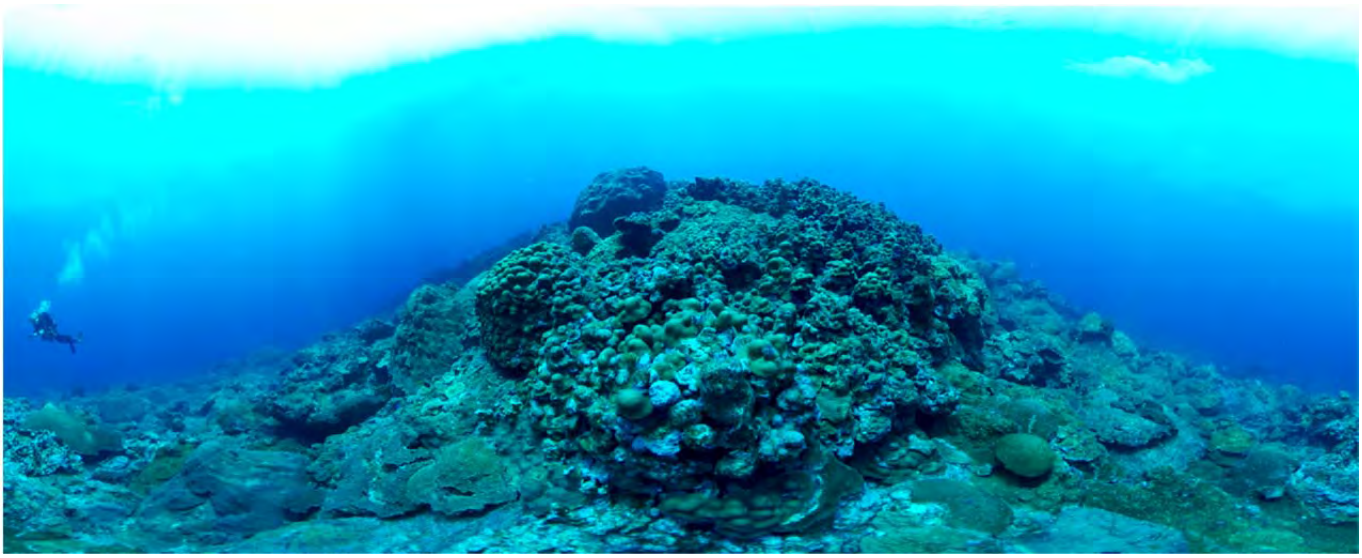
Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration

FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

2015 RESEARCH AND MONITORING REPORT



February 2016

The purpose of this document is to report the activities of the Flower Garden Banks Research Team during FY2015.

National Oceanic and Atmospheric Administration

Office of National Marine Sanctuaries
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Cover Photo
A 360 degree panoramic image taken at the East Flower Garden Bank using a camera provided by Catlin Seaview. Image credit: FGBNMS/Hickerson

ACRONYMS

AMNH – American Museum of Natural History
BOEM – Bureau of Ocean Energy Management
BSEE – Bureau of Safety and Environmental Enforcement
GIS – Geographic Information System
CIOERT – Cooperative Institute of Ocean Exploration, Research and Technology
CUNY – City University of New York
DSO – Dive Safety Officer
FAC – Federal Advisory Committee
FDA – Food and Drug Administration
FGBNMS – Flower Garden Banks National Marine Sanctuary
GREAT – Gulf Reef Environmental Action Team
HD – High Definition
LTM – Long-Term Monitoring
NCCOS – National Centers for Coastal Ocean Science
NCRMP – National Coral Reef Monitoring Program
NOAA – National Oceanic and Atmospheric Administration
NPR – National Public Radio
ONMS – Office of National Marine Sanctuaries
OSU – Oregon State University
REEF – Reef Environmental Education Foundation
ROV – Remotely Operated Vehicle
R/V – Research Vessel
SAC – Sanctuary Advisory Council
SCUBA – Self Contained Underwater Breathing Apparatus
TAMUCC – Texas A&M University – Corpus Christi
TAMUG – Texas A&M at Galveston
TNC – The Nature Conservancy
TPWD – Texas Parks and Wildlife
UL-LA – University of Louisiana, Lafayette
UNCW-UVP – University of North Carolina – Wilmington Undersea Vehicle Program
UTB – University of Texas - Brownsville
UTIG – University of Texas Institute for Geophysics
WQ – Water Quality

