in the Gulf of Mexico. These samples and data were collected during expedition PS21-04, between August 4-17, 2021, on the R/V *Point Sur*. The samples were collected with ROV *Global Explorer*'s hydraulic manipulators, Niskin bottles, and the ship's CTD Niskin Rosette. This expedition was part of the CYCLE project, funded by award NA18NOS4780166 from NOAA's National Centers for Coastal Ocean Science, Competitive Research Program and the Office of Ocean Exploration to PI Herrera, and is aimed at understanding the connectivity of coral ecosystems in the northwestern Gulf of Mexico. The ROV video annotations were performed through a contract from the Mesophotic and Deep Benthic Communities (MDBC) project, led by the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior (DOI), to Herrera.

The PS21-04 expedition conducted 12 CTD casts and 11 ROV dives. A total of 204 eDNA samples were collected during the expedition, including 60 samples taken with the ROV and 144 taken from CTD/Niskin bottles deployed from the R/V *Manta*.

eDNA sequencing demonstrated that these primers substantially enrich coral eDNA. On average, **72% of eDNA sequencing reads generated with these primers from near-seafloor samples collected over coral habitats are identified as coral sequences**. The amplification success and percentage of coral sequencing reads in the samples using the primers reflect the abundance of corals at the study sites. The most abundant coral species at each site are detected using eDNA sequencing, and the video annotation and eDNA sequencing datasets are complimentary; some coral species are detected in eDNA but not in video, and vice-versa. These results were published by McCartin et al. (2023) **[4]**.

Alt Text: A remotely operated underwater vehicle's robotic manipulator arm carefully collecting samples of bright yellow-orange deep-sea coral against a dark ocean backdrop.



Alt Text: Two researchers aboard a research vessel carefully collecting seawater samples from a CTD rosette sampler, processing them into multiple containers and filtration units set up on the ship's deck.

eDNA FILTRATION PROTOCOL FROM NISKIN BOTTLES

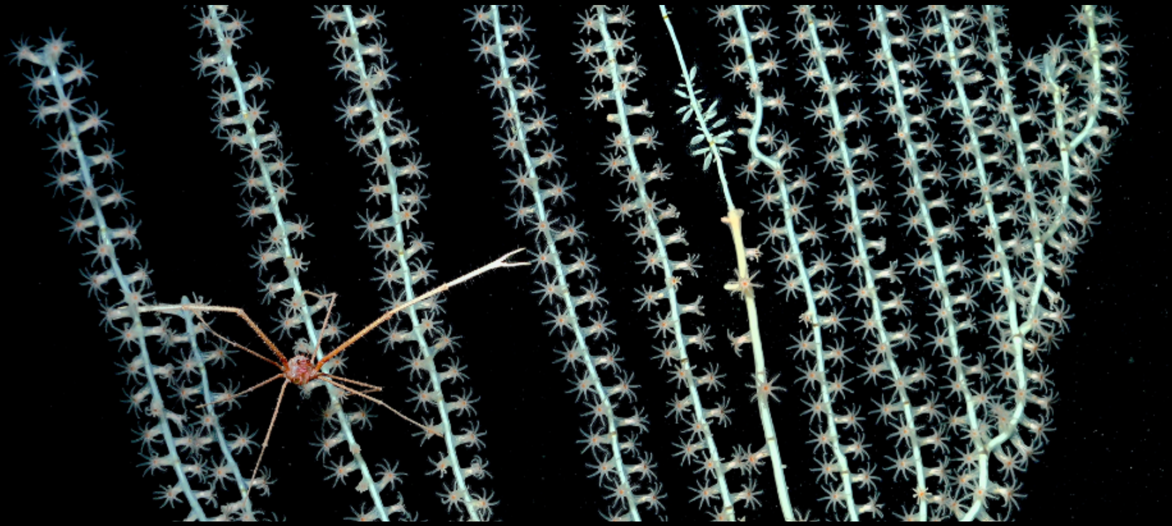
In collaboration with Annette Govindarajan from the Woods Hole Oceanographic Institution, the project team co-developed and optimized a **standardized protocol for collecting eDNA from seawater** samples taken with Niskin bottles mounted on CTD rossettes or ROVs. This protocol has been successfully deployed in multiple expeditions in the Gulf of Mexico, Caribbean, and the Pacific, including NOAA Ocean Exploration-sponsored expeditions through the Ocean Exploration Cooperative Institute (OECI) and was adopted by federal partners at the United States Geological Survey for their eDNA work within the Mesophotic and Deep Benthic Communities (MDBC) project, led by the National Oceanic and Atmospheric Administration (NOAA) and Department of the Interior (DOI). The protocol is publicly accessible and routinely updated, following best practices [8].

REFERENCE DNA BARCODES

The team compiled a **comprehensive reference DNA sequence database for corals** from the southeastern US, including >400 specimens representing over 250 species ranging from shallow reefs to >2500 m. This database incorporated specimens available in the Smithsonian's National Museum of Natural History collections and from recent expeditions to the Gulf of Mexico and Puerto Rico, described below. This database was generated leveraging funding from the NOAA Office of Education Educational Partnership Program with Minority Serving Institutions awards NA16SEC4810009 and NA21SEC4810004, the Smithsonian Institution, and BOEM. The database is described by McCartin et al. 2023 [4] and Quattrini et al. 2024 [2] and is publicly accessible [9].

We used the reference database to classify 28S eDNA sequences generated from eDNA samples collected in expeditions MT19 and PS21-04 to the Gulf of Mexico and expeditions NF-22-02 on the NOAA Ship *Nancy Foster* and expedition FkT230417 on the R/V *Falkor (too)* to Puerto Rico. Expedition NF-22-02 on the *Nancy Foster* explored hard-bottom habitats using the ROV *Global Explorer* between April 6-19, 2022, and was funded through an NOAA Ocean Exploration award NA21OAR0110202 to Quattrini. The classified eDNA 28S sequences from these samples revealed clear patterns of **depth zonation and species replacement in coral communities surveyed between 17 and 2000 meters.** These results are being prepared for publication in late 2024.

We also characterized the spatial distribution of pelagic and benthic eDNA over Bright Bank in the Gulf of Mexico from samples collected during expedition MT19. Our findings, published by McCartin et al. (2024) [1], show that the spatial reach of benthic eDNA at the Flower Garden Banks National Marine Sanctuary is likely restricted to individual banks.



Alt Text: A close-up underwater photograph showing a delicate deep-sea coral colony with translucent polyps, hosting a long-legged squat lobster perched on the branches, against a dark background..

PREDICTIVE MODEL OF EDNA DEGRADATION

One of our most significant accomplishments was developing a **general predictive model for the degradation rate of marine eDNA** [7]. The model was empirically derived from controlled experiments, precise quantitative PCR DNA concentration measurements, and literature meta-analyses. Our experiments and analyses demonstrate that **temperature alone predicts roughly 50% of the effects of the eDNA degradation process in seawater over time**. Interestingly, we found that pH and oxygen levels have negligible influence on marine eDNA degradation.

For example, **at 4°C**, a temperature found in the deep ocean, polar regions, and the surface ocean during winter, **eDNA fragments can be detected for ~18 days** after being released into the ocean. However, **at 20°C**, a temperature found in the surface ocean from tropical to temperate regions, eDNA fragments can only be detected **for less than a week**.

These time-to-complete-degradation estimates represent a theoretical maximum. Molecular diffusion and small-scale advection processes can drastically decrease the time before eDNA is diluted enough to dip below the detection limit. In other words, marine eDNA from a known and highly concentrated source, like a coral colony, can only be detected for hours to days after it is released, and this timing depends primarily on temperature.

This degradation model formulation is crucial for estimating accurate parameter estimates of the DNA degradation rate that must be included in physical eDNA signal spread and decay models. These multidisciplinary connections between molecular biology and physical oceanography are crucial for inferring the locations of eDNA source animals.

Alt Text: A close-up underwater photograph showing a delicate deep-sea coral colony with translucent polyps, hosting a long-legged squat lobster perched on the branches, against a dark background..

PRODUCTS

PUBLICATIONS

1. Quattrini, A.M., Morrissey, D. and McCartin, L.J., 2025. A new soft coral species from the Gulf of Mexico (Octocorallia: Scleralcyonacea: *Parasphaerascleridae*). *Zootaxa*, *5601*(3):545-557. https://doi.org/10.11646/zootaxa.5601.3.8
2. Horowitz J., Barajas M., L. McCartin, S. Vohsen, S. Herrera (2025) Description of a new species of black coral in the family Schizopathidae (Anthozoa, Antipatharia) from Puerto Rico. *ZooKeys*. 1231: 331–346 (2025) https://doi.org/10.3897/zookeys.1231.136967
3. McCartin L., A. Govindarajan, J.M. McDermott, S. Herrera (2024) Environmental DNA Transport at an Offshore Mesophotic Bank in the Northwestern Gulf of Mexico. Available as pre-print in *bioRxiv* https://doi.org/10.1101/2024.08.26.609783.
4. Quattrini A.M., L.J. McCartin, E.E. Easton, J. Horowitz, H. Bowers, K. Mitchell, M. Sei, H.H. Wirshing, C.S. McFadden, S. Herrera (2024). Skimming genomes for systematics and DNA barcodes of corals. *Ecology and Evolution*. e11254. http://doi.org/10.1002/ece3.11254.
5. Govindarajan A.F., A. Adams, E. Allan, S. Herrera, A. Lavery, J. Llopiz, L. McCartin, D. Yoerger, W. Zhang (2023) Advances in Environmental DNA Technology for Observing Ocean Twilight Zone Biodiversity. *Oceanography*. 36(1):27. https://doi.org/10.5670/oceanog.2023.s1.27.
6. McCartin L., E. Saso, S. Vohsen, N. Pittoors, P. Demetriades, C. McFadden, A. Quattrini, S. Herrera (2024) Nuclear eDNA Meta-barcoding Primers for Anthozoan Coral Biodiversity Assessment. *PeerJ*. 12:e18607. https://doi.org/10.7717/peerj.18607.
7. Horowitz J., D.M. Opresko, S. Herrera, C. Hansel, A.M. Quattrini (2024) Ameripathidae, a new family of Antipatharian Corals (Cnidaria: Anthozoa: Hexacorallia: Antipatharia). *ZooKeys*. 1203:355-375. https://doi.org/10.3897/zookeys.1203.121411
8. Govindarajan A.F., L. McCartin, A. Adams, E. Allan, M. Belani, R. Francolini, J. Fujii, A. Kukulya, F. Marin, K. Tradd, D. Yoerger, J. McDermott & S. Herrera

(2022) Improved biodiversity detection using a large-volume environmental DNA sampler with *in situ* filtration and implications for marine eDNA sampling strategies. *Deep-Sea Research Part I: Oceanographic Research Papers.* 189: 103871. https://doi.org/10.1016/j.dsr.2022.103871

