

Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration

FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY



2017 RESEARCH AND MONITORING REPORT



February 2018

The purpose of this document is to report the activities of the Flower Garden Banks Research Team during FY2017.

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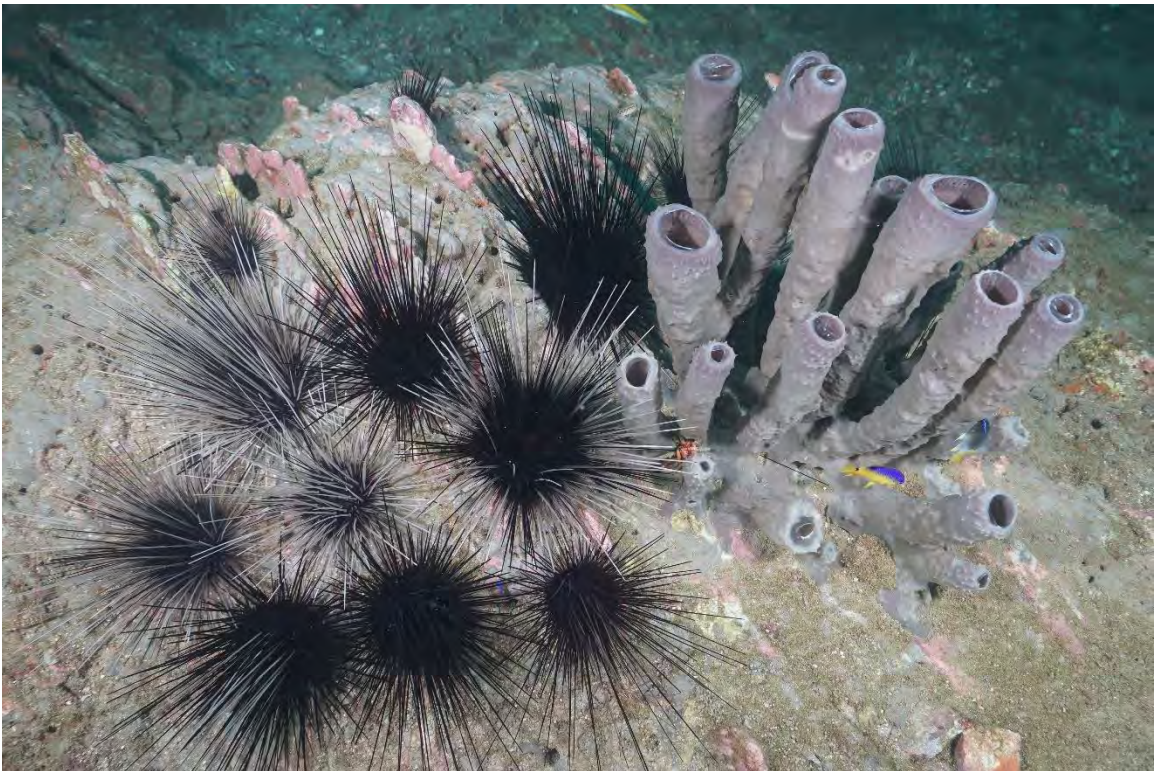
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Jimmy MacMillan, Research Specialist
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Travis Sterne, Research Specialist
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NOAA Divers Raven Walker and Travis Sterne prepare to retrieve an ocean acidification array, as part of a collaboration with Texas A&M University and Bureau of Ocean Energy Management.
(Photo: G.P. Schmahl/NOAA/FGBNMS)



Overview

The Flower Garden Banks National Marine Sanctuary (FGBNMS) research team was involved in 19 research cruises and expeditions during the FY2017 field season. The *R/V Manta* was utilized by the research team for a period of 51 days to conduct scuba and ROV operations. Four FGBNMS divers joined the *M/V Fling* on a cruise to assess the reef post Hurricane Harvey. A pool of 28 sanctuary personnel, scientists, and reciprocity divers conducted 665 SCUBA dives. Twenty-seven percent of the dives were conducted by reciprocity divers. Activities included biological surveys and sample collection, response to Hurricane Harvey, continued response to 2016 mortality event and bleaching event, removal of invasive species, equipment installation and maintenance, image collection, guardian mask training, hydraulic drilling training, and dive safety training. Twelve sanctuary permits were processed, and an additional nine were/are ongoing.



Long-Spined Sea Urchins (*Diadema antillarum*), tube sponges, and damselfish at Stetson Bank. (Photo: G.P. Schmahl/NOAA/FGBNMS)

FY 2017 HIGHLIGHTS

Northwest Gulf of Mexico ROV Cruise



A typical assemblage of mesophotic coral and associated invertebrates and fish found in the Northwestern Gulf of Mexico. (Photo: NOAA/FGBNMS-UVP)

FGBNMS partnered with NOAA's Deep Sea Coral Research and Technology Program, National Marine Sanctuary Foundation, University of North Carolina – Undersea Vehicle Program (UVP), and Drs. Mercer Brugler (American Museum of Natural History) and David Hicks (University of Texas - Rio Grande Valley) to conduct surveys in mesophotic ecosystems within the Northwestern Gulf of Mexico. Surveys were conducted at MacNeil, Bright, 28 Fathom, Elvers, McGrail, Sonnier, Alderdice, and Parker Banks. Data analysis was conducted by Travis Sterne.

ROV Seafloor Surveys

A total of 49 ROV dives were conducted during the expedition, yielding a total bottom time of 48.4 hours, 97 video clips, 53 recorded DVDs, more than 2649 digital still photos, and 2373 HD video screen grabs. Depth ranges explored during the ROV dives ranged from 15 - 209 meters.

ROV Transects

A total of 85 seafloor transects were conducted during the expedition. Transects were 5 minutes in length and were conducted at depths ranging between 15 - 144 meters.

Specimen Collections

A total of 93 biological specimens and 2 substrate samples were collected during the expedition including 86 specimens that were purposely collected and nine specimens that were incidentally collected when caught in ROV propellers. Specimens collected included 33 black corals, 39 octocorals, five sponges, five stony corals, one echinoderm, one green algae, one coralline algae, two bryozoans, one fish, three unidentified invertebrates, and three substrate samples.



R/V *Manta* (Photo: CIOERT/FAU)

CRUISES and EXPEDITIONS

All of the following cruises were conducted on *R/V Manta* by the FGBNMS Research Team, unless indicated otherwise. (*Partially funded through National Marine Sanctuary Foundation):

1. 10/5-6/16 EFGB Bleaching Response
2. 10/18-19/16 WFGB Bleaching Response
3. 11/14-15/16 Water Quality – samples and instrument exchange, moorings
4. 1/31-2/2/17 Water Quality - samples and instrument exchange, EFGB Bleaching Response
5. 4/2-4/17 Parker Bank Multibeam Mapping*
6. 4/24-26/17 Elvers Bank Multibeam Mapping*
7. 5/7-8/17 Water Quality (samples and instrument exchange) and Ocean Acidification installation (Texas A&M)
8. 5/31-6/2/17 Mooring buoy/training and installation*
9. 6/27-29/17 Mooring buoy maintenance*
10. 7/6-7/17 Ocean Acidification instrument recovery (Texas A&M) and mooring maintenance*
11. 7/12-14/17 HIA389A Pre-Removal Monitoring
12. 7/18-21/17 Stetson Bank Long-Term Monitoring
13. 7/25-27/17 East and West FGB Long-Term Monitoring deep station installation
14. 8/1-3/17 EFGB Long-Term Monitoring*
15. 8/14-16/17 EFGB Long-Term Monitoring
16. 8/21-23/17 WFGB Long Term Monitoring
17. 9/16-17/17 Post Hurricane Harvey (MV FLING) Hickerson, Johnston, MacMillan, and Nuttall
18. 9/22-26/17 ROV – DSCRTP Northwestern Gulf of Mexico 1*
19. 9/29-10/4/17 ROV – DSCRTP Northwestern Gulf of Mexico 2*

ADDITIONAL *R/V MANTA* CRUISES

The *R/V Manta* was chartered by different user groups during the 2017 research season.

1. 1/20-21/17 TAMU DiMarco Glider Recovery and Deployment
2. 5/14-18/17 SCRIPPS Hydroacoustic Surveys
3. 5/21-26/17 UTIG
4. 6/12-16/17 TAMU DiMarco Hypoxia Surveys
5. 9/1-3/17 Post Hurricane Harvey Emergency Survey Work
6. 9/8/17 Post Hurricane Harvey TAMU Glider Deployment



Researchers, Dr. Mercer Brugler (AMNH/CUNY) and student Nadia Alomari (CUNY) celebrate the sampling of a potentially undescribed species of black coral from Elvers Bank. (Photo: G.P. Schmahl/NOAA/FGBNMS)

ADDITIONAL SCIENCE ACTIVITIES

1. Coordination of IA between BOEM and FGBNMS for collection of high resolution multibeam imagery of 24 reefs and banks in the NWGOM and South Texas
2. Deployment of Sound Traps
3. Post Draft Environment Impact Statement activities – response to public comments
4. Permitting
5. Scheduling of *R/V Manta*
6. Coordination of SCUBA operations and trainings
7. Coordination of shipboard research equipment and activities
8. Regional GIS support
9. Science presence at SAC meetings
10. Participation in NOAA Coral Collaboration calls
11. Participation in NOAA Deep Sea Coral calls
12. Participation in RESTORE planning calls



Orbicella faveolata, a star coral, releases gamete bundles during the annual mass spawning event. (Photo: G.P. Schmahl/NOAA/FGBNMS)

SCIENTIFIC INTERPRETATION/OUTREACH



2017 Ocean Discovery Day interactive mural project – Sharks and Rays of FGBNMS. (Original artwork: Jacqui Stanley, Marine Educator/Artist)

1. Ocean Discovery Day – Sharks and Rays of FGBNMS
2. Ocean Discovery Day – 360 degree interactive Virtual Reality Experience, including design of banner, and coordination of event
3. Contribution to digital slide catalog/library and video library
4. Development of PowerPoint presentations for various events
5. Facebook postings
6. Web-based research reports and blogs
7. Articles: Alert Diver, Galveston Monthly, Triathlete Magazine



2017 Final mural – Sharks and Rays of FGBNMS. Ocean Discovery Day participants each replicated a portion of the original mural on an 8.5x11" canvas. A total of 96 individuals, mostly children, contributed a section to create this 12'x6' mural.

CONFERENCES, MEETINGS, PRESENTATIONS, TRAINING, ETC.

1. Unit Dive Supervisor's Meeting. April 1-5, 2017. St. Petersburg, FL. Marissa Nuttall
2. NOAA Divemaster Training. January 23-February 4, 2017. Key West, FL. Michelle Johnston.
3. Seaside Chats – Mantas and More, February 15, 2017. Galveston, TX. Marissa Nuttall
4. Texas Gulf Coast Council of Dive Clubs Annual Banquet. Houston, Texas. Emma Hickerson
5. Texas Lionfish Conference – February 15, 2017. Galveston, TX. Speaker and panelist. Michelle Johnston
6. Galveston College Lecture Series. March 7, 2017. Galveston, TX. Emma Hickerson
7. Oppe Elementary School Lionfish Presentation. April 11, 2017. Galveston, TX. John Embesi and Dustin Picard
8. Primer PERMANOVA Training – March 6-10, 2017. Williamsburg, VA. Michelle Johnston
9. Guardian Mask Training – May 23, 2017. FGBNMS Dive Unit.
10. Hydraulic Drilling Training – May 30 – June 2, 2017. FGBNMS Dive Unit.



Atlantic Sea Nettle (*Chrysaora quinquecirrha*) at Stetson Bank. (Photo: G.P. Schmahl/NOAA/FGBNMS)

ABSTRACTS AND PUBLICATIONS

Davies, S.W., Strader, M.E., Kool, J.T., Kenkel, C.D., and Matz, M.V. 2017. Modeled differences of coral life-history traits influence the refugium potential of a remote Caribbean reef. *Coral Reefs*.

Johnston, M.A., R.J. Eckert, M.F. Nuttall, T.K. Sterne, J.A. Embesi, D.P. Manzello, E.L. Hickerson, and G.P. Schmahl. 2017. Long-term monitoring at East and West Flower Garden Banks, 2013–2015, volume 1: technical report. U.S. Dept. of Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, Louisiana. OCS Study BOEM 2017-058. 186 pp.

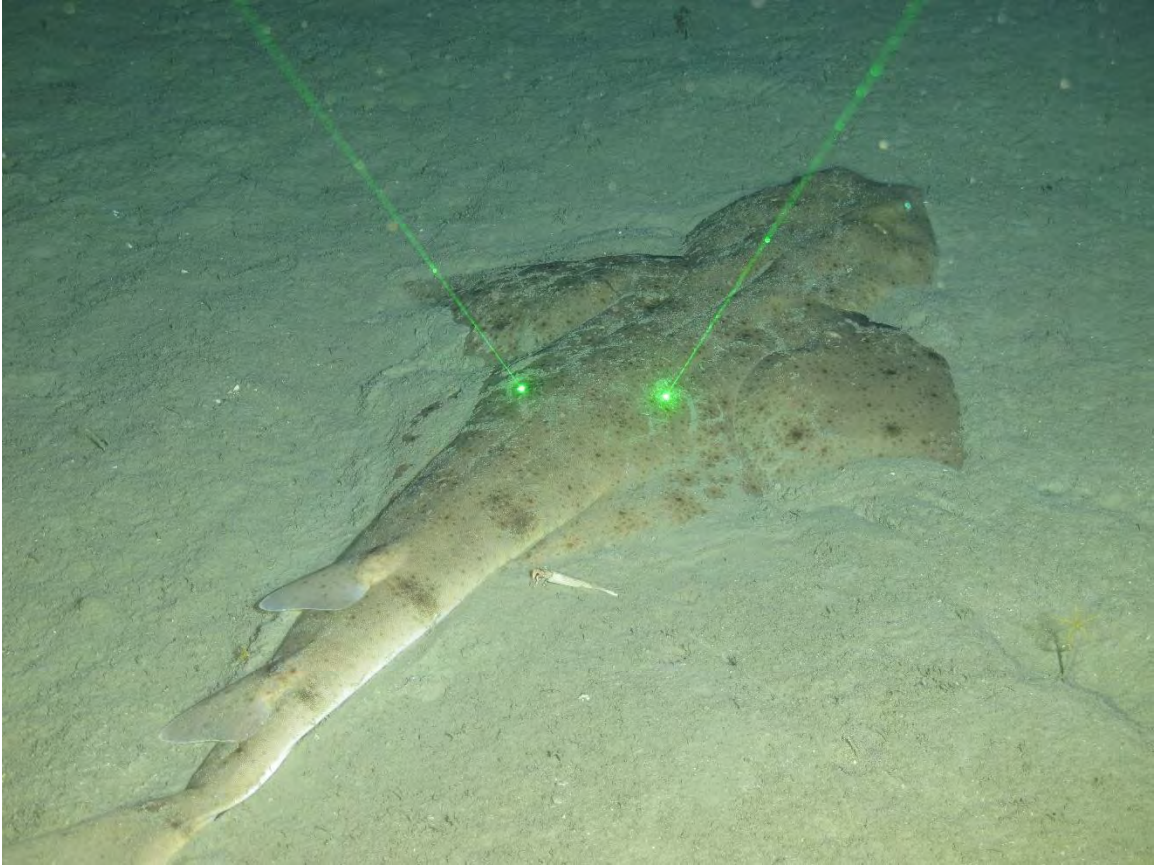
Johnston, M.A., R.J. Eckert, M.F. Nuttall, T.K. Sterne, J.A. Embesi, D.P. Manzello, E.L. Hickerson, and G.P. Schmahl. 2017. Long-term monitoring at East and West Flower Garden Banks, 2013–2015, volume 2: appendices. U.S. Dept. of Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, Louisiana. OCS Study BOEM 2017-059. 431 pp.

Johnston, M.A., T.K. Sterne, R.J. Eckert, M.F. Nuttall, J.A. Embesi, R. Walker, X. Hu, E.L. Hickerson, and G.P. Schmahl. 2017. Long-Term Monitoring at East and West Flower Garden Banks: 2016 Annual Report. Marine Sanctuaries Conservation Series ONMS-17-09. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 132 pp.

Kiene, W., Johnston, M., Hickerson, E., and Schmahl, G.P. Unprecedented 2016 at Flower Garden Banks National Marine Sanctuary. *Southern Climate Monitor*. February 2017. Volume 7, Issue 2.

Nuttall, M.F., T.K. Sterne, R.J. Eckert, X. Hu, J. Sinclair, E.L. Hickerson, J.A. Embesi, M.J. Johnston, G.P. Schmahl. 2017. Long-Term Monitoring at Stetson Bank, Flower Garden Banks National Marine Sanctuary, 2015 Annual Report. Marine Sanctuaries Conservation Series ONMS-17-06. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 98 pp.

Sammarco PW, Nuttall MF, Beltz D, Horn L, Taylor G, Hickerson EL, and Schmahl GP. 2016. The positive relationship between relief and species richness in mesophotic communities on offshore banks, including geographic patterns. *Environmental Geosciences* ; 23 (4): 195–207.



An Angel Shark photographed during ROV operations at Elvers Bank at 170m.
(Photo: FGBNMS/UNCW-UVP)

NON-BASE FUNDING

- EFGB & WFGB Long-Term Monitoring 2017 – BOEM - \$150,000
- Stetson Bank Long-Term Monitoring – BSEE – \$272,388.28
- HIA389A Monitoring – BSEE - \$178,459.00
- NOAA Deep Sea Coral Research Technology Program \$23,000 – NWGOM Habitat
Characterization maps – Travis Sterne/Marissa Nuttall
- NOAA Deep Sea Coral Research Technology Program \$98,000 – NWGOM ROV cruises

PERMITTED 2017 AND ONGOING ACTIVITIES WITH PARTNERS

- Mercer Brugler (AMNH) - Black coral genetics
- Adrienne Correa (Rice University) – Assessment of the distribution of two common bioeroders in the northwestern Gulf of Mexico
- Adrienne Correa (Rice University), Sarah Davies (Boston University), Lory Santiago (UH), Jason Sylvan (TAMU), Katie Shamberger (TAMU) – Impact of freshwater runoff from Hurricane Harvey on coral reef benthic organisms and associated microbial communities
- Ron Eytan (TAMUG) – Genetic connectivity of blenny populations, cryptic endemism, and genetics of hybrid breakdown in coral reef fishes in the gulf of Mexico and Greater Caribbean
- Santiago Herrera (LeHigh University) – Population Connectivity of Deepwater Corals in the NWGOM
- David Hicks (UTRGV) – Octocoral genetics
- Joe Kuehl (Baylor University) – Micromovement of water on the reef caps at the FGBNMS
- Derek Manzello (NOAA) – National Coral Reef Monitoring Program – Ocean Acidification
- Frank Muller-Karger (USF) – Satellite imagery
- Niall Slowey (TAMU) – Ocean Acidification Sentinel Site Mooring and Seafloor Sensors
- Southeast Area Monitoring and Assessment Program (SEAMAP) Reef Fish Survey.
- Josh Stewart – Population Structure of Oceanic Manta Rays in the Gulf of Mexico and Greater Caribbean Basin
- Benjamin Titus (Ohio State University) – Abundance and distribution of sea anemone symbioses on the coral reefs of the Flower Garden Banks
- Joshua Voss (FAU/CIOERT) – Characterization of mesophotic corals through genetic connectivity assessment and a reciprocal transplant experiment
- John Walpert (TAMU-GERG) – Flower Garden Banks TABS Buoy Monitoring System
- David Wells (TAMUG) – Movement and Oceanographic Preferences of Scalloped Hammerhead Sharks (*Sphyrna lewini*) in the Gulf of Mexico.
- Danielle Fails (SHSU) – Lionfish parasites at FGBNMS.

2017 RESEARCH STAFFING

The FGBNMS Research Team is comprised of a mixture of Federal Employees (FTEs) and contractors. Contract staff is provided primarily through Cardinal Point Captains, LLC (CPC).

1. Leslie Whaylen Clift, Cruise Coordinator (joined team in April 2017, NMSF)
2. John Embesi, HIA389A Monitoring Project Manager, Research Specialist (CPC)
3. Emma Hickerson, Research Coordinator
4. Michelle Johnston, FGBLTM Project Manager
5. Jimmy MacMillan, Research Specialist (joined team in August 2017, CPC)
6. Marissa Nuttall, Stetson Bank LTM Project Manager, Research Specialist (CPC)
7. G.P. Schmahl, Sanctuary Superintendent
8. Travis Sterne, Research Specialist (CPC)
9. Raven Walker, Research Specialist (CPC)

R/V MANTA core crew—services provided by Cardinal Point Captain's, LLC.

1. Captain Seth Leo
2. Mate Michael Allison
3. Deckhand Gerry Amador
4. Galleyhand Rachel Sellers

FGBNMS NOAA Divers:

1. Kelly Drinnen
2. Ryan Eckert
3. John Embesi
4. Emma Hickerson (outgoing Unit Diving Supervisor – March 2017)
5. Michelle Johnston
6. Jimmy MacMillan
7. Marissa Nuttall (incoming Unit Diving Supervisor – March 2017)
8. Dustin Picard
9. G.P. Schmahl
10. Travis Sterne
11. Adrienne Simoes-Correa
12. Jenny Vander Pluym
13. Raven Walker

Reciprocity Diver 2017:

TAMUG (AAUS)

1. Jamie Albach
2. Josh Carter
3. Candace Grimes
4. Amie Hufton
5. Monika McGuinness
6. Nicole Morgan
7. Kaleb Reddoch
8. Jill Thompson-Grim

Zara Environmental, LLC (AAUS)

1. Jimmy MacMillan

FIU (AAUS)

1. Hank Becker

UCSD (AAUS)

1. Josh Stewart

Moody Gardens (AAUS)

1. Jake Emmert
2. Kaitlyn Buhler
3. Ryan Hannum
4. Rachel Susen

BOEM (AAUS)

1. Brian Zelenke
2. Scott Sorsett
3. Doug Jones



Manta Ray swimming over the coral reef at FGBNMS. (Photo: G.P. Schmahl/NOAA/FGBNMS)

ACRONYMS

AAUS – American Association of Underwater Scientists
AMNH – American Museum of Natural History
BOEM – Bureau of Ocean Energy Management
CIOERT – Cooperative Institute for Ocean Exploration, Research, and Technology
CPC – Cardinal Points Captains
CUNY – City University – New York
DSCRTP – Deep Sea Coral Research and Technology Program
EFGB – East Flower Garden Bank
FAU – Florida Atlantic University
FY – Fiscal Year
FGBNMS – Flower Garden Banks National Marine Sanctuary
GERG – Geochemical Environmental Research Group
GIS – Geographic Information System
HD – High Definition
HIA389A – High Island A389A gas platform – within EFGB boundaries
M/V – Motor vessel
NMSF – National Marine Sanctuary Foundation
NOAA – National Oceanographic and Atmospheric Administration
NWGOM – Northwestern Gulf of Mexico
ONMS – Office of National Marine Sanctuaries
PERMANOVA – Permutational ANOVA
RESTORE – Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies
ROV – Remotely operated vehicle
R/V – Research Vessel
SAC – Sanctuary Advisory Council
SCUBA – Self-contained underwater breathing apparatus
SHSU – Sam Houston State University
TAMU – Texas A&M University
TAMUG – Texas A&M University - Galveston
USF – University of South Florida
WFGB – West Flower Garden Bank

For more information, contact:
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