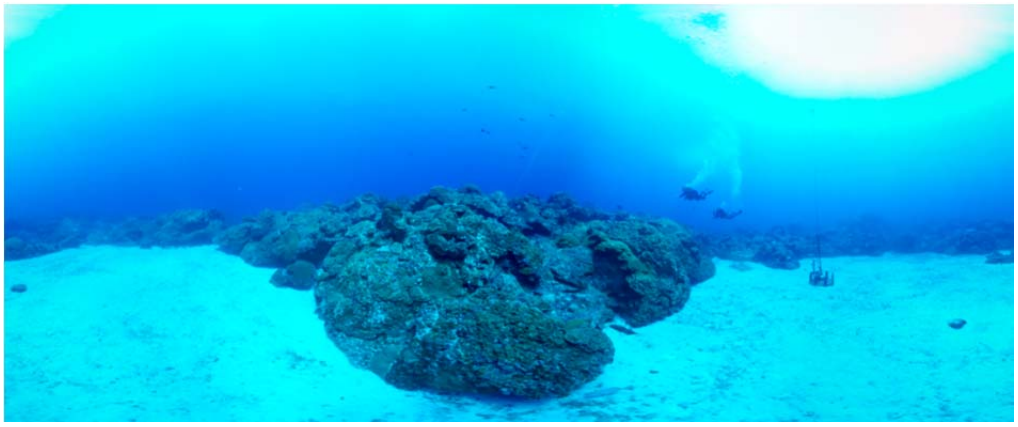

Figure 1. 360 degree panoramic image of the sand flat at the West Flower Garden Bank near buoy #2. The divers are returning from installing a water quality instrument on the rack shown sitting in the sand. Image credit: FGBNMS/Hickerson

Overview

The Flower Garden Banks National Marine Sanctuary (FGBNMS) research team was involved in 18 research cruises and expeditions during the 2015 field season. The R/V MANTA was utilized by the research team for a period of 56 days to conduct operations. A pool of 44 sanctuary personnel, scientists, and reciprocity divers conducted 849 SCUBA dives. 18.8% of the dives were conducted by reciprocity divers. Activities included biological surveys and sample collection, removal of invasive species, equipment maintenance, image collection, and dive safety training. Six sanctuary permits were processed, and an additional eight were/are ongoing.

Figure 2. A manta ray glides over the healthy massive corals below the recreational dive vessel, M/V FLING. Image credit: FGBNMS/G.P. Schmahl

FY 2015 HIGHLIGHTS

CONTINUED EXPLORATION OF THE REEFS AND BANKS IN THE NORTHWESTERN GULF OF MEXICO

In July we conducted remotely operated vehicle operations with our Mohawk ROV, operated by the terrific crew from UNCW-Undersea Vehicles Program, Lance Horn and Jason White. We were thrilled to have Dr. Tom Bright (for whom Bright Bank is named), and black coral researchers Drs. Dennis Opresko (Smithsonian) and Mercer Brugler (AMNH/CUNY), and student Craig (CUNY), as well as algae researcher, Will Schmidt (UL-LA).

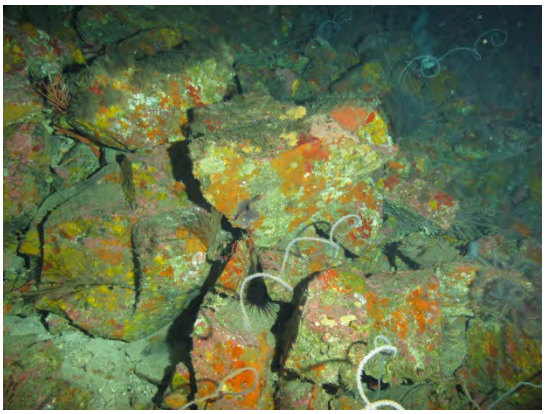

Figure 3a . A very large (20cm long) nudibranch, yet to be identified, encountered at Elvers Bank in about 150m depth. Image credit: FGBNMS/UNCW-UVP. Figure 3b. Basalt blocks at the base of Alderdice Bank –covered in colorful encrusting sponges and black corals. These are the remnants of a 74 million year old volcano – the only known volcanic structure in the Gulf of Mexico. Image credit: FGBNMS/UNCW-UVP

During the five day cruise we visited the East Flower Garden Bank, Horseshoe, Rankin/28 Fathom/Bright complex, Elvers, Rezak/Sidner/Bryant/Bouma complex, Parker, and Alderdice Banks. Our goal was to visit places we knew had spectacular features – and collect high resolution imagery. We also visited several sites we for the first time, and a variety of fascinating and unique habitats. We supported the researchers and conducted black coral and algae samples – fully utilizing the capabilities of the CSIP 5-function manipulator on the ROV, and the custom designed sampling carousel and tool skid (thanks to Harbor Branch Oceanographic Institute for the design and constructions). This cruise proved the functionality and duration of the R/V MANTA, as well as the value of our ROV and team.

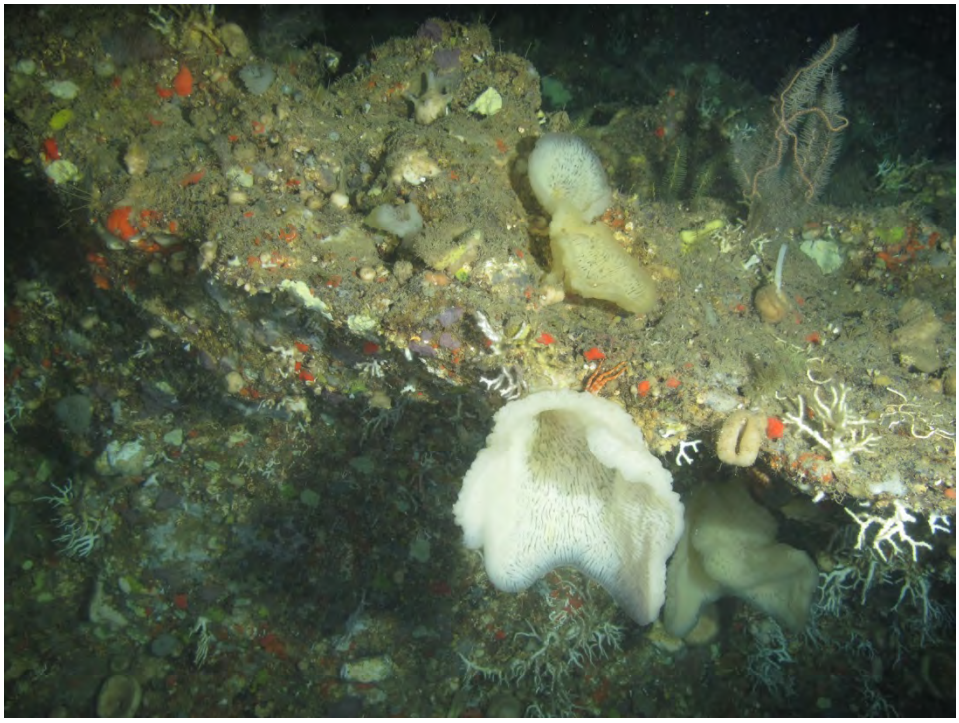

Figure 4. Fascinating outcroppings dominated by glass sponges – at Elvers Bank. Image credit: FGBNMS/UNCW-UVP

Figure 5. L-R Marissa Nuttall (FGBNMS, Jason White (UNCW-UVP), Dr. Tom Bright (FGBNMS), Dr. Mercer Brugler (AMNH/CUNY), Will Schmidt (UL-LA), G.P. Schmahl (FGBNMS), Tim Hill (R/V MANTA), Dr. Dennis Opresko (Smithsonian), Craig Dawes (CUNY), Capt. Mike Shetler (R/V MANTA), Emma Hickerson (FGBNMS),Captain Mike Shetler (R/V MANTA), Lance Horn (UNCW-UVP), Brett Mayberry (R/V MANTA),Captain Ty Hlavaty (R/V MANTA)

BSEE & FGBNMS EXPAND STETSON BANK LONG-TERM MONITORING

In 1993, an annual long-term monitoring program was initiated at Stetson Bank by Gulf Reef Environmental Action Team (GREAT). Later, the program was conducted by FGBNMS, and in 2015, Bureau of Safety and Environmental Enforcement (BSEE) partnered with FGBNMS (IA E14PG00052) to expand the annual monitoring effort. With twelve years of monitoring data, this represents one of the longest marginal environment coral community monitoring programs.

Annual monitoring consists of surveys of both benthic and fish community on the shallow (<110ft) reef cap. In 2015, benthic and fish community assessments were expanded to the deeper edges of the main reef feature and to the mesophotic habitat surrounding the bank (Figure 6).

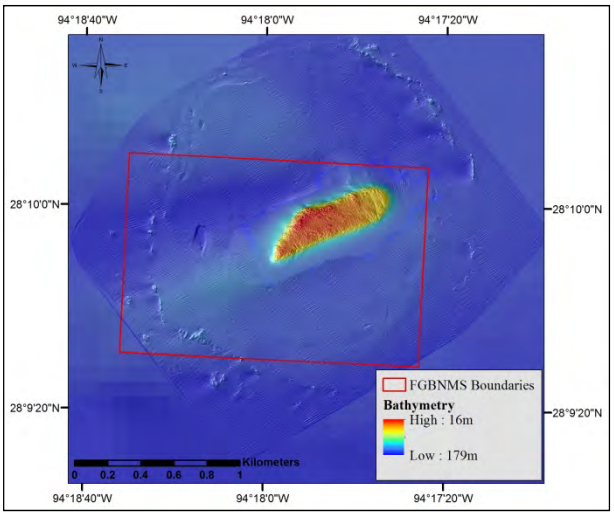

Figure 6. Topographic map of Stetson Bank.

The monitoring program also expanded water quality measurements from temperature, salinity, and nutrient levels to turbidity, dissolved oxygen, and ocean carbonate measurements.

Results from 2015 show that, while coral cover on the shallow reef cap remains low (<3%), cover is stable in recent years. However, in 2015 macroalgae cover declined from 2014, while open substrate increased (Figure 7).

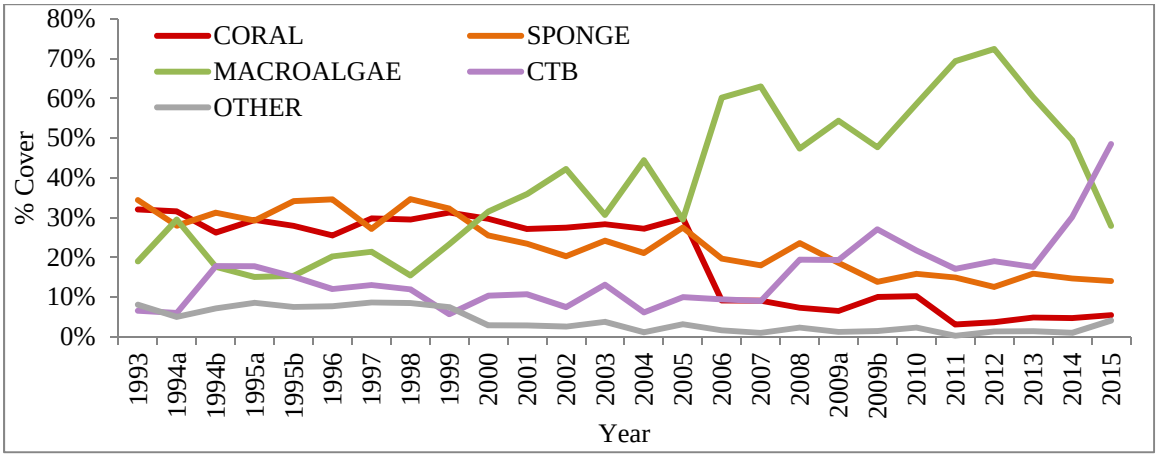

Figure 7. Percent cover of functional groups, taken from repetitive photostations, from 1993 – 2015.

Mesophotic benthic monitoring identified two distinct habitats at Stetson Bank; coralline algae reefs that occur on the deeper edges of the main feature and deep reefs that occur on the ring of patch reefs surrounding the main feature. Along with multiple sponge species, small stony corals were observed in the coralline algae reef habitat, while the deep reef habitat was characterized by black coral sea fans (Figure 8).

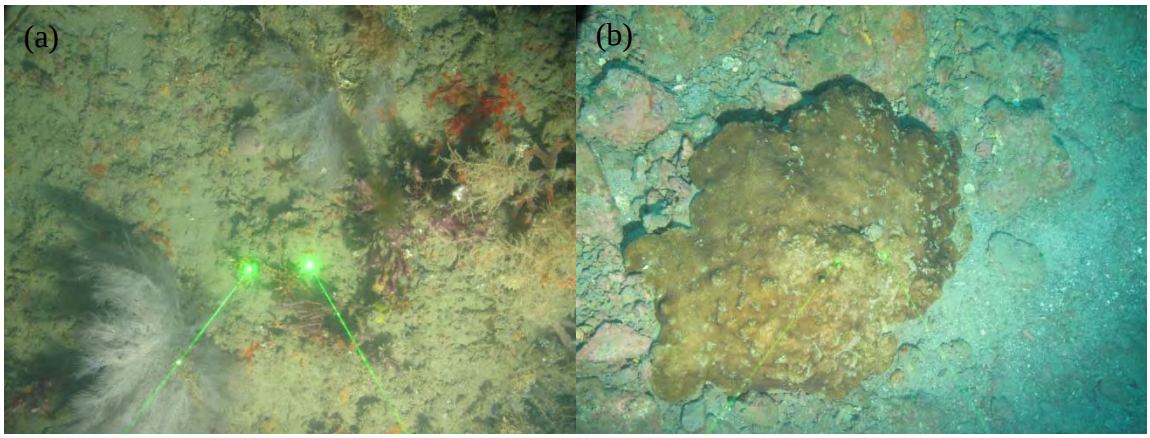

Figure 8. Benthic images of (a) deep reef and (b) coralline algae reef habitat at Stetson Bank. Image credit: FGBNMS/UNCW-UVP

The fish community between the shallow reef cap and deep reefs showed distinct differences in trophic biomass, with shallow and coralline algae reef habitats dominated by reef-associated invertivores and deep reef habitat dominated by piscivores, including commercially and recreationally valuable species. While invasive lionfish were not observed on the shallow reef cap, they were the 8th most frequently sighted species of 53 in mesophotic surveys (Figure 9).

Figure 9. Lionfish and Big-Eye in mesophotic habitat at Stetson Bank. Image credit: FGBNMS/UNCW-UVP

As anthropogenic stressors to marine environments continue and increase, long-term monitoring datasets like this project at Stetson Bank are essential to understanding community stability and ecosystem resilience.

FGBNMS AND BSEE INITIATE HI-A-389-A MONITORING PROJECT IN PREPARATION FOR PLATFORM DECOMMISSIONING

Figure 10. HI-A-389-A Platform. Image credit: G.P. Schmahl

The HI-A-389-A platform was installed near East Flower Garden Bank 35 years ago. It has now come to the end of its working life, and plans are being put in place to decommission the structure. The current proposal outlines a partial removal – to leave the lower portion below around 65ft standing. Since the time of installation, an extensive fouling community has developed on the structure. Prior to the removal, BSEE and FGBNMS will conduct an assessment of the encrusting and mobile organisms utilizing the underwater platform structure using divers and a remotely operated vehicle. Acoustic imaging of the fish populations as well as limited fish tagging is also planned. Surveys will be conducted prior to the removal platform, and again after the platform is removed.

In 2015, ROV operations were conducted, and included fish and benthic surveys on each side and level of the platform. The platform has 8 levels from the surface to the seafloor which is 125 meters deep. Surveys were also conducted adjacent to the structure on the seafloor. These surveys were limited due to entanglement issues included debris and poor water visibility. ROV surveys of pipelines and the surrounding seafloor were also completed. A total of five ROV dives were conducted.

Figure 11. A horizontal cross member at 120ft, thickly encrusted by sponges, mollusks, and invasive orange cup coral. Image credit: FGBNMS/UNCW-UVP

A broad survey of the structure was eventually accomplished. Completed tasks included: vertical pile photographic transects on each corner pile (4), horizontal structure photographic transects (29), horizontal junction photographs (32), roving fish surveys on the jacket (26), roving fish surveys on the surrounding seafloor (6), random belt fish surveys on the seafloor (6), random belt benthic surveys on the seafloor (6), repetitive belt transects on the seafloor, which included two along pipelines (6), and one full water column temperature profile.

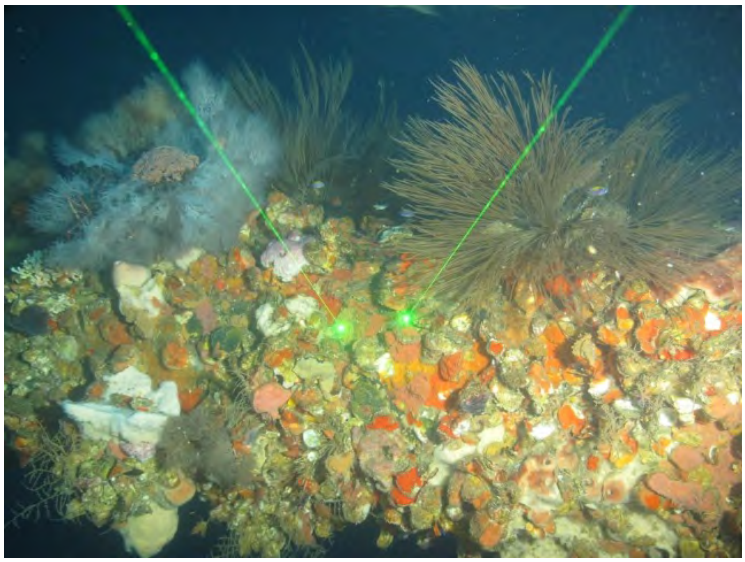

Figure 12. A horizontal cross member at 235ft, thickly encrusted by primarily biofouling community - sponges, bivalves, bryozoans, and antipatharians (black corals). The laser beams are used for scaling, and are 10cm apart. Image credit: FGBNMS/UNCW-UVP

FGBNMS PARTNERS WITH REEF AND NATIONAL MARINE SANCTUARY FOUNDATION TO HOLD FIRST LIONFISH INVITATIONAL AS PART OF RESPONSE TO INVASION

Figure 13. Lionfish removed from FGBNMS. Image credit: FGBNMS

Researchers are studying lionfish diet through stomach content analysis and providing data and samples for age/growth, genetic, and ciguatera studies (Table 1) as part of the FGBNMS Lionfish Program. While fish biomass at FGBNMS remains high, the invasion is still in the early stages, and negative impacts on the reef community may not be seen for several years.

Table 1. Priority activities currently conducted by staff and partners at Flower Garden Banks National Marine Sanctuary.

Category	Focus Area/Project	Brief Description
Monitoring	CRCP NCRMP	National Coral Reef Monitoring Program. Lionfish abundance and size conducted along reef-wide random belt transects.
	FGB Long-Term Monitoring	Lionfish abundance and size documented on Bohnsack fish surveys within study sites.
	Stetson Monitoring	Lionfish abundance and size documented on Bohnsack fish surveys within study sites.
	Citizen science reporting	Lionfish sightings reported to the Sanctuary through an online report form.
Control	Identify Priority Areas	Priority areas for lionfish control include buoyed areas on the FGBNMS reef cap.
	Permitting Mechanisms	Select individuals are authorized via a permit and letter of authorization to remove lionfish from priority areas.
	Targeted Removals	Staff and permitted volunteers are trained and issued permits to safely remove lionfish.
Research	Diet	Stomach contents analyzed from all lionfish fish removed from FGBNMS.
	Ciguatera	Partner with NOAA NCCOS and FDA to test lionfish for ciguatera fish poisoning.
	Mercury	Lionfish screened for mercury levels at the FGB.
	Habitat Utilization	Collect data on density, distribution, and habitats utilized on shallow and deep reefs through diver surveys and ROV surveys.
	Age and Growth	Partner with NOAA NCCOS, TAMU-CC, and TAMUG for otolith analysis.

Category	Focus Area/Project	Brief Description
	Tissue collection	Partner with TAMU-CC and UTB for genetic analysis and gene mapping.
	Gulf Mapping	Partner with TNC for GIS analysis and map products documenting a time series of the Gulf of Mexico invasion.
	Parasites	Partner with Sam Houston University to screen lionfish for parasites.
Education & Outreach	Training and Handling Workshops	Partner with REEF, Houston Zoo, and Texas State Aquarium to host lionfish safe handling workshops.
	Lionfish messaging	Development of messages and facts incorporated in presentations given to dive clubs and community organizations. Work with local schools on "Host a Lionfish" in your classroom week.
	Partnerships	Key partners to date have included Fling Charters, REEF, NOAA NCCOS, TX State Aquarium, TAMU-CC, TAMUG, UTB, OSU, Sam Houston Univ., The Nature Conservancy, FDA, Haven, and the Houston Zoo.
	Special Events	Host Ocean Discovery Day and partner with Houston restaurants to hold special lionfish dinner events.
	Outreach Materials	Develop facts sheets and sighting forms. Partner with Moody Gardens and Gladys Porter Zoo on aquarium exhibits and provide lionfish for aquaria.

FGBNMS currently works to remove lionfish when possible, and three cruises dedicated to focused removal efforts were conducted in 2015. Two cruises were conducted on board the R/V Manta, and a third cruise was conducted on board the M/V Fling in partnership with REEF, the National Marine Sanctuary Foundation, Fling Charters, and Oregon State University. This first ever Lionfish Invitational used trained volunteer divers to help conduct research and remove invasive lionfish within the marine sanctuary on Aug. 31st – Sept. 3rd, 2015. Collection permits were issued for 30 divers participating in the four-day lionfish research cruise. Reef fish surveys were conducted and lionfish were removed and dissected as part of the on-going lionfish research and management program at NOAA and fish surveys were also conducted on the R/V Manta outside of removal areas. The skilled group of divers removed a total of 317 lionfish, helping to protect native reef fish at FGBNMS. The largest lionfish removed was 43.1 cm – a Texas record. More research and management strategies are needed to control the population and to understand control targets and other effective control mechanisms that would minimize ecosystem-level impacts.

To date, approximately 2614 lionfish have been observed within FGBNMS, and approximately 1484 of those have been removed from sanctuary waters. The most common identifiable gut contents include crustaceans (46%), wrasses (8%), blennies (3%), and damselfishes (3%).

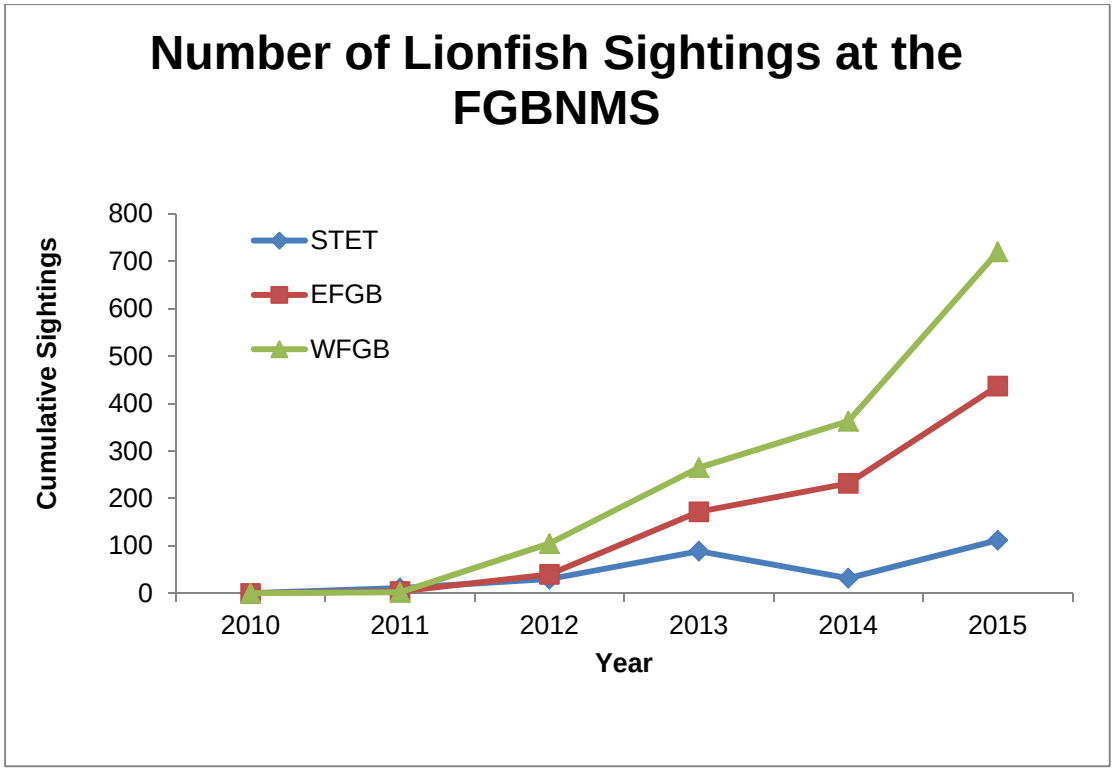

Figure 14. Lionfish sightings at Flower Garden Banks National Marine Sanctuary.

Sanctuary staff are tracking the invasion at FGBNMS and surrounding banks by documenting the locations of lionfish removals and observations. These include observations include sightings using SCUBA and during ROV surveys in deep water habitat. Lionfish sighting forms (on the FGBNMS website) are available for recreational divers to report sightings and pictures.

More about Lionfish: http://flowergarden.noaa.gov/education/invasivelionfish.html

Figure 15. ONMS Science Coordinator Dr. Steve Gittings conducts at fish survey at FGBNMS. Image credit: FGBNMS/Schmahl

CRUISES and EXPEDITIONS

- WQ November 9-10, 2014 (including collection of 360 degree panoramics with Catlin Seaview equipment).
- WQ February 10-11, 2015
- Lionfish Removals June 9-11, 2015
- WQ April 30 – May 1, 2015
- Get Into Your Sanctuary Day – June 27, 2015
- Stetson Bank LTM June 21-26, 2015
- Stetson Bank ROV July 12-17, 2015
- Reefs and Banks of the Northwestern Gulf of Mexico ROV July 20-24, 2015
- HIA389A ROV July 27-31, 2015
- Mooring inspection/coral spawning/Oceangate August 4-8, 2015
- Dive Safety Drills August 18, 2015
- Lionfish surveys August 31-September 1, 2015
- East and West FGB LTM September 7-11, 2015

FGBNMS Divers participated in the following projects and cruises:

- NCRMP Ocean Acidification May 31 – June 5, 2015
- CIOERT ROV July 5-10, 2015
- FGBNMS Industry Cruise July 27-29, 2015
- NCRMP benthic and fish surveys August 24-28, 2015

Figure 16. R/V MANTA moored in the sanctuary. Image credit: Voss Lab/FIU/CIOERT

ADDITIONAL *R/V MANTA* CRUISES

The *R/V Manta* is available for charter by outside agencies and institutions:

- May 24-29 UTIG – Oceanographic sampling techniques

ADDITIONAL SCIENCE ACTIVITIES

1. Sanctuary Expansion Draft Environmental Impact Statement development
2. Continued acoustic array discussions and asset acquisition
3. Continued building technical diving equipment inventory
4. Permitting
5. Scheduling of *R/V Manta*
6. Coordination of SCUBA operations
7. Coordination of shipboard research equipment and activities
8. Submitted NOAA fleet shiptime requests and needs
9. Regional GIS support
10. Science presence at SAC meetings
11. Participation in NOAA Coral Collaboration calls
12. Participation in NOAA Deep Sea Coral calls

Figure 17. Manta ray at FGBNMS. Image credit: FGBNMS/Schmahl

Figure 18. 2015 Ocean Discovery Day interactive mural project – Sea Turtles of the Gulf of Mexico. The original artwork (above) is gridded out for visitors to pick a square to recreate. Original artwork by Marine Educator/Artist, Jacqui Stanley

SCIENTIFIC INTERPRETATION/OUTREACH

1. Ocean Discovery Day – Sea Turtles of the Gulf of Mexico Mural
2. Various media interviews – KHOU11 news, Austin American Statesman, NPR, TPWD, ONMS Quickchats, Galveston Daily News
3. Collection of 360 Degree images
4. Developed collaboration with Bryan Museum, Galveston
5. Earth is Blue Image selection
6. Prepared HD clips for traveling exhibit
7. Development of HD B-ROLL Media package
8. Development of Still Images Media package
9. Contribution to digital slide catalog/library
10. Facebook postings
11. Web-based research reports and blogs
12. Response to “Into the Sea” mail (Hickerson)

Figure 19. 2015 Final mural – Sea Turtles of the Gulf of Mexico. Ocean Discovery Day participants replicated a portion of the original mural on an 8”x8” canvas – a total of 162 individuals, mostly children, contributed a square to create this 12’x6’ mural.

CONFERENCES, MEETINGS, PRESENTATIONS, TRAINING, ETC.

1. Unit Diving Supervisory Meeting
2. Research Coordinator Meeting
3. Texas DSO Meeting
4. NOAA Working Diver Training – Eckert, Johnston, Nuttall
5. NOAA DiveMaster Training – Embesi
6. Conducted TAMUG FGBNMS Specialty Class
7. TAMUG Scientific Methods Class – SCUBA for science
8. Guardian Mask Technician Training
9. Monterey Bay Aquarium Research Institute
10. Patton Elementary School
11. SAC/FAC Meeting and MANTA tour
12. Surfrider meeting presentation
13. Sustainable Seafood Conference, New Orleans

Figure 20. Pinnacles of Stetson Bank dominated by sponges and algae. Image credit: FGBNMS/G.P. Schmahl

ABSTRACTS AND PUBLICATIONS

Brugler MR, France SC, Opresko DM, 2013. The evolutionary history of the order Antipatharia (Cnidaria: Anthozoa: Hexacorallia) as inferred from mitochondrial and nuclear DNA: Implications for black coral taxonomy and systematics. Zoological Journal of the Linnean Society 169: 312-361.

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Johnston, M.A., M.F. Nuttall, R.J. Eckert, J.A. Embesi, N.C. Slowey, E.L. Hickerson, and G.P. Schmahl. 2015. Long-term monitoring at East and West Flower Garden Banks National Marine Sanctuary, 2011–2012, 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 2015-027. 194 p.

Johnston, Michelle A., M.F. Nuttall, R.J. Eckert, J.A. Embesi, N.C. Slowey, