



2020 RESEARCH AND MONITORING REPORT



The purpose of this document is to report the activities of the Flower Garden Banks Research and Monitoring Team during FY2020.

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Cover photo: *Distichopathes hickersonae*, a black coral, discovered at Elvers Bank, and described in 2020. Photo: NOAA/UNCW-UVP



Disclaimer

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Report Availability

Electronic copies of this report may be downloaded from Flower Garden Banks National Marine Sanctuaries website at <https://flowergarden.noaa.gov>.

Research Staff Projects

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- Deep-sea coral research and technology program project co-lead
- 2016 localized mass mortality monitoring coordinator
- Long-term monitoring program support

Karol Breuer

- Coordination of mooring buoy program

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- HI-A-389-A project manager
- Coordination of mooring buoy program

Emma Hickerson

- Coordination of research and monitoring activities
- Permit coordinator
- Resource protection coordinator

Michelle Johnston

- East and West FGB long-term monitoring project manager
- Invasive lionfish lead
- Lead author – HI-A-389-A Technical Report

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- Water quality project manager
- Long-term monitoring program support

Marissa Nuttall

- Stetson Bank long-term monitoring project manager
- CPC team lead
- FGBNMS unit diving supervisor
- GIS lead
- Deep-sea coral research and technology program project co-lead

Kelly O'Connell

- Manta ray catalog lead
- Long-term monitoring program support



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Overview

The Flower Garden Banks National Marine Sanctuary (FGBNMS) research team was involved in six research cruises between October 1, 2019 and September, 2020. No offshore cruises have taken place since the beginning of March, 2020, due to COVID-19 pandemic restrictions. All 2020 research cruises were rescheduled for 2021/22. The FGBNMS research staff began teleworking in mid-March, 2020. Research efforts were primarily focused on supporting FGBNMS boundary expansion, data analysis, publication and report development, and multibeam mapping. The R/V *Manta* was utilized by the research team for a period of eight days prior to the shut-down of operations. A pool of 24 sanctuary personnel, scientists, and reciprocity divers conducted 60 scuba dives. Twenty-two percent of the dives were conducted by volunteer divers. Activities included biological surveys and sample collection, equipment installation and maintenance, and dive safety training. Two sanctuary permits were processed, and an additional 12 permits were ongoing. Under direction from FGBNMS staff, and co-funded by Bureau of Ocean Energy Management (BOEM), NOAA Ship *Thomas Jefferson* collected 313 mi² of high resolution multibeam bathymetric data in September/October 2020. FGBNMS continued to work with NOAA Ship *Pisces* to identify multibeam targets.



Figure 1. NOAA Ship *Thomas Jefferson* accomplished a significant mapping effort in 2020 in collaboration with FGBNMS and BOEM. Photo: NOAA

FY2020 Highlights

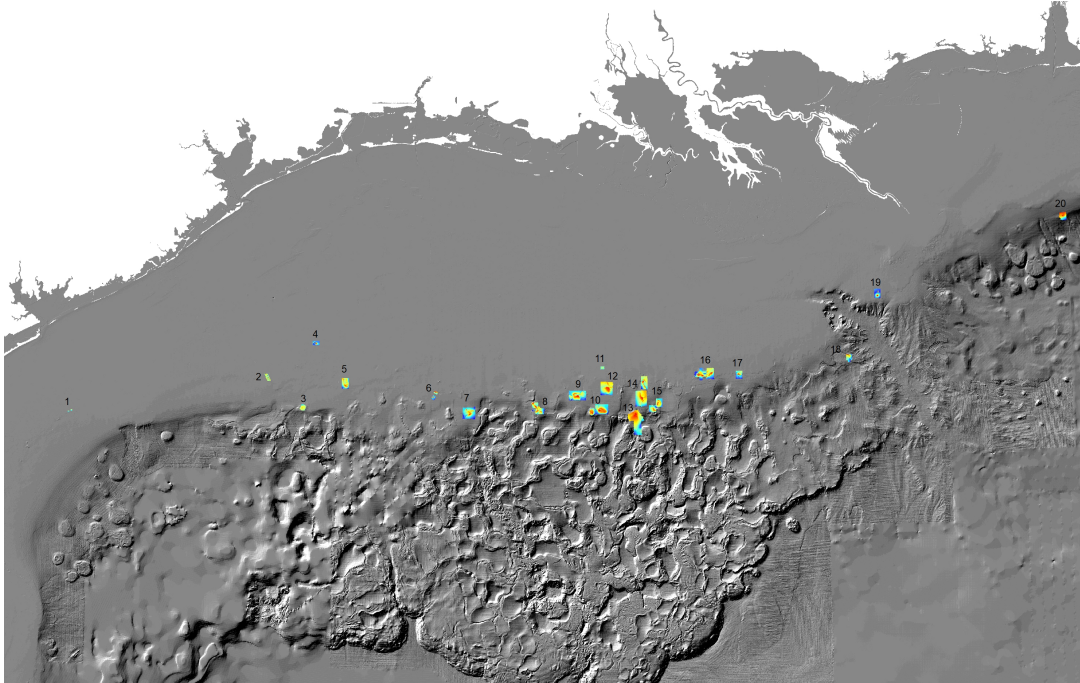


Figure 2. Multibeam data from No Activity Zone Mapping. 1. Big and Small Dunn Bar, 2. Claypile, 3. Coffee Lump, 4. Davis, 5. Elvers, 6. Antoine, 7. Sweet, 8. Alaminos, 9. Assumption Dome, 10. Adeline and EI385, 11. Berwick and Patterson, 12. Ewing, 13. Henderson Ridge North, 14. Sackett, 15. Viosca Knoll East. Image: NOAA

Flower Garden Banks National Marine Sanctuary completed coordination for collection of 414.7 mi² of high resolution bathymetric data by various partners under a five year Interagency Agreement between FGBNMS and BOEM, and also opportunistically by NOAA Ship *Pisces*. The NOAA Ship *Thomas Jefferson* collected 313.3 mi² of multibeam data at 14 target sites. An update and evaluation of the efficacy of the No Activity Zone (NAZ) boundaries that BOEM applies to certain topographic features in the Gulf of Mexico is warranted in order to distance permitted bottom disturbing activities from sensitive benthic habitats. This necessitates that BOEM obtain and use updated bathymetric survey data. Due to NOAA's shared interest in data collection for northern Gulf of Mexico bank features, this is a collaborative effort between BOEM and FGBNMS. The finished datasets will be utilized by both BOEM and NOAA in order to re-evaluate and modify agency policies used to manage environmental resources.

Preliminary data is available from flowergarden@noaa.gov and final data will be available on [NOAA's Bathymetry Data Viewer](#) in the latter part of 2021.

Table 1. NAZ mapping table of targets, summarizing platforms, area mapped, and resolution.

Location	Survey Vessel	Area (mi ²)	Resolution (m ²)	Project Code
Adeline Bank	NOAA Ship <i>Thomas Jefferson</i>	42.6	4	OPR-K306-TJ-20
Alaminos Bank	NOAA Ship <i>Thomas Jefferson</i>	39.2	4	OPR-K306-TJ-20
Antoine Bank	NOAA Ship <i>Thomas Jefferson</i>	6.4	4	OPR-K306-TJ-20
Assumption Dome	NOAA Ship <i>Thomas Jefferson</i>	56.5	6	OPR-K306-TJ-20
Berwick Bank	NOAA Ship <i>Thomas Jefferson</i>	12.1	4	OPR-K306-TJ-20
BOEM Target E1385	NOAA Ship <i>Thomas Jefferson</i>	20.7	4	OPR-K306-TJ-20
Elvers Bank	NOAA Ship <i>Thomas Jefferson</i>	34.5	4	OPR-K306-TJ-20
Ewing Bank	NOAA Ship <i>Thomas Jefferson</i>	20.3	4	OPR-K306-TJ-20
Henderson Ridge North	NOAA Ship <i>Thomas Jefferson</i>	9.3	8	OPR-K306-TJ-20
Patterson Bank	NOAA Ship <i>Thomas Jefferson</i>	14.5	4	OPR-K306-TJ-20
Sackett Bank	NOAA Ship <i>Thomas Jefferson</i>	12.8	4	OPR-K306-TJ-20
Sweet Bank	NOAA Ship <i>Thomas Jefferson</i>	32.1	4	OPR-K306-TJ-20
Viosca Knoll East	NOAA Ship <i>Thomas Jefferson</i>	12.3	6	OPR-K306-TJ-20
TOTAL AREA MAPPED		341.6		

Berwick Bank

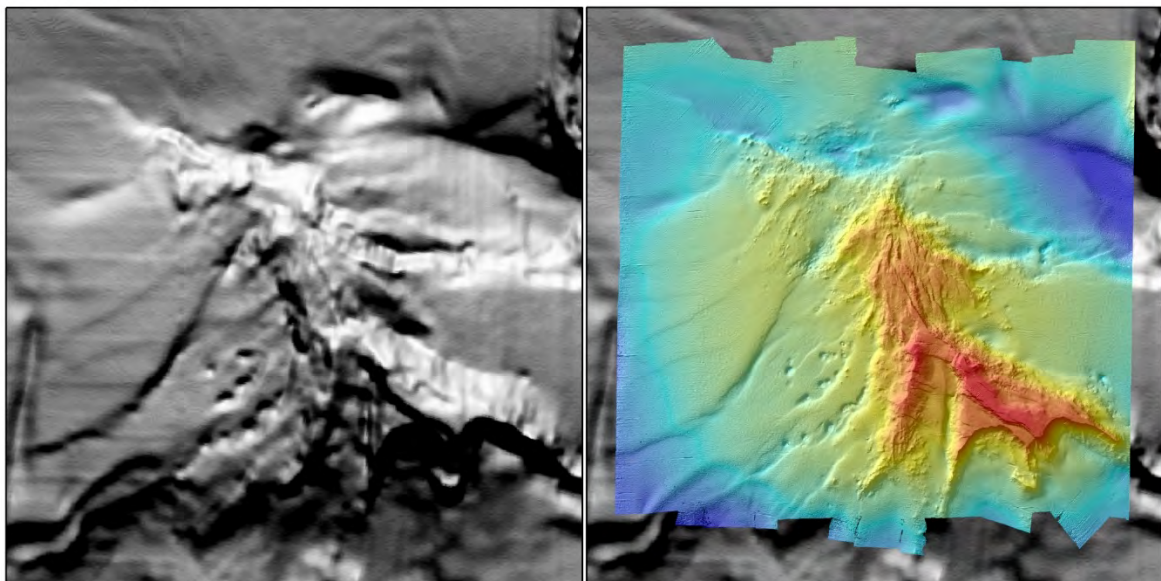


Figure 3. An example of the difference between the quality of the resolution of the mapping data before (on the left) and after (on the right) high resolution multibeam data collection by NOAA Ship *Thomas Jefferson* at Berwick Bank. Image: NOAA

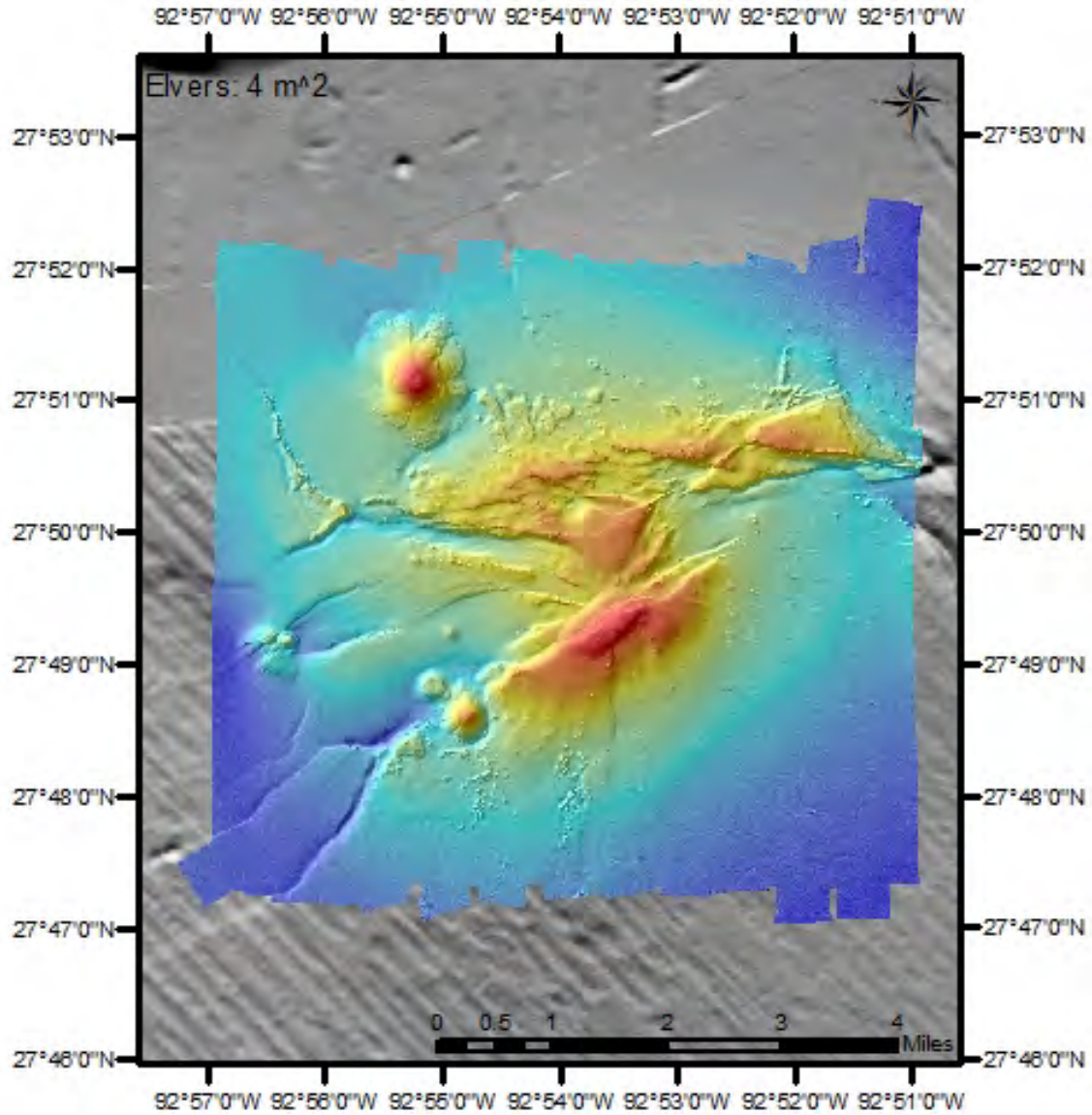


Figure 4. Updated multibeam map of Elvers Bank using higher resolution data collected by NOAA Ship *Thomas Jefferson*. The original map used data collected by Terrasond, Inc. that was less-detailed due to noise of imagery related to sea conditions. Image: NOAA

Cruises and Expeditions



Figure 5. FGBNMS Research Vessel *Manta*. Photo: Voss Lab/FAU

The following cruises were conducted on board the R/V *Manta* by the FGBNMS Research Team, unless indicated otherwise:

October 18-20, 2019 HIA389A Scuba/Bioacoustics
October 29, 2020 – WFGB Deep Station Photography
November 19, 2019 Water Quality I
December 4, 2019 Water Quality II
February 23, 2020 – Water Quality I
March 12, 2020 – Water Quality II/Mortality Site

Additional R/V *Manta* Cruises

The R/V *Manta* was chartered by Texas A&M University (TAMU) on January 5, 2020 – TAMU glider pickup

Additional Research and Monitoring Team Activities



Figure 6. RJE Oceanbotics SRV-8 ROV. Photo: Hickerson/NOAA

Purchase of RJE Oceanbotics SRV-8 Remotely Operated Vehicle (ROV)

East and West long-term monitoring funds were utilized to purchase a small ROV, to support future long-term monitoring activities. The vehicle includes a 200 m umbilical, navigation system, lights, cameras (forward and downward looking), lasers, and single function manipulator.

Development of Mapping Portal with National Centers for Environmental Information (NCEI)

FGBNMS is working with NOAA's NCEI to develop a GIS-based mapping portal to serve spatial data and mapping information online. An earlier version of the mapping tool will be upgraded to be more functional, and have the ability to serve a larger variety of data, including long-term monitoring data.

Computer Learning to enhance East and West Long-Term Monitoring Program

FGBNMS research team collaborated with Swift Engineering to initiate an effort to develop machine learning capabilities to automate coral identification for long-term monitoring image analysis.



Figure 7. Replacement Seabird water quality carousel. Photo: O'Connell/NOAA

Replacement Water Quality Carousel

East and West Flower Garden Banks and Stetson Bank Long-Term Monitoring funds were used to purchase water quality carousel to replace a carousel lost during operations in 2019. The carousel includes 12 1L Niskin bottles, for water sampling and a SBE 19plus V2 SeaCAT for measuring conductivity, temperature, and pressure. The carousel package has five auxiliary sensors including an altimeter, a photosynthetically active radiation (PAR) sensor, an ECO fluorometer, a pH sensor, and a dissolved oxygen sensor.

FGBNMS Boundary Expansion

The FGBNMS boundary expansion effort was strongly supported by FGBNMS research staff, primarily Raven Blakeway, Marissa Nuttall, and Emma Hickerson, in document development, outreach material development, and GIS support.

Mooring Buoys

Karol Breuer took on the role of co-lead of the mooring buoy program, with Emma Hickerson, to coordinate providing mooring buoys to Fling Charters during 2020 while FGBNMS was unable to be offshore. This helped to support commercial operations in the sanctuary and build up the inventory of mooring buoys and supplies for future installation.

FGBNMS National Coral Reef Monitoring Program (NCRMP) Coral Reef Conservation Program (CRCP) Funding

FGBNMS and NCRMP were awarded CRCP funds for a three-year data integration project to calibrate the two separate monitoring programs. Michelle Johnston and Erica Towle (NCRMP) are co-PIs on this project. The project will begin in 2021 due to COVID-19 delays.

Long-Term Monitoring (LTM) Data Archiving with NCEI

FGBNMS is working with NOAA's NCEI to archive EFGB, WFGB, and Stetson Bank long-term monitoring data. Michelle Johnston and Marissa Nuttall have successfully archived all 2018 data and the research team will be working to archive additional years.

Lionfish

While lionfish cruises were canceled due to COVID-19, Michelle Johnston contributed to a manuscript (in press) on lionfish removal efficacy lead by Dr. Alexandria Davis from the University of Alberta. Michelle Johnston and Steve Gittings also submitted a proposal and were accepted to present to Good Pitch Texas on a lionfish documentary with staff from Lionfish University in October 2020.

Flower Garden Banks and National Coral Reef Status Report Cards

The NOAA Coral Reef Conservation Program (CRCP) Flower Garden Banks Status Report was finalized in May 2020 and the National Status Report for U.S. Coral Reefs was finalized in November 2020. FGBNMS research staff worked closely with NCRMP and University of Maryland Center for Environmental Science (UMCES), along with others across NOAA, to provide content for the report cards. The national report card highlights that U.S. coral reefs are in fair condition, but declining and vulnerable. As a remote reef, FGBNMS is in good condition. The report cards are intended to be used as communication, education, and outreach tools, and not intended to directly inform program activities or assess management actions.

Manta Ray Catalog

The manta ray catalog was updated in 2020 to improve the presentation of information for consistency and to provide detailed background information regarding recent research projects. The rewrite highlighted the designation of the Flower Garden Banks and the surrounding area as nursery habitat for oceanic manta rays (*Mobula birostris*) and a potential new species of manta (*Mobula cf. birostris*). The updates also included information about the ongoing tagging projects taking place in the sanctuary. In the year 2020, only one new individual was cataloged bringing the total number of individuals to 101 with 25 individual resightings.

Lionfish

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Data Mining

Significant effort went into mining data from DFH cruise annotations to develop species lists for the FGBNMS expansion sites and a report detailing the marine debris encountered at all sanctuary sites. These products will be finalized in 2021.

Publications

- Johnston, M.A., R.D. Blakeway, K. O'Connell, J. MacMillan, M.F. Nuttall, X. Hu, J.A. Embesi, E.L. Hickerson, and G.P. Schmahl. 2020. Long-Term Monitoring at East and West Flower Garden Banks: 2018 Annual Report. National Marine Sanctuaries Conservation Series ONMS-20-09. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 124 pp.
- Johnston, M.A., M.F. Nuttall, K. O'Connell, J. MacMillan, R.D. Blakeway, E. Ebert, C. Taylor, E.L. Hickerson, J.A. Embesi, and G.P. Schmahl. 2020. Baseline Ecological Assessment of Artificial Reef, High Island A-389-A: Pre- and Post-Structure Removal. National Marine Sanctuaries Conservation Series ONMS-20-11. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 201 pp.
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- Nuttall MF, Somerfield PJ, Sterne TK, MacMillan JT, Sinclair J, Hickerson EL, Embesi JA, Johnston MJ, and Schmahl GP. 2020. Stetson Bank Long-Term Monitoring: 1993-2015. National Marine Sanctuaries Conservation Series ONMS-20-06. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 156 pp.
- Opresko, D., Goldman, S.L., Johnson, R., Parra, K., Nuttall, M., Schmahl, G.P., and Brugler, M.R. 2020. Morphological and molecular characterization of a new species of black coral from Elvers Bank, northwestern Gulf of Mexico (Cnidaria: Anthozoa: Hexacorallia: Antipatharia: Aphanipathidae: *Distichopathes*). *Journal of the Marine Biological Association of the United Kingdom*. 1-8.
<https://doi.org/10.1017/S002531542000051X>.

- Shore, A. N., Sims, J.A., Grimes, M., Howe-Kerr, L.E., Stadler, L., Sylvan, J. B., Shamberger, K. E., F., Davies, S. W., Santiago-Vazquez, L. Z., Correa, A. M. S. On a reef far, far away: Offshore transport of floodwaters following extreme storms impacts sponge health and associated microbial communities. In press
- Sterne, T.K., Retchless, D., Allee, R., Highfield, W. 2020. Predictive modelling of mesophotic habitats in the north-western Gulf of Mexico. *Aquatic Conservation Marine and Freshwater Ecosystems*, 1-14. Doi:10.1002/aqc.3281.
- Wetmore, L., Dance, M.A., Hill, R., and Rooker, J. Community dynamics of fish assemblages on mid-shelf and outer-shelf coral reefs in the northwestern gulf of Mexico. *Front. Mar. Sci.*/doi:10.3389/fmars.2020.00152. In review.

Science Interpretation Activities

1. October 1, 2019 – Virtual lionfish dissections – Devers Elementary 5th graders (Johnston)
2. October 3, 2019 – Gulf of Mexico Forum Thesispalooza – East and West Flower Garden Banks LTM, and lionfish presentations (Johnston)
3. November 6, 2019 – Regional response training presentation – McKinney, Texas (Hickerson)
4. November 15, 2019 – Virtual lionfish dissections – St. Andrew’s Elementary 4th Grade Empower Girls Group (Johnston)
5. December 3, 2019 – Lionfish dissections – Oppe Elementary 3rd grade students (Johnston/Drinnen)
6. January 9, 2020 – FGBNMS presentation to Australian/American Chamber of Commerce – Houston, Texas (Hickerson)
7. January 30, 2020 – FGBNMS research and overview, Galveston, Texas (Schmahl/Hickerson/Nuttall)
8. March 23, 2020 – Virtual FGBNMS overview – Institute for Journalism and Natural Resources (Hickerson)
9. July 31, 2020 – Get Into Your Sanctuary – Lionfish cooking with Kitchen Chick (Johnston/Drinnen/Clift)
10. September 9, 2020 – Guest lecture – Texas A&M University Galveston (TAMUG) Fisheries Management class (Johnston)
11. SCUBA Magazine – HIA-A-389-A interview (Hickerson)
12. Earth Is Blue support – imagery and fact checking
13. Response to letters from students – Into the Sea (Hickerson)
14. Development of video annotations for all GFOE dives

Trainings, Meetings, Conferences

1. October 18, 2019 – Ocean Acidification – NOAA OAP/Xingpin Hu (TAMUCC), project coordination meeting – Corpus Christi, Texas (Hickerson)
2. November 7 – 9, 2019 – NOAA Diving Field Training – Galveston, Texas
3. December 5, 2019 – CYCLE/RESTORE project coordination meeting/Santiago Herrera (LeHigh University) – Tampa, Florida (Hickerson)
4. February 3, 2020 – First aid, CPR, AED, and oxygen administration training for divers and vessel crew – Galveston, Texas
5. February 10-11, 2020 – NCRMP National Report Card Meeting – Silver Spring, Maryland (Johnston)

Glossary of Acronyms

BOEM – Bureau of Ocean Energy Management
DSCRTP – Deep Sea Coral Research and Technology Program
FGBNMS – Flower Garden Banks National Marine Sanctuary
GFOE – Global Foundation for Ocean Exploration
GIS – Geographic Information Systems
LTM – Long-Term Monitoring
NCEI – National Centers for Environmental Information
NCRMP – National Coral Reef Monitoring Program
NOAA – National Oceanic and Atmospheric Administration
SCUBA – Self Contained Underwater Breathing Apparatus
TAMU – Texas A&M University
TAMUCC – Texas A&M University – Corpus Christi
TAMUG – Texas A&M at Galveston

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