9. McCartin L., S. Vohsen, S. Ambrose, M. Layden, C. McFadden, E. Cordes, J. McDermott & S. Herrera (2022) Temperature Controls eDNA Persistence Across Physicochemical Conditions in Seawater. *Environmental Science & Technology*. 56(12):8629–8639. https://doi.org/10.1021/acs.est.2c01672

PROTOCOLS

10. McCartin L., A. Govindarajan, J.M. McDermott, S. Herrera (2024) Deep-Sea eDNA Sampling from Seawater with Peristaltic Pumps and Sterivex Filters. *protocols.io.* https://dx.doi.org/10.17504/protocols.io.4r3l2q1k4l1y/v1

DATASETS

11. Coral 28S barcode reference database: https://github.com/LukeJMcCartin/Anthozoan-Coral-eDNA-Metabarcoding-Bioinformatics-Analysis
12. Govindarajan A., et al. (2022). Improved biodiversity detection using a large-volume environmental DNA sampler with *in situ* filtration and implications for marine eDNA sampling strategies. *Dryad.* https://doi.org/10.5061/dryad.0zpc8670v
13. Herrera S., L. McCartin, J. McDermott (2024). CTD casts Manta 2019 eDNA cruise. *Figshare.* https://doi.org/10.6084/m9.figshare.25145633.v2
14. Skimming genomes for systematics and DNA barcodes of corals. NCBI Bioproject PRJNA1043120
15. Environmental DNA Sequences from the Northwestern Gulf of Mexico Mesophotic and Deep Coral Ecosystems. NCBI Bioproject PRJNA1159220
16. FKt230417 Fakor (too) cruise data: Health Diagnostics of Deep-Sea Coral. https://doi.org/10.7284/910099
17. Mesophotic and Deep Benthic Communities: Annotations and images of corals and sponges from the northern Gulf of Mexico from 2017-07-20 to 2021-08-15 (NCEI Accession 0299813). https://www.ncei.noaa.gov/archive/accession/0299813

PRESENTATIONS

18. McCartin L., S. Vohsen, J. McDermott & S. Herrera (2024) Temperature Controls the Degradation Rate of Marine eDNA. 3rd National Workshop on Marine eDNA. Johns Hopkins Applied Physics Laboratory. MD. Talk
19. Wood A., L. McCartin, S.Herrera, A. Quattrini, & A. Collins (2024) Anthozoan eDNA Primer Set Characterizes Ctenophore and Medusozoan Communities in the Gulf of Mexico. 3rd National Workshop on Marine eDNA. Johns Hopkins Applied Physics Laboratory. MD. Poster.
20. McCartin L., E. Saso, S. Vohsen, N. Pittoors, P. Demetriades, C. McFadden, A. Quattrini & S. Herrera. (2024) New eDNA Meta-barcoding Primers to Elucidate the Distribution of Diverse Anthozoan Corals. Ocean Sciences Meeting, New Orleans, LA. Talk.
21. Quattrini A., H. Bowers, D.M. De Leo, H. Wirshing, C. McFadden, S. Herrera (2023) Skimming and targeting genomes for systematics and population genetics of deep-sea corals. 8th International Symposium on Deep-Sea Corals. Edinburgh, Scotland. Talk.
22. McCartin L., E. Saso, S. Vohsen, N. Pittoors, P. Demetriades, C. McFadden, A. Quattrini & S. Herrera (2023) Nuclear eDNA Sequencing to Study Mesophotic and Deep-sea Anthozoan Corals. 8th International Symposium on Deep-Sea Corals. Edinburgh, Scotland. Talk.
23. McCartin L., E. Saso, S. Vohsen, N. Pittoors, P. Demetriades, C. McFadden, A. Quattrini & S. Herrera. *Nuclear Environmental DNA* Sequencing to Study Mesophotic and Deep Anthozoan Corals. NOAA Open Ocean Restoration Plan, Natural Resource Damage Assessment. Mesophotic and Deep Benthic Communities (MDBC). 3rd Habitat Assessment and Evaluation Workshop. Smithsonian NMNH, Washington, DC.
24. McCartin L., A. Govidarajan, J. McDermott & S. Herrera (2022) Zooplankton eDNA community composition is structured by depth in the epipelagic Gulf of Mexico. Scientific Committee for Ocean Research MetaZooGene Symposium. Dublin, IRL. Talk.
25. McCartin L., S. Vohsen, S. Ambrose, M. Layden, E. Cordes, C. McFadden, J. McDermott & S. Herrera (2022) Temperature Controls Environmental DNA Persistence Across Physicochemical Conditions in Seawater. 2nd National Workshop on Marine Environmental DNA. Costa Mesa, CA. Poster.

26. McCartin L., S. Vohsen, E. Saso, E. Cordes, A. Govindarajan, C. McFadden, A. Quattrini, D. Yoerger, J. McDermott & S. Herrera (2022) Environmental DNA Sequencing to Study Deep Coral Reefs in the Gulf of Mexico. The Gulf of Mexico Conference. Baton Rouge, LA. Talk.

27. McCartin L., S. Vohsen, S. Ambrose, A. Hallaj, M. Layden, E. Cordes, C. McFadden, J. McDermott & S. Herrera (2021) Physicochemical Controls on the Persistence of Marine Environmental DNA. ASLO Aquatic Sciences Meeting. Talk.

28. Ambrose S., M. Galaska, A. Weinnig, C. Gomez, E. Cordes, C. McFadden, A. Quattrini, J. McDermott & S. Herrera (2019) Assessing eDNA Degradation Rates in Deepwater Marine Environments to Determine Persistence Controls and Viability for Species Identifications. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Poster.

PRODUCTS

29. **Public Seminar** (2023) Coral Forensics in the Deep Flower Garden Banks. Flower Garden Banks National Marine Sanctuary Seaside Chats Series.

30. **Video** about the MT19 expedition (2020) Exploring Deepwater Ecosystems with eDNA. It is hosted on the NOAA Ocean Exploration YouTube channel https://youtu.be/5gSSLigCI8Y, with >4,700 views.

31. **Webpage** for the MT19 expedition (2019) Exploring Deepwater Ecosystems with eDNA. Hosted on the NOAA Ocean Exploration website https://oceanexplorer.noaa.gov/explorations/20edna/welcome.html

FINANCES

The project expensed all the received funds during the award period.

OCEANOGRAPHIC DEPLOYMENTS

AUV *Mesobot* Dives (large-volume samples: >40 liters)

				Deployment			Recovery			
Expedition	Date	Dive	Site	Time	Lat	Long	Time	Lat	Lon	Collection Depths
MT19	20190924	MB008	Bright Bank	18:10	27.914	-93.323	19:57	27.916	-93.323	80m(2x)
MT19	20190925	MB009	Bright Bank	14:25	27.849	-93.258	18:32	27.841	-93.268	120m(2x), 100m(2x), 80m (2x), 60m (2x), 40m 2x), 20m (2x)
MT19	20190925	MB010	Bright Bank	20:45	27.867	-93.314	21:00	N/A	N/A	
MT19	20190926	MB011	South of Bright	16:11	27.539	-93.340	20:45	27.543	-93.383	400m(2x), 360m(2x), 320m (2x), 280m(2x), 240m(2x), 200m(2x)
MT19	20190926/20190927	MB012	South of Bright	20:29	27.539	-93.340	2:20	27.537	-93.359	320m(2x), 160m(2x), 100m(2x), 80m(2x), 60m(2x), 40m(2x)

CTD Casts (small-volume samples: 1-5 liters)

Expedition	CTD #	Date	Site	Time	Lat	Long	Collection Depths (m)
MT19	CTD01	20190924	Bright Bank	14:20	27.886	-93.296	58m(x4), 40m(x3), 20m(x4)
MT19	CTD02	20190924	Bright Bank	15:24	27.897	-93.328	83m(x12)
MT19	CTD03	20190924	Bright Bank	16:59	27.905	-93.314	95m(x3), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD04	20190924	Bright Bank	20:28	27.924	-93.333	100(x3), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD05	20190924	Bright Bank	23:50	27.905	-93.276	101m(x3), 81m(x3), 60m(x2), 40m(x4)
MT19	CTD06	20190925	Bright Bank	12:21	27.884	-93.282	101m(x2), 80m(x3), 61m(x3), 40m(x3)
MT19	CTD07	20190925	Bright Bank	13:09	27.829	-93.240	aborted
MT19	CTD08	20190925	Bright Bank	16:29	27.842	-93.269	99.5m(x2), 80m(x3), 60(x3), 40(x3)
MT19	CTD09	20190925	Bright Bank	18:59	27.867	-93.276	99.5m(x3), 80m(x3), 60(x3), 40(x3)
MT19	CTD10	20190925	Bright Bank	20:04	27.867	-93.314	100(x3), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD11	20190925	Bright Bank	22:45	27.901	-93.270	83m(x12)
MT19	CTD12	20190926	Bright Bank	0:06	27.924	-93.258	100(x2), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD13	20190926	Bright Bank	12:16	27.849	-93.334	101(x3), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD14	20190926	South of Bright	17:36	27.540	-93.350	100(x2), 80m(x3), 60m(x3), 40m(x3)
MT19	CTD15	20190926	South of Bright	21:01	27.546	-93.386	400m(2x), 320m (3x), 240m(3x), 160m(3x)
MT19	CTD16	20190927	Bright Bank	12:29	27.886	-93.276	90(x3), 80m(x3), 60m(x3), 40m(x3)

Expedition	CTD #	Date	Site	Time	Lat	Long	Collection Depths (m)
MT19	CTD17	20190927	Bright Bank	14:12	27.891	-93.261	NA
PS21-04	CTD01	20210806	VK826	20:49	29° 09.473' N	88° 00.931' W	469-452 m
PS21-04	CTD02	20210806	VK826	23:49	29° 09.481' N	88° 00.941' W	468-447 m
PS21-04	CTD03	20210807	Alabama Alps	13:33	29° 15.192' N	88° 20.320' W	73(x3), 70m(x2), 60m(x2), 40m(x2), 5m(x2)
PS21-04	CTD04	20210809	Alderdice	20:09	28° 05.702' N	92° 00.354' W	82(x3), 75m(x3), 60m(x3), 40m(x3)
PS21-04	CTD05	20210809	Alderdice	23:51	28° 05.700' N	92° 00.356' W	80(x12)
PS21-04	CTD06	20210810	McGrail	20:18	27° 57.412' N	92° 34.887' W	88(x3), 84m(x3), 60m(x2), 40m(x2), 40m(x2)
PS21-04	CTD07	20210810	McGrail	23:17	27° 57.460' N	92° 34.856' W	87(x3), 82m(x3), 60m(x2), 20m(x2), 5m(x2)
PS21-04	CTD08	20210811	Bright	20:47	27° 54.042' N	93° 16.216' W	84(x3), 80m(x3), 60m(x2), 40m(x2), 5m(x2)
PS21-04	CTD09	20210812	Stetson	20:35	28° 09.418' N	94° 18.190' W	52(x3), 48m(x3), 41m(x3), 6m(x3)
PS21-04	CTD10	20210813	EFGB	20:47	27° 53.461' N	93° 37.221' W	80m(x3), 76m(x3), 61m(x2), 41m(x2), 5m(x2)
PS21-04	CTD11	20210814	E. of Bright	20:45	27° 53.721' N	93° 16.007' W	114m(x3), 108m(x3), 81m(x2), 41m(x2), 5m(x2)
PS21-04	CTD12	20210816	Diaphus	3:06	28° 05.286' N	90° 42.077' W	80m(x3), 75m(x3), 60m(x2), 40m(x2), 5m(x2)
NF22-02	1		Whitng Bank Ridge		17 46.81492N	65 40.19412W	1200
NF22-02	2		Whiting Bank		17 48.54218N	65 42.88816W	500
NF22-02	3		Guayanilla Canyon		17 54.30966N	66 43.4001W	350
NF22-02	4		Guayanilla Canyon		17 53.91632N	66 42.86659W	625
NF22-02	5		1KM SW of Grappler Seamount		17 48.13633N	65 57.96195W	950
NF22-02	6		3KM SW of Grappler Seamount		17 47.52006N	65 58.90718W	1400
NF22-02	7		6KM SW of Grappler Seamount		17 46.59508N	66 00.37171W	1275
NF22-02	8		Investigator Bank		17 44.90822N	66 11.1329W	300
NF22-02	9		1KM SW of Investigator Bank		17 44.53651N	66 11.53751W	350
NF22-02	10		3KM SW of Investigator Bank		17 43.79212N	66 12.33936W	540
NF22-02	11		6KM SW of Investigator Bank		17 42.68294N	66 13.5958W	1050
NF22-02	12		~3KM SW of Whiting Bank		17 48.27602N	65 43.81482W	1150
FKt230417	CTD02	20230418	Desecheo Ridge	14:05	18 23.36922	67 25.05417	171m (x6)
FKt230417	CTD03	20230420	Desecheo Ridge	13:58	18 23.34571	67 24.51319	119m (x6)
FKt230417	CTD11	20230429	Whiting Seamount	11:01	17 50.57874	65 42.04436	1005m (x6)

ROV Dives

Expedition	Dive	Date	Locality	Lat	Long	Max. depth (m)
PS21-04	GE012	2021-08-05	VK826	29.15719	-88.01468	480
PS21-04	GE013	2021-08-08	Diaphus	28.08821	-90.70141	81
PS21-04	GE014	2021-08-09	Alderdice	28.09505	-92.00566	82
PS21-04	GE015	2021-08-10	McGrail	27.95717	-92.58129	85
PS21-04	GE016	2021-08-11	Bright	27.90071	-93.27022	83
PS21-04	GE017	2021-08-12	Stetson	28.15685	-94.30297	54
PS21-04	GE018	2021-08-13	EFGB	27.89072	-93.62013	81
PS21-04	GE019	2021-08-13	EFGB	27.89999	-93.60962	55
PS21-04	GE020	2021-08-14	Bright	27.89328	-93.27173	65
PS21-04	GE021	2021-08-15	Alderdice	28.07683	-91.99257	66
PS21-04	GE022	2021-08-15	GC354	27.59729	-91.82677	530
NF22-02	GEX-22-01	2022-09-04	N. PR Midwater	18.6640	-65.9665	900
NF22-02	GEX-22-02	2022-10-04	Whiting Bank Ridge	17.7846	-65.6720	1246
NF22-02	GEX-22-03	2022-11-04	Whiting Bank	17.8113	-65.7147	535
NF22-02	GEX-22-04	2022-12-04	Guayanilla Canyon	17.9049	-66.7183	663
NF22-02	GEX-22-05	2022-14-04	Guayanilla Canyon	17.909	-66.7044	523
NF22-02	GEX-22-06	2022-15-04	Grappler Bank	17.8075	-65.9585	658
NF22-02	GEX-22-07	2022-16-04	Grappler Bank	17.8077	-65.9586	660
FKt230417	504	2023-04-18	Desecheo Ridge	18.38911	-67.417476	186
FKt230417	505	2023-04-19	Desecheo Ridge	18.389273	-67.408296	124
FKt230417	506	2023-04-19	Desecheo Ridge	18.387182	-67.408248	190
FKt230417	507	2023-04-20	Desecheo Ridge	18.386357	-67.401401	364
FKt230417	508	2023-04-21	Desecheo Ridge	18.383427	-67.406819	411
FKt230417	509	2023-04-21	Desecheo Ridge	18.377776	-67.407436	710
FKt230417	510	2023-04-22	La Parguera	17.884004	-67.020494	82
FKt230417	511	2023-04-23	La Parguera	17.884548	-67.020963	30
FKt230417	512	2023-04-23	La Parguera	17.884377	-67.020552	43
FKt230417	513	2023-04-26	Esperanza Ridge	17.773121	-65.423372	1991
FKt230417	514	2023-04-26	Esperanza Ridge	17.758271	-65.43974	2047
FKt230417	515	2023-04-27	Whiting Bank	17.844544	-65.702834	1237
FKt230417	516	2023-04-28	Whiting Bank	17.844638	-65.701799	1177
FKt230417	517	2023-04-28	Whiting Bank	17.84174	-65.70097	970
FKt230417	518	2023-04-29	Whiting Bank	17.840145	-65.69778	757
FKt230417	519	2023-04-30	Whiting Bank	17.832811	-65.697968	550
FKt230417	520	2023-04-30	Whiting Bank	17.810052	-65.713896	406
FKt230417	521	2023-05-01	Whiting Bank	17.810443	-65.713025	378
FKt230417	522	2023-05-01	Whiting Bank	17.845733	-65.719659	1801
FKt230417	523	2023-05-02	Whiting Bank	17.845132	-65.717652	1680
FKt230417	524	2023-05-02	Whiting Bank	17.845488	-65.718459	1725
FKt230417	525	2023-05-03	Ridge SW of Vieques	18.00176	-65.6239	1564
FKt230417	526	2023-05-04	Ridge SW of Vieques	18.007535	-65.609978	1166
FKt230417	527	2023-05-04	Vieques Wall	18.058859	-65.585035	68
FKt230417	528	2023-05-04	Vieques Wall	18.058604	-65.583831	200

DNA SEQUENCES AND VOUCHERS

The project generated reference whole genome skims for 199 corals and 57 fishes and 170 references 28S barcodes for corals from the Gulf of Mexico, the Caribbean, and the Southeast US Atlantic. These results were published by Quattrini et al. (2024). Most specimens are deposited in the Smithsonian National Museum of Natural History, have been assigned USNM accession numbers, and are publicly accessible. DNA sequences from individual specimens were deposited at the National Center for Biotechnology Information (NCBI) Sequence Read Archive (SRA) and GeneBank databases and are publicly accessible.

WHOLE GENOME SKIMS

Class	Species	Specimen ID	Museum Accession/ Voucher	Locality	Lat/Lon	Depth (m)	SRA Accession
Octocorallia	*Iciligorgia brunnea*	IZ-S92	USNM:86848	Great Barrier Reef, Australia		5	SAMN38332661
Octocorallia	*Lateothela grandiflora*	IZ-S93	USNM:57340	southeastern US, USA	30.47 N 79.85 W	494	SAMN38332662
Octocorallia	*Sibogagorgia dennisgordoni*	IZ-S96	NIWA:3328	Kermadec Ridge, New Zealand	37.0 S 176.12 E	1000	SAMN38332663
Octocorallia	*Stenogorgia casta*	IZ-S101	USNM:14515	southeastern US, USA	31.3333 N 79.3667 W	512	SAMN38332664
Octocorallia	*Stenogorgia casta*	IZ-S102	USNM:1150199	southeastern US, Atlantic Ocean	31.819 N 77.608 W	670	SAMN38332665
Octocorallia	*Swiftia exserta*	IZ-S103	USNM:55974	San Bernardo Point, West of, Colombia	9.7517 N 76.1517 W	78	SAMN38332666
Octocorallia	*Callistephanus koreni*	IZ-S104	USNM:55966	Florida Keys, USA	24.4 N 80.867 W	225	SAMN38332667
Octocorallia	*Callistephanus pacificus*	IZ-S118	USNM:1075784	Welker Seamount, Pacific Ocean	55.0528 N 140.309 W	783	SAMN38332668
Octocorallia	*Callistephanus pallida*	IZ-S119	USNM:1010388	Georges Bank, Atlantic Ocean	39.875 N 67.408 W	1400	SAMN38332669
Octocorallia	*Swiftia exserta*	IZ-S120	USNM:1021359	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332670
Octocorallia	*Callistephanus pacificus*	IZ-S121	USNM:1116868	Washington, USA	48.301 N 124.936 W	250	SAMN38332671
Octocorallia	*Lateothela grandiflora*	IZ-S122	USNM:1095147	Viosca Knoll, USA	29.1702 N 88.012 W	457	SAMN38332672
Octocorallia	*Callistephanus torreyi*	IZ-S124	USNM:1027078	Rodriguez Seamount, USA	34.0533 N 121.101 W	1029	SAMN38332673
Octocorallia	*Callistephanus simplex*	IZ-S125	USNM:1075786	Welker Seamount, Pacific Ocean	55.0664 N 140.408 W	1096	SAMN38332674
Octocorallia	*Swiftia exserta*	IZ-S126	USNM:1018489	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332675
Octocorallia	*Callistephanus simplex*	IZ-S127	USNM:1075781	Welker Seamount, Pacific Ocean	55.0528 N 140.309 W	793	SAMN38332676
Octocorallia	*Swiftia exserta*	IZ-S128	USNM:1021361	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332677
Octocorallia	*Swiftia exserta*	IZ-S129	USNM:1116148	Diaphus Bank, USA	29.0885 N 90.7052 W	91	SAMN38332678
Octocorallia	*Lateothela grandiflora*	IZ-S130	USNM:1139023	Cape Lookout, USA			SAMN38332679
Octocorallia	*Callistephanus pacificus*	IZ-S131	USNM:1116867	Washington, USA	49.3031 N 124.936 W	251	SAMN38332680
Octocorallia	*Melithaea sp.*	IZ-S132	USNM:1016875	Penang, Malacca Strait, Malaysia			SAMN38332681

Octocorallia	*Swiftia exserta*	IZ-S133	USNM:1021360	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332682
Octocorallia	*Lateothela grandiflora*	IZ-S134	USNM:1095147	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332683
Octocorallia	*Callistephanus simplex*	IZ-S136	USNM:1075795	Welker Seamount, Pacific Ocean	55.0664 N 140.408 W	1049	SAMN38332684
Octocorallia	*Callistephanus pacificus*	IZ-S137	USNM:1075797	Pratt Seamount, Pacific Ocean	56.2969 N 142.469 W	1094	SAMN38332685
Octocorallia	*Lateothela grandiflora*	IZ-S138	USNM:1138902	southeastern US, USA	32.2676 N 77.4741 W	600	SAMN38332686
Octocorallia	*Callistephanus simplex*	IZ-S140	USNM:1075796	Pratt Seamount, Pacific Ocean	56.2969 N 142.469 W	1192	SAMN38332687
Octocorallia	*Callistephanus simplex*	IZ-S141	USNM:1075798	Pratt Seamount, Pacific Ocean	56.1692 N 142.701 W	1165	SAMN38332688
Octocorallia	*Swiftia exserta*	IZ-S142	USNM:1021503	Tobago, Cardinal Rock, Trinidad and Tobago		27	SAMN38332689
Hexacorallia	*Aphanosticthopathes sp.*	NF-22-02	USNM:1660409	Caribbean Sea, Puerto Rico	17.7833 N 65.672 W	1254	SAMN38332690
Octocorallia	Keratoisididae	NF-22-02	USNM:1660412	Caribbean Sea, Puerto Rico	17.7833 N 65.672 W	1194	SAMN38332691
Octocorallia	*Iridogorgia cf. splendens*	NF-22-02	USNM:1660413	Caribbean Sea, Puerto Rico	17.781132 N 65.670546 W	925	SAMN38332692
Octocorallia	*Thesea cf. hebes*	NF-22-02	USNM:1660419	Caribbean Sea, Puerto Rico	17.809944 N 65.712846 W	352	SAMN38332693
Hexacorallia	Aphanipathes sp.	NF-22-02	USNM:1660420	Caribbean Sea, Puerto Rico	17.810682 N 65.712119 W	354	SAMN38332694
Octocorallia	*Elisella sp.*	NF-22-02	USNM:1660422	Caribbean Sea, Puerto Rico	17.810929 N 65.71175 W	342	SAMN38332695
Octocorallia	*Distichopathes hickersonae*	NF-22-02	USNM:1660423	Caribbean Sea, Puerto Rico	17.810979 N 65.711397 W	329	SAMN38332696
Octocorallia	*Thesea cf. grandiflora*	NF-22-02	USNM:1660424	Caribbean Sea, Puerto Rico	17.811279 N 65.710882 W	308	SAMN38332697
Octocorallia	*Chrysogorgia desboni*	NF-22-02	USNM:1660327	Caribbean Sea, Puerto Rico	17.811347 N 65.71085 W	304	SAMN38332698
Octocorallia	*Nicella robusta*	NF-22-02	USNM:1660426	Caribbean Sea, Puerto Rico	17.811347 N 65.71085 W	304	SAMN38332699
Octocorallia	*Chrysogorgia desboni*	NF-22-02	USNM:1660328	Caribbean Sea, Puerto Rico	17.810896 N 65.711841 W	304	SAMN38332700
Hexacorallia	*Bathypathes pseudoalternata*	NF-22-02	USNM:1660427	Caribbean Sea, Puerto Rico	17.810896 N 65.711841 W	347	SAMN38332701
Octocorallia	*Elisella sp.*	NF-22-02	USNM:1660435	Caribbean Sea, Puerto Rico	17.810929 N 65.71175 W	337	SAMN38332702
Hexacorallia	*Aphanipathes sp.*	NF-22-02	USNM:1660437	Caribbean Sea, Puerto Rico	17.902576 N 66.72171 W	420	SAMN38332703
Octocorallia	*Chironephytha sp.*	NF-22-02	USNM:1660438	Caribbean Sea, Puerto Rico	17.905151 N 66.721737 W	348	SAMN38332704
Octocorallia	*Thesea cf. hebes*	NF-22-02	USNM:1660439	Caribbean Sea, Puerto Rico	17.904867 N 66.721978 W	343	SAMN38332705
Octocorallia	*Nicella obesa*	NF-22-02	USNM:1660440	Caribbean Sea, Puerto Rico	17.904865 N 66.721966 W	359	SAMN38332706
Octocorallia	*Chrysogorgia sp.*	NF-22-02	USNM:1660329	Caribbean Sea, Puerto Rico	17.904848 N 66.721974 W	363	SAMN38332707

Octocorallia	*Thesea cf. grandiflora*	NF-22-02	USNM:1660442	Caribbean Sea, Puerto Rico	17.904434 N 66.721882 W	391	SAMN38332708
Octocorallia	*Thesea cf. grandiflora*	NF-22-02	USNM:1660443	Caribbean Sea, Puerto Rico	17.904699 N 66.722151 W	372	SAMN38332709
Octocorallia	*Ellisella sp.*	NF-22-02	USNM:1660444	Caribbean Sea, Puerto Rico	17.90471 N 66.722162 W	369	SAMN38332710
Octocorallia	*Bebryce sp.*	NF-22-02	USNM:1660445	Caribbean Sea, Puerto Rico	17.904793 N 66.72206 W	364	SAMN38332711
Hexacorallia	*Stylopathes americana*	NF-22-02	USNM:1660446	Caribbean Sea, Puerto Rico	17.904865 N 66.721941 W	363	SAMN38332712
Octocorallia	*Callogorgia cf. gracilis*	NF-22-02	USNM:1659356	Caribbean Sea, Puerto Rico	17.910326 N 66.709922 W	498	SAMN38332713
Octocorallia	*Acanthogorgia sp.*	NF-22-02	USNM:1659364	Caribbean Sea, Puerto Rico	17.914699 N 66.704896 W	492	SAMN38332714
Octocorallia	*Parantipathes cf. tetrasticha*	NF-22-02	USNM:1659372	Caribbean Sea, Puerto Rico	17.914692 N 66.704896 W	493	SAMN38332715
Octocorallia	*Acanthogorgia sp.*	NF-22-02	USNM:1659373	Caribbean Sea, Puerto Rico	17.912637 N 66.706336 W	482	SAMN38332716
Octocorallia	*Acanthogorgia sp.*	NF-22-02	USNM:1659375	Caribbean Sea, Puerto Rico	17.912637 N 66.706336 W	482	SAMN38332717
Octocorallia	*Chrysogorgia desboni*	NF-22-02	USNM:1660403	Caribbean Sea, Puerto Rico	17.912637 N 66.706336 W	482	SAMN38332718
Octocorallia	*Acanthogorgia sp.*	NF-22-02	USNM:1659377	Caribbean Sea, Puerto Rico	17.915217 N 66.704508 W	519	SAMN38332719
Octocorallia	*Acanthoprimnoa goesi*	NF-22-02	USNM:1659380	Caribbean Sea, Puerto Rico	17.908986 N 66.710962 W	454	SAMN38332720
Octocorallia	*Placogorgia sp.*	NF-22-02	USNM:1659383	Caribbean Sea, Puerto Rico	17.807822 N 65.954049 W	438	SAMN38332721
Octocorallia	*Nidalia sp.*	NF-22-02	USNM:1659385	Caribbean Sea, Puerto Rico	17.807609 N 65.956297 W	544	SAMN38332722
Octocorallia	*Chrysogorgia sp.*	NF-22-02	USNM:1660330	Caribbean Sea, Puerto Rico	17.807811 N 65.958187 W	622	SAMN38332723
Octocorallia	*Heteropathes cf. americana*	NF-22-02	USNM:1659390	Caribbean Sea, Puerto Rico	17.807606 N 65.956913 W	574	SAMN38332724
Octocorallia	*Nicella sp.*	NF-22-02	USNM:1659393	Caribbean Sea, Puerto Rico	17.807576 N 65.954661 W	468	SAMN38332725
Hexacorallia	*Stylopathes americana*	NF-22-02	USNM:1659395	Caribbean Sea, Puerto Rico	17.807658 N 65.956588 W	556	SAMN38332726
Octocorallia	*Acanthoprimnoa goesi*	NF-22-02	USNM:1659397	Caribbean Sea, Puerto Rico	17.80757 N 65.954548 W	464	SAMN38332727
Octocorallia	*Pseudodrifa cf. nigra*	RB-19-010		southeastern US, Atlantic Ocean	31.8801 N 77.3738 W	792	SAMN38332728
Octocorallia	*Pseudodrifa cf. nigra*	RB-19-012		southeastern US, Atlantic Ocean	31.8848 N 77.3704 W	756	SAMN38332729

Octocorallia	*Pseudodrifa cf. nigra*	RB-19-014		southeastern US, Atlantic Ocean	31.8818 N 77.3734 W	773	SAMN38332730
Octocorallia	*Pseudodrifa cf. nigra*	RB-19-021		southeastern US, Atlantic Ocean	31.984 N 77.411 W		SAMN38332731
Octocorallia	*Callistephanus sp*	RB-19-026	USNM:1606569	southeastern US, Atlantic Ocean	31.985 N 77.4107 W	691	SAMN38332732
Octocorallia	*Pseudoanthomastus sp*	RB-19-031	USNM:1606573	southeastern US, USA	32.6407 N 77.6845 W	700	SAMN38332733
Octocorallia	*Metallogorgia cf. melanotrichos*	RB-19-066	USNM:1660629	southeastern US, Atlantic Ocean	31.2874 N 77.2368 W	1331	SAMN38332734
Octocorallia	*Chrysogorgia cf artospira*	RB-19-071		southeastern US, Atlantic Ocean	31.289 N 77.234 W	1334	SAMN38332735
Octocorallia	*Hemicorallium cf. imperiale*	RB-19-076		southeastern US, Atlantic Ocean	31.28578 N 77.23729 W	1362	SAMN38332736
Octocorallia	*Paramuricea sp.*	RB-19-077		southeastern US, Atlantic Ocean	31.2867 N 77.2374 W	1350	SAMN38332737
Octocorallia	*Iridogorgia cf. splendens*	RB-19-091	USNM:1660632	southeastern US, Atlantic Ocean	31.2861 N 77.2373 W	1359	SAMN38332738
Octocorallia	*Acanthogorgia spissa*	RB-19-092		southeastern US, USA	34.9307 N 75.1503 W	1567	SAMN38332739
Octocorallia	*Callistephanus pallida*	RB-19-101	USNM:1660633	southeastern US, USA	34.9308 N 75.1503 W	1567	SAMN38332740
Octocorallia	*Acanthogorgia aspera*	RB-19-111		southeastern US, USA	33.9189 N 75.8335 W	944	SAMN38332741
Octocorallia	*Paramuricea sp.*	RB-19-112		southeastern US, Atlantic Ocean	22.9175 N 75.834 W	959	SAMN38332742
Octocorallia	*Heteropolypus sp.*	RB-19-192		southeastern US, Atlantic Ocean	32.996 N 75.928 W	2589	SAMN38332743
Octocorallia	*Chrysogorgia sp.*	RB-19-193		southeastern US, Atlantic Ocean	32.99094 N 75.9 W	2608	SAMN38332744
Octocorallia	*Stenogorgia casta*	RB-19-206		southeastern US, Atlantic Ocean	31.89667 N 77.6986 W	662	SAMN38332745
Octocorallia	*Chrysogorgia sp*	RB-19-207		southeastern US, Atlantic Ocean	31.9034 N 77.6964 W	772	SAMN38332746
Octocorallia	Carijoidae	RB-19-217		southeastern US, Atlantic Ocean	31.9078 N 77.6959 W	771	SAMN38332747
Octocorallia	*Anthomastus cf canariensis*	AT41-18-08		southeastern US, USA	32.01366 N 77.39584 W	729	SAMN38332748
Hexacorallia	*Aphanostichopathes dissimilis*	AT41-18-33	USNM:1606539	southeastern US, Atlantic Ocean	31.323 N 77.245 W	1273	SAMN38332749
Hexacorallia	*Bathypathes pseudoalternata*	AT41-18-36		southeastern US, Atlantic Ocean	31.3224832 N 77.245047 W	1273	SAMN38332750
Hexacorallia	*Alternatipathes sp.*	AT41-18-039	USNM:1606551	southeastern US, Atlantic Ocean	31.3238 N 77.2413 W	1217	SAMN38332751
Hexacorallia	*Stauropathes sp*	AT41-18-42	USNM:1606527	southeastern US, Atlantic Ocean	31.3225 N 77.245 W	1273	SAMN38332752
Octocorallia	*Leiopathes cf. montana*	AT41-18-51	USNM:1606568	southeastern US, USA	32.0125 N 78.3134 W	558	SAMN38332753
Hexacorallia	*Javania cf cailleti*	AT41-18-117		southeastern US, USA	34.9367 N 75.1685 W	1564	SAMN38332754
Hexacorallia	*Telopathes sp.*	AT41-18-123		southeastern US, USA	34.9389 N 75.1701 W	1428	SAMN38332755
Hexacorallia	*Bathypathes sp.*	AT41-18-125		southeastern US, USA	34.9367 N 75.1685 W	1579	SAMN38332756
Octocorallia	*Callistephanus pallida*	AT41-18-126	USNM:1606544	southeastern US, USA	34.9375 N 75.1697 W	1507	SAMN38332757
Octocorallia	*Lateothela grandiflora*	RB-19-043	USNM:1606577	southeastern US, Atlantic Ocean	31.9842 N 77.4114 W	700	SAMN38332758
Octocorallia	*Plumarella pourtalesii*	RB-19-201		southeastern US, Atlantic Ocean	31.8837 N 77.7231 W	723	SAMN38332759
Octocorallia	*Callogorgia delta*	LII-10-379		Gulf of Mexico, USA	28.06631 N 89.71589 W	630	SAMN38332760

Octocorallia	*Trachythela sp.*	SH10057		Gulf of Mexico, USA	28.63374 N 88.16979 W	1850	SAMN38332761
Octocorallia	*Muriceides sp.*	SH10195	USNM:1695024	Gulf of Mexico, USA	29.4402 N 87.5755 W	68	SAMN38332762
Octocorallia	Paramuriceidae	SH10225	USNM:1695025	Gulf of Mexico, USA	29.43878 N 87.57665 W	66	SAMN38332763
Octocorallia	*Callistephanus* cf. *pallida*	SH10256		Gulf of Mexico, USA	26.57054 N 93.48343 W	1703	SAMN38332764
Octocorallia	*Sibogagorgia sp.*	SH10264	USNM:1695026	Gulf of Mexico, USA	26.5705 N 93.4832 W	1695	SAMN38332765
Octocorallia	*Ellisella sp.*	SH10611	USNM:1695027	Gulf of Mexico, USA	28.08585 N 90.69983 W	99	SAMN38332766
Hexacorallia	*Stichopathes sp.*	SH10725	USNM:1665778	Gulf of Mexico, USA	28.353 N 92.461 W	57	SAMN38332767
Octocorallia	*Carijoa* cf. *riseii*	SH10768	USNM:1695029	Gulf of Mexico, USA	28.0717 N 92.46733 W	80	SAMN38332768
Octocorallia	*Nicella* sp.	SH10858	USNM:1695030	Gulf of Mexico, USA	27.83437 N 92.89096 W	98	SAMN38332769
Octocorallia	Placogorgia sp.	SH10899	USNM:1695031	Gulf of Mexico, USA	27.89127 N 93.26053 W	118	SAMN38332770
Octocorallia	*Nicella sp.*	SH10954	USNM:1695032	Gulf of Mexico, USA	28.00769 N 93.47987 W	84	SAMN38332771
Octocorallia	*Caliacis cf. nutans*	SH10978	USNM:1665776	Gulf of Mexico, USA	28.00719 N 93.48011 W	85	SAMN38332772
Octocorallia	*Ellisella* sp.	SH10979	USNM:1695033	Gulf of Mexico, USA	28.00719 N 93.48011 W	85	SAMN38332773
Octocorallia	Paramuriceidae	SH10981	USNM:1695034	Gulf of Mexico, USA	28.00697 N 93.48028 W	85	SAMN38332774
Octocorallia	*Bebryce sp.*	SH10985	USNM:1695035	Gulf of Mexico, USA	28.007055 N 93.480476 W	84	SAMN38332775
Octocorallia	*Ellisella* sp.	SH11717	USNM:1695036	Gulf of Mexico, USA	28.0858 N 90.70001 W		SAMN38332776
Hexacorallia	*Stichopathes* sp.	SH11720		Gulf of Mexico, USA	28.08598 N 90.69999 W		SAMN38332777
Octocorallia	*Anthomastus sp.*	SH11782	USNM:1695037	Gulf of Mexico, USA		1412	SAMN38332778
Hexacorallia	*Antipathes furcata*	SH11797		Gulf of Mexico, USA	28.09485 N 92.00566 W	83	SAMN38332779
Hexacorallia	*Antipathes cf. atlantica*	SH11805		Gulf of Mexico, USA	28.095 N 92.00598 W	82	SAMN38332780
Octocorallia	*Thesea* cf. *rubra*	SH11833	USNM:1695038	Gulf of Mexico, USA	27.95723 N 92.58442 W	83	SAMN38332781
Octocorallia	*Thesea* cf. *rubra*	SH11835		Gulf of Mexico, USA	27.95722 N 92.58436 W	84	SAMN38332782
Octocorallia	*Leptogorgia cf. violacea*	SH11839		Gulf of Mexico, USA	27.95853 N 92.58411 W	82	SAMN38332783
Octocorallia	*Chironepthya sp.*	SH11965A		Gulf of Mexico, USA	27.8903 N 93.62331 W	91	SAMN38332784
Hexacorallia	*Tanacetipathes sp.*	SH11968	USNM:1695039	Gulf of Mexico, USA	27.89056 N 93.62333 W	92	SAMN38332785
Octocorallia	*Leiopathes cf. glaberrima*	SH12078	USNM:1665757	Gulf of Mexico, USA	29.15711 N 88.01466 W	487	SAMN38332786
Octocorallia	*Leiopathes sp.*	SH12079	USNM:1695040	Gulf of Mexico, USA	29.15709 N 88.01464 W	488	SAMN38332787
Octocorallia	*Pseudoanthomastus sp*	SH12080	USNM:1695041	Gulf of Mexico, USA	29.15722 N 88.0163 W	479	SAMN38332788
Octocorallia	*Lateothela grandiflora*	SH12081	USNM:1665758	Gulf of Mexico, USA	29.15715 N 88.0164 W	482	SAMN38332789
Hexacorallia	*Tanacetipathes cf. hirta*	SH12084	USNM:1695042	Gulf of Mexico, USA	27.95759 N 92.5805 W	90	SAMN38332790
Hexacorallia	*Tanacetipathes cf. tanacetum*	SH12085	USNM:1695043	Gulf of Mexico, USA	27.95761 N 92.5803 W	90	SAMN38332791

Octocorallia	*Scleracis* cf. *guadalupensis*	SH12090	USNM:1695046	Gulf of Mexico, USA	27.95717 N 92.5811 W	86	SAMN38332792
Octocorallia	*Nicella sp.*	SH12091	USNM:1695047	Gulf of Mexico, USA	27.95717 N 92.5811 W	86	SAMN38332793
Octocorallia	*Nicella sp.*	SH12092	USNM:1695048	Gulf of Mexico, USA	27.95717 N 92.5811 W	86	SAMN38332794
Octocorallia	*Chironepthya sp.*	SH12095	USNM:1665759	Gulf of Mexico, USA	27.90098 N 92.2703 W	85	SAMN38332795
Hexacorallia	*Stichopathes sp.*	SH12098	USNM:1695049	Gulf of Mexico, USA	28.15692 N 94.3028 W	54	SAMN38332796
Octocorallia	*Thesea nivea*	SH12099	USNM:1695050	Gulf of Mexico, USA	28.1587 N 94.3031 W	54	SAMN38332797
Hexacorallia	*Umimayanthus parasiticus*	SH12101	USNM:1665762	Gulf of Mexico, USA	28.15701 N 94.3031 W	54	SAMN38332798
Octocorallia	*Caliacis cf. nutans*	SH12107	USNM:1695051	Gulf of Mexico, USA	27.89072 N 93.6196 W	79	SAMN38332799
Octocorallia	*Callogorgia gracilis*	SH12114	USNM:1665766	Gulf of Mexico, USA	27.8952 N 93.2668 W	114	SAMN38332800
Octocorallia	*Nidalia sp.*	SH12115	USNM:1695052	Gulf of Mexico, USA	27.89561 N 93.2677 W	111	SAMN38332801
Octocorallia	*Plumapathes pennacea*	SH12116	USNM:1665767	Gulf of Mexico, USA	27.8935 N 93.2736 W	67	SAMN38332802
Octocorallia	*Elatopathes abietina*	SH12118	USNM:1695054	Gulf of Mexico, USA	27.895 N 93.2665 W	109	SAMN38332803
Hexacorallia	*Aphanipathes cf. pedata*	SH12120	USNM:1695055	Gulf of Mexico, USA	27.89508 N 93.26661 W	110	SAMN38332804
Hexacorallia	*Sibopathes sp*	SH12127	USNM:1665769	Gulf of Mexico, USA	27.59856 N 91.8255 W	531	SAMN38332805
Octocorallia	*Paracalyptrophora carinata*	SH12128	USNM:1665770	Gulf of Mexico, USA	27.59676 N 91.8267 W	534	SAMN38332806
Octocorallia	*Paramuricea sp*	SH12129	USNM:1665771	Gulf of Mexico, USA	27.59725 N 91.8268 W	527	SAMN38332807
Octocorallia	*Chelidonsis aurantiaca mexicana*	SH12130	USNM:1695057	Gulf of Mexico, USA	27.59694 N 91.8267 W	531	SAMN38332808
Octocorallia	*Scleracis cf. guadalupensis*	SH13888		Gulf of Mexico, USA	27.90071 N 93.27009 W	87	SAMN38332809
Octocorallia	*Hedera cf. caerulescens*	SH13891		Gulf of Mexico, USA			SAMN38332810
Octocorallia	*Swiftia exserta*	SH10090		Gulf of Mexico, USA	29.2502 N 88.3384 W	71	SAMN38332811
Octocorallia	*Swiftia exserta*	SH10104		Gulf of Mexico, USA	29.25288 N 88.33845 W	78	SAMN38332812
Octocorallia	*Swiftia exserta*	SH10656		Gulf of Mexico, USA	27.96797 N 93.61281 W	73	SAMN38332813
Octocorallia	*Swiftia exserta*	SH10657		Gulf of Mexico, USA	27.96797 N 93.61281 W	73	SAMN38332814
Octocorallia	*Swiftia exserta*	SH10764		Gulf of Mexico, USA	28.07165 N 92.46734 W	80	SAMN38332815
Octocorallia	*Muricea pendula*	SH10087		Gulf of Mexico, USA	29.25022 N 88.3385 W	71	SAMN38332816
Octocorallia	*Muricea pendula*	SH10681		Gulf of Mexico, USA	27.95669 N 93.60033 W	79	SAMN38332817
Octocorallia	*Muricea pendula*	SH10782		Gulf of Mexico, USA	28.07168 N 92.46733 W	79	SAMN38332818
Octocorallia	*Muricea pendula*	SH10786		Gulf of Mexico, USA	28.07155 N 92.46733 W	79	SAMN38332819
Octocorallia	*Muricea pendula*	SH10788		Gulf of Mexico, USA	28.07153 N 92.4673 W	79	SAMN38332820
Octocorallia	*Ellisella sp.*	SH12123	USNM:1695056	Gulf of Mexico, USA	27.8983 N 93.2523 W	67	SAMN38332821
Octocorallia	*Pseudoplexaura flagellosa*	flk001	USNM:1606815	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332822
Octocorallia	*Plexaurella dichotoma*	flk012	USNM:1606816	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332823

Octocorallia	*Eunicea succinea*	flk019	USNM:1606817	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332824
Octocorallia	*Antillogorgia n sp*	FLK020	USNM:1606818	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332825
Octocorallia	*Antillogorgia kallos*	FLK021	USNM:1606819	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332826
Octocorallia	*Eunicea tayrona*	FLK022	USNM:1606820	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332827
Octocorallia	*Eunicea clavigera*	FLK024	USNM:1606821	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332828
Octocorallia	*Muricea elongata*	FLK034	USNM:1606823	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332829
Octocorallia	*Eunicea tourneforti fatra*	FLK037	USNM:1606824	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332830
Octocorallia	*Eunicea calyculata*	FLK047	USNM:1606825	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332831
Octocorallia	*Eunicea tourneforti*	FLK052	USNM:1606826	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332832
Octocorallia	*Antillogorgia americana*	FLK058	USNM:1606827	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332833
Octocorallia	*Eunicea knighti*	FLK059	USNM:1606828	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332834
Octocorallia	*Pterogorgia citrina*	FLK063	USNM:1606829	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332835
Octocorallia	*Plexaurella grisea*	FLK068	USNM:1606830	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332836
Octocorallia	*Eunicea fusca*	FLK073	USNM:1606831	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332837
Octocorallia	*Pseudoplexaura porosa*	FLK074	USNM:1606832	Florida Keys, USA	24.77828 N 80.73589 W	5	SAMN38332838
Octocorallia	*Antillogorgia bipinnata*	FLK078	USNM:1606833	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332839
Octocorallia	*Eunicea fusca*	FLK080	USNM:1606834	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332840
Octocorallia	*Plexaura kuna*	FLK086	USNM:1606835	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332841
Octocorallia	*Pterogorgia guadalupensis*	FLK095	USNM:1606836	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332842
Octocorallia	*Eunicea laciniata*	FLK097	USNM:1606837	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332843
Octocorallia	*Antillogorgia acerosa*	FLK098	USNM:1606838	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332844
Octocorallia	*Muricea atlantica*	FLK101	USNM:1606839	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332845
Octocorallia	*Muricea muricata*	FLK104	USNM:1606840	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332846
Octocorallia	*Plexaura homomalla*	FLK105	USNM:1606841	Florida Keys, USA	24.69238 N 80.94783 W	4	SAMN38332847
Octocorallia	*Muricea laxa*	FLK106	USNM:1606842	Florida Keys, USA	24.69238 N 80.94783 W	4	SAMN38332848
Octocorallia	*Eunicea flexuosa*	FLK107	USNM:1606843	Florida Keys, USA	24.69238 N 80.94783 W	4	SAMN38332849
Octocorallia	*Eunicea mammosa*	FLK110	USNM:1606844	Florida Keys, USA	24.69238 N 80.94783 W	4	SAMN38332850
Octocorallia	*Pseudoplexaura wagenaari*	FLK132	USNM:1606845	Florida Keys, USA	24.72286 N 80.86167 W	5	SAMN38332851
Octocorallia	*Briareum asbestinum*	pan019	USNM:1606846	Bocas del Toro, Panama	9.2481 N 82.12953 W	7	SAMN38332852
Octocorallia	*Plexaura kukenthali*	pan070	USNM:1606847	Bocas del Toro, Panama	9.25006 N 82.13339 W	8	SAMN38332853
Octocorallia	*Muricea atlantica*	PAN079	RMNH:40834	Bocas del Toro, Panama			SAMN38332854

Octocorallia	*Pterogorgia anceps*	pan088	RMNH:40837	Bocas del Toro, Panama			SAMN38332855
Octocorallia	*Plumarella cf. laxiramosa*	AT41-18-068	USNM:1606536	southeastern US, USA	32.0698 N 78.3711 W	402	SAMN38332856
Octocorallia	*Paramuricea sp.*	AT-41-18-111	USNM:1606523	southeastern US, USA	33.5728 N 76.4654 W	374	SAMN38332857
Octocorallia	*Antillogorgia elisabethae*	FLK026	USNM:1606822	Florida Keys, USA	24.7525 N 81.75458 W	15	SAMN38332858
Octocorallia	*Gorgonia flabellum*	PAN036	RMNH:40827	Bocas del Toro, Panama			SAMN38332859
Actinopterygii	*Scorpaena plumieri*	ARV19180D-21-01	ANSP:190315	Bahamas			SAMN37845066
Actinopterygii	*Carangoides bartholomaei*	ARV19180D-21-02	ANSP:191545	Bahamas			SAMN37845049
Actinopterygii	*Caranx ruber*	ARV19180D-21-03	ANSP:199286	Bahamas			SAMN37845050
Actinopterygii	*Neoniphon marianus*	ARV19180D-21-04	ANSP:190163	Bahamas			SAMN37845062
Actinopterygii	*Haemulon plumierii*	ARV19180D-21-05	ANSP:199344	Bahamas			SAMN37845060
Actinopterygii	*Mulloidichthys martinicus*	ARV19180D-21-06	ANSP:199411	Bahamas			SAMN37845061
Actinopterygii	*Gnatholepis thompsoni*	ARV19180D-21-07	ANSP:189930	Bahamas			SAMN37845053
Actinopterygii	*Lutjanus apodus*	ARV19180D-21-08	ANSP:199404	Bahamas			SAMN37845058
Actinopterygii	*Scorpaenodes caribbaeus*	ARV19180D-21-09	ANSP:191651	Bahamas			SAMN37845067
Actinopterygii	*Acanthurus coeruleus*	ARV19180D-21-10	ANSP:189689	Bahamas			SAMN37845065
Actinopterygii	*Chromis insolata*	ARV19180D-21-11	ANSP:199439	Bahamas			SAMN37845052
Actinopterygii	*Hypoplectrus puella*	ARV19180D-21-12	ANSP:190015	Bahamas			SAMN37845054
Actinopterygii	*Aldrovandia affinis*	ARV19180D-21-13	NCMNS:92003	USA, Gulf of Mexico, GC852			SAMN37904783
Actinopterygii	*Melanonus zugmayeri*	ARV19180D-21-14	NCMNS:91835	USA, Gulf of Mexico, GC852			SAMN37904784
Actinopterygii	*Paralichthys squamilentus*	ARV19180D-21-16	NCMNS:73192	USA, Gulf of Mexico, VK862 / VK906			SAMN37904785
Actinopterygii	*Bathycongrus dubius*	ARV19180D-21-17	NCMNS:92529	USA, Gulf of Mexico, VK862 / VK906			SAMN37904786
Actinopterygii	*Epigonus pandionis*	ARV19180D-21-18	NCMNS:44466	USA, Gulf of Mexico, VK862 / VK906			SAMN37904787
Actinopterygii	*Diplacanthopoma brachysoma*	ARV19180D-21-19	NCMNS:92694	USA, Gulf of Mexico, VK826			SAMN37904788
Actinopterygii	*Helicolenus dactylopterus*	ARV19180D-21-20	NCMNS:88417	USA, Cape Canaveral, Atlantic Ocean			SAMN37904789
Actinopterygii	*Lophiodes beroe*	ARV19180D-21-21	NCMNS:73201	USA, Gulf of Mexico, West Florida Slope			SAMN37904790
Actinopterygii	*Monolene sessilicauda*	ARV19180D-21-23	NCMNS:92927	USA, Cape Lookout, Atlantic Ocean			SAMN37904791
Actinopterygii	*Citharichthys arctifrons*	ARV19180D-21-24	NCMNS:92926	USA, Cape Lookout, Atlantic Ocean			SAMN37904792
Actinopterygii	*Ateleopus*	ARV19180D-21-26	NCMNS:88040	USA, Cape Lookout, Atlantic Ocean			SAMN37904793
Actinopterygii	*Myxine glutinosa*	ARV19180D-21-27	NCMNS:92943	USA, Cape Lookout, Atlantic Ocean			SAMN37904794
Actinopterygii	*Chlorophthalmus agassizi*	ARV19180D-21-28	NCMNS:93136	USA, Cape Lookout, Atlantic Ocean			SAMN37904795
Actinopterygii	*Hymenocephalus billsam*	ARV19180D-21-29	NCMNS:93412	USA, Gulf of Mexico, VK826			SAMN37904796
Actinopterygii	*Malacocephalus occidentalis*	ARV19180D-21-30	NCMNS:95234	USA, Gulf of Mexico, VK862 / VK906			SAMN37904797
Actinopterygii	*Bembrops anatirostris*	ARV19180D-21-32	NCMNS:88418	USA, Gulf of Mexico, VK862 / VK906			SAMN37904798
Actinopterygii	*Dibranchus atlanticus*	ARV19180D-21-33	NCMNS:95230	USA, Gulf of Mexico, VK862 / VK906			SAMN37904799
Actinopterygii	*Melanogrammus aeglefinus*	ARV19180D-21-39	KUIT: 2930	USA, Atlantic Ocean			SAMN37929632
Actinopterygii	*Lutjanus jocu*	ARV19180D-21-40	ANSP:192005	Bahamas			SAMN37845059
Actinopterygii	*Ocyurus chrysurus*	ARV19180D-21-49	ANSP:191612	Bahamas			SAMN37845063
Actinopterygii	*Cephalopholis fulva*	ARV19180D-21-50	ANSP:189798	Bahamas			SAMN37845051
Actinopterygii	*Synodus synodus*	ARV19180D-21-51	ANSP:190431	Bahamas			SAMN37845068
Actinopterygii	*Liopropoma rubre*	ARV19180D-21-57	ANSP:190077	Bahamas			SAMN37845055
Actinopterygii	*Rypticus subbifrenatus*	ARV19180D-21-58	ANSP:191664	Bahamas			SAMN37845064

Actinopterygii	*Coryphaenoides armatus*	ARV19180D-21-62	VIMS:12804HB098	USA: Mid-atlantic Ridge At Charlie Gibbs Fracture Zone	SAMN37929644
Actinopterygii	*Coryphaenoides brevibarbis*	ARV19180D-21-63	VIMS:12884HB168	USA: Mid-atlantic Ridge At Charlie Gibbs Fracture Zone	SAMN37929645
Actinopterygii	*Nezumia bairdii*	HB155ARV442		USA: Mid-atlantic Ridge at Charlie Gibbs Fracture Zone	SAMN37929657
Actinopterygii	*Coryphaenoides leptolepis*	HB060ARV670		USA: Mid-atlantic Ridge at Charlie Gibbs Fracture Zone	SAMN37929658
Actinopterygii	*Antimora rostrata*	G125ARV654		USA: Bear Seamount, North Atlantic Ocean	SAMN37929659
Actinopterygii	*Physiculus fulvus*	ARV19180D-21-87	KUIT: 3508ARV376	USA, Atlantic Ocean	SAMN37929662
Actinopterygii	*Coelorinchus caribbaeus*	ARV348		USA, Atlantic Ocean	SAMN37929672
Actinopterygii	*Halargyreus johnsonii*	ARV196		USA, Atlantic Ocean	SAMN37929678
Actinopterygii	*Steindachneria argentea*	ARV346		USA, Atlantic Ocean	SAMN37929679
Actinopterygii	*Hymenocephalus italicus*	ARV354		USA, Atlantic Ocean	SAMN37929684
Actinopterygii	*Bathygadus macrops*	ARV369		USA, Atlantic Ocean	SAMN37929685
Actinopterygii	*Microgadus tomcod*	ARV19180D-21-117	KUIT: 5884ARV476	USA, Atlantic Ocean	SAMN37929689
Actinopterygii	*Zenopsis conchifera*	ARV19180D-21-118	KUIT:2929ARV494	USA, Atlantic Ocean	SAMN37929690
Actinopterygii	*Regalecus glesne*	ARV19180D-21-119	KUIT:5286ARV482	USA, Atlantic Ocean	SAMN37929691
Actinopterygii	*Desmodema polystictum*	ARV19180D-21-120	KUIT:7467ARV480	USA, Atlantic Ocean	SAMN37929692
Actinopterygii	*Zu cristatus*	ARV19180D-21-121	KUIT:8238ARV485	USA, Atlantic Ocean	SAMN37929693
Actinopterygii	*Gaidropsarus ensis*	ARV19180D-21-122	KUIT: 3675ARV469	USA, Atlantic Ocean	SAMN37929694
Actinopterygii	*Coryphaenoides alateralis*	ARV19180D-21-124	KUIT: 3700ARV463	USA, Atlantic Ocean	SAMN37929696
Actinopterygii	*Merluccius albidus*	ARV389		USA, Atlantic Ocean	SAMN37929697
Actinopterygii	*Phycis chesteri*	ARV400		USA, Atlantic Ocean	SAMN37929698
Actinopterygii	*Laemonema goodebeanorum*	ARV373		USA, Atlantic Ocean	SAMN37929699

28S CORAL BARCODES

Family	Species	Sample ID	Voucher	Country	Lat	Long	Depth (m)	GenBank Access.
Primnoidae	Callogorgia delta	LII-10-379	LII-10-379	United States	28.06631	-89.71589	630	PP073569
Victorgorgiidae	Trachythela sp.	SH10057		United States	28.63375	-88.16979	1850	PP073570
Plexauridae	Muricea pendula	SH10087		United States	29.25023	-88.33851	71	PP073571
Paramuriceidae	Paramuriceidae sp.	SH10195	NMNH:USNM1695024	United States	29.44020	-87.57550	68	PP073572
Paramuriceidae	Paramuriceidae sp.	SH10223	NMNH:USNM1695025	United States				PP073573
Gorgoniidae	cf. Callistephanus sp.	SH10256		United States	26.57054	-93.48343	1703	PP073574
Gorgoniidae	cf. Callistephanus sp.	SH10329		United States				PP073575
Ellisellidae	Ellisella sp.	SH10611	NMNH:USNM1695027	United States	28.08585	-90.69983	99	PP073576

Antipathidae	Stichopathes sp.	SH10725	NMNH:USNM1 665778	United States	28.35300	-92.46100	57	PP073577
Carijoidae	Carijoa riisei	SH10745	NMNH:USNM1 695028	United States	28.35270	-92.46942	53	PP073578
Ellisellidae	Nicella sp.	SH10768	NMNH:USNM1 695029	United States	28.07171	-92.46734	79.9	PP073579
Paramuriceidae	Paramuriceidae sp.	SH10858	NMNH:USNM1 695030	United States	27.83438	-92.89097	97.7	PP073580
Paramuriceidae	Placogorgia cf. rudis/tenuis	SH10899	NMNH:USNM1 695031	United States	27.89128	-93.26053	118	PP073581
Ellisellidae	Nicella sp.	SH10954	NMNH:USNM1 695032	United States	28.00769	-93.47987	84.1	PP073582
NA	Malacalcyonacea sp.	SH10978	NMNH:USNM1 665776	United States	28.00719	-93.48012	84.7	PP073583
Ellisellidae	Ellisella sp.	SH10979	NMNH:USNM1 695033	United States	28.00719	-93.48012	84.7	PP073584
Paramuriceidae	Bebryce cf. cinerea/grandis	SH10985	NMNH:USNM1 695035	United States	28.00706	-93.48048	83.6	PP073585
Ellisellidae	Ellisella sp.	SH11717	NMNH:USNM1 695036	United States	28.08581	-90.70001		PP073586
Antipathidae	Stichopathes sp.	SH11720		United States	28.08599	-90.69999		PP073587
Antipathidae	Antipathes furcata	SH11797		United States	28.09485	-92.00567	83	PP073588
Antipathidae	Antipathes atlantica	SH11805		United States	28.09501	-92.00599	82	PP073589
Incertae sedis	Thesea cf. rubra	SH11833	NMNH:USNM1 695038	United States	27.95724	-92.58443	83.39	PP073590
Incertae sedis	Thesea cf. rubra	SH11835		United States	27.95723	-92.58436	83.6	PP073591
Gorgoniidae	Leptogorgia cf. violacea	SH11840		United States				PP073592
Siphonogorgiidae	Chironephthya sp.	SH11965A		United States				PP073593
Myriopathidae	Tanacetipathes sp.	SH11968	NMNH:USNM1 695039	United States	27.89056	-93.62334	91.58	PP073594
Leiopathidae	Leiopathes cf. glaberrima	SH12078	NMNH:USNM1 665757	United States	29.15712	-88.01466	487	PP073595
Alcyoniidae	Lateothela cf. grandiflora	SH12081		United States	29.15715	-88.01641	482	PP073596
Ellisellidae	Nicella sp.	SH12089		United States	27.95717	-92.58110	86	PP073597
Ellisellidae	Nicella sp.	SH12089		United States	27.95717	-92.58110	86	PP073597
Scleracidae	Scleracis cf. guadalupensis	SH12090	NMNH:USNM1 695046	United States	27.95717	-92.58110	86	PP073598
Ellisellidae	Nicella sp.	SH12091	NMNH:USNM1 695047	United States	27.95717	-92.58110	86	PP073599
Ellisellidae	Nicella sp.	SH12092	NMNH:USNM1 695048	United States	27.95717	-92.58110	86	PP073600
Incertae sedis	Thesea nivea	SH12099	NMNH:USNM1 695050	United States	28.15870	-94.30310	54	PP073601
Parazoanthidae	Umimayanthus parasiticus	SH12101	NMNH:USNM1 665762	United States	28.15702	-94.30310	54	PP073602
Incertae sedis	Thesea cf. guadalupensis	SH12109		United States	27.89072	-93.61970	79	PP073603
Primnoidae	Callogorgia cf. gracilis	SH12114	NMNH:USNM1 665766	United States	27.89521	-93.26680	114	PP073604
Nidaliidae	Nidalia sp.	SH12115	NMNH:USNM1 695052	United States	27.89561	-93.26780	111	PP073605
Antipathidae	Antipathes atlantica	SH12117		United States	27.89834	-93.27140	66	PP073606

Aphanipathidae	Elatopathes abietina	SH12118	NMNH:USNM1695054	United States	27.89501	-93.26660	109	PP073607
Ellisellidae	Ellisella sp.	SH12123	NMNH:USNM1695056	United States	27.89840	-93.25240	67	PP073608
Cladopathidae	Sibopathes sp.	SH12127	NMNH:USNM1665769	United States	27.59857	-91.82560	531	PP073609
Primnoidae	Paracalyptrophora carinata	SH12128	NMNH:USNM1665770	United States	27.59676	-91.82670	534	PP073610
Paramuriceidae	Paramuricea sp. (A/E)	SH12129	NMNH:USNM1665771	United States	27.59726	-91.82680	527	PP073611
Chelidonisididae	Chelidonisis aurantiaca mexicana	SH12130	NMNH:USNM1695057	United States	27.59694	-91.82670	531	PP073612
Plexaurellidae	Plexaurella nutans	ANT100	RNMH:Coel40826	Panama				PP073613
Malacacanthidae	Malacacanthus capensis	ANT101	SAF031	South Africa				PP073614
Acrophytidae	Acrophytum claviger	ANT105	SAF054	South Africa				PP073615
Discophytidae	Discophyton rudyi	ANT106	SBMNH:145136	Canada				PP073616
Paralcyoniidae	Ceeceenus quadrus	ANT107	UF2858	Japan				PP073617
Acanthoaxiidae	Acanthoaxis wirtzi	ANT109	RNMH:Coel39502	Cameroon				PP073618
Keroeididae	Keroeides sp.	ANT112	CAS:196833	Philippines				PP073619
Isididae	Isis hippuris	ANT114	CAS:196605	Philippines				PP073620
Xeniidae	Protodendron repens	ANT115	ZMTAU:Co35118	Japan				PP073621
Isididae	Rumphella sp.	ANT116	RNMH:Coel40991	Palau				PP073622
Eunicellidae	Eunicella tricoronata	ANT117	RNMH:Coel40814	South Africa				PP073623
Dendrophylliidae	Tubastraea coccinea	ANT118		Brazil				PP073624
Faviidae	Mussismilia hispida	ANT120		Brazil				PP073625
Aphanipathidae	Aphanipathes pedata	ANT137	NMNH:USNM1288458	United States				PP073626
Antipathidae	Antipathes grandis	ANT14		United States				PP073627
Schizopathidae	Stauropathes sp.	ANT144	NMNH:USNM1404493	United States				PP073628
Schizopathidae	Stauropathes arctica	ANT147		Canada				PP073629
Myriopathidae	Myriopathes ulex	ANT15		United States				PP073630
Schizopathidae	Umbellapathes sp.	ANT150	NMNH:USNM1404092	United States				PP073631
Caryophylliidae	Phyllangia americana	ANT151		Brazil				PP073632
Pocilloporidae	Pocillopora damicornis	ANT16		Australia				PP073633
Faviidae	Favia fragum	ANT161		Curacao				PP073634
Meandrinidae	Meandrina meandrites	ANT162		Curacao				PP073635
Agariciidae	Agaricia lamarcki	ANT164		Curacao				PP073636
Merulinidae	Orbicella annularis	ANT166		Curacao				PP073637
Merulinidae	Orbicella franksi	ANT167		Curacao				PP073638
Meandrinidae	Dendrogyra cylindrus	ANT168		Curacao				PP073639
Meandrinidae	Eusmilia fastigiata	ANT169		Curacao				PP073640
Pocilloporidae	Stylophora pistillata	ANT17		Australia				PP073641
Isidoidae	Isidoides armata	ANT170	NORFANZ36/10	Pacific Ocean				PP073642
Xeniidae	Caementabunda simplex	ANT171	ZMTAU:Co36122	Madagascar				PP073643
Sarcophytidae	Sclerophytum wanannense	ANT172	ZMTAU:Co36905	Taiwan				PP073644
Sarcophytidae	Sclerophytum acutum	ANT173	ZMTAU:Co36988	Taiwan				PP073645
Ellisellidae	Dichotella gemmacea	ANT178	RNMH:CoelF612	Indonesia				PP073646
Agariciidae	Pavona decussata	ANT18		Australia				PP073647

Cladocoridae	Cladocora sp.	ANT181	PI2	Italy	PP073648
Oculinidae	Oculina varicosa	ANT182	DAY-M3	United States	PP073649
Oculinidae	Oculina cf. varicosa	ANT183	DPA-8	United States	PP073650
Poritidae	Porites astreoides	ANT184	PAST17	United States	PP073651
Dendrophylliidae	Balanophyllia elegans	ANT185	g7	United States	PP073652
Poritidae	Porites panamensis	ANT186	x8	Mexico	PP073653
Plexauridae	Eunicea flexuosa	ANT188	M1-1	United States	PP073654
Alcyoniidae	Alcyonium acaule	ANT19	MR8-AA2	France	PP073655
Oculinidae	Oculina patagonica	ANT190	OC-Leb2	Lebanon	PP073656
Oculinidae	Oculina patagonica	ANT191	ITA-2a	Italy	PP073657
Oculinidae	Oculina patagonica	ANT192	NAT-4	Spain	PP073658
Oculinidae	Oculina varicosa	ANT193		United States	PP073659
Oculinidae	Oculina varicosa	ANT194		United States	PP073660
Poritidae	Porites divaricata	ANT196	Pb9	Belize	PP073661
Oculinidae	Oculina robusta	ANT197	SAR2	United States	PP073662
Poritidae	Porites sverdrupi	ANT198	Psver152	Mexico	PP073663
Alcyoniidae	Alcyonium digitatum	ANT20	RNMH:Coel39671	Isle of Man	PP073664
Alcyoniidae	Alcyonium haddoni	ANT21	AMNH:6046	Argentina	PP073665
Dendrophylliidae	Enallopsammia rostrata	ANT212	NIWA91138	New Zealand	PP073666
Coralliidae	Anthomastus sp.	ANT22	CE-14-059	Ireland	PP073667
Antipathidae	Antipathes atlantica	ANT223	NMNH:USNM1288454	United States	PP073668
Schizopathidae	Telopathes magna	ANT226	NMNH:USNM1204049		PP073669
Poritidae	Porites porites	ANT234	PPor76	United States	PP073670
Poritidae	Porites cf. colonensis	ANT235	COL1	Colombia	PP073671
Poritidae	Porites cf. porites	ANT238	ANP2	Bahamas	PP073672
Clavulariidae	Clavularia inflata	ANT24	RNMH:Coel40903	Palau	PP073673
Poritidae	Porites lobata	ANT240	Plob NS2	United States	PP073674
Caryophylliidae	Desmophyllum pertusum	ANT255	NMNH:USNM1550993	United States	PP073675
Caryophylliidae	Desmophyllum pertusum	ANT256			PP073676
Cornulariidae	Cornularia pabloi	ANT26	NMNH:USNM1178390	South Africa	PP073677
Poritidae	Porites evermanni	ANT265	Plo_3H3	Costa Rica	PP073678
Poritidae	Porites lutea	ANT269	PI_53	Philippines	PP073679
Erythropodiidae	Erythropodium caribaeorum	ANT27	RNMH:Coel40829	Panama	PP073680
Poritidae	Porites cf. australiensis	ANT270	PI_03	Philippines	PP073681
Subergorgiidae	Subergorgia rubra	ANT275	ZMTAU:Co37287	Israel	PP073682
Helioporidae	Heliopora coerulea	ANT28	CRCNI:577	Palau	PP073683
Caryophylliidae	Paraconotrochus antarcticus	ANT280		Antarctica	PP073684
Dendrophylliidae	Enallopsammia profunda	ANT283	NMNH:USNM1664477	United States	PP073685
Dendrophylliidae	cf. Thecopsammia sp.	ANT284	NMNH:USNM1664475	United States	PP073686
Coralliidae	Anthomastus grandiflorus	ANT285	AT41-18-121	United States	PP073687
Keratoisididae	Keratoisidinae sp.	ANT29	CE-14-020	Ireland	PP073688

Parasphaerascleridae	Parasphaerasclera valdiviae	ANT30	SAF248	South Africa	PP073689
Plexauridae	Plexaura kuna	ANT31	RNMH:Coel40836	Panama	PP073690
Sarcophytidae	Sclerophytum slieringsi	ANT33	ZMTAU:Co36307	Taiwan	PP073691
Sarcophytidae	Sclerophytum lochmodes	ANT34	ZMTAU:Co36386	Taiwan	PP073692
Sarcophytidae	Sclerophytum maximum	ANT35	ZMTAU:Co36283	Taiwan	PP073693
Tubiporidae	Tubipora musica	ANT36	ZMTAU:Co34116	Israel	PP073694
Coralliidae	Paraminabea aldersladei	ANT37	RNMH:Coel40985	Palau	PP073695
Sarcophytidae	Sarcophyton trocheliophorum	ANT38	PAL356	Palau	PP073696
Leptophytidae	Leptophyton benayahui	ANT39	SAF288	South Africa	PP073697
Discomidae	Discosoma sp.	ANT3a			PP073698
Corymbophytidae	Corymbophyton bruuni	ANT40	ZMTAU:Co37586	South Africa	PP073699
Carijoidae	Carijoa riisei	ANT41	RNMH:Coel40807	Panama	PP073700
Eunicellidae	Complexum monodi	ANT42	ALC-SEN1	Senegal	PP073701
Leptophytidae	Tenerodus fallax	ANT43	RNMH:Coel40214	South Africa	PP073702
Nephtheidae	Dendronephthya sinaiensis	ANT44	ZMTAU:Co34163	Israel	PP073703
Ifalukellidae	Trichogorgia capensis	ANT46	SAF192	South Africa	PP073704
Primnoidae	Primnoella chilensis	ANT47	MACN-IN:39146	Argentina	PP073705
Incrustatidae	Incrustatus comauensis	ANT48	ARG026	Argentina	PP073706
Paramuriceidae	Paramuricea sp.	ANT49	NMNH:USNM1607719	Ireland	PP073707
Briareidae	Briareum hamrum	ANT51	ZMTAU:Co34187	Israel	PP073708
Paramuriceidae	Acanthogorgia breviflora	ANT52	ZMTAU:Co34194	Israel	PP073709
Siphonogorgiidae	Siphonogorgia godeffroyi	ANT53	RNMH:Coel41055	Palau	PP073710
Paramuriceidae	Bebryce sp.	ANT54	RNMH:Coel40821	Palau	PP073711
Capnellidae	Eunephthya thyrsoidea	ANT55	RNMH:Coel40182	South Africa	PP073712
Spongiodermidae	Diodogorgia nodulifera	ANT56	MJ03	United States	PP073713
Balticinidae	Balticina finmarchica	ANT58	CE-14-010	Ireland	PP073714
Kophobelemnidae	Kophobelemnon sp.	ANT59	CE-14-031	Ireland	PP073715
Alcyoniidae	Anthothela grandiflora	ANT60	NMNH:USNM1611548	Ireland	PP073716
Ideogorgiidae	Ideogorgia capensis	ANT61	RNMH:Coel40804	South Africa	PP073717
Melithaeidae	Alertigorgia orientalis	ANT62	NTM:C014528	Australia	PP073718
Echinoptilidae	Actinoptilum molle	ANT63	RNMH:Coel40822	South Africa	PP073719
Sinulariidae	Sinularia brassica	ANT64	RNMH:Coel41303	Palau	PP073720
Subergorgiidae	Annella mollis	ANT65	PAL124	Palau	PP073721
Sarcophytidae	Sclerophytum flexibile	ANT67	RNMH:Coel41316	Palau	PP073722
Melithaeidae	Solenocaulon sp.	ANT68	RNMH:Coel40033	Indonesia	PP073723
Cladiellidae	Cladiella pachyclados	ANT69	ZMTAU:Co34129	Israel	PP073724
Melithaeidae	Melithaea erythraea	ANT72	ZMTAU:Co37709	Israel	PP073725

Acrossotidae	Acrossota amboinensis	ANT73	NB11		PP073726
Dendrobrachiidae	Dendrobrachia sarmentosa	ANT75	MCZ:31831	Isle of Man	PP073727
Paramuriceidae	Neoacis? sp.	ANT76D	QM:G331536	Australia	PP073728
Anthogorgiidae	Muricella sp.	ANT77	QM:G331552	Australia	PP073729
Protoptilidae	Distichoptilum gracile	ANT78	CE-14-084	Ireland	PP073730
Aquaumbridae	Aquaumbra klapferi	ANT80	NMNH:USNM1150167	United States	PP073731
Paramuriceidae	Thrombophyton coronatum	ANT81	SBMNH:145123	United States	PP073732
Chelidonisididae	Chelidonisis aurantiaca mexicana	ANT82	NMNH:USNM1478132	United States	PP073733
Coralliidae	Anthomastinae n. sp.	ANT85	NA064-076-01-B	Ecuador	PP073734
Caryophylliidae	Desmophyllum dianthus	ANT95	MAC-13-CM 596	United States	PP073735
Flabellidae	Flabellum alabastrum	ANT96	MAC-13-270	United States	PP073736
Nephthyigorgiidae	Nephthyigorgia sp.	ANT97	RNMH:Coel40819		PP073737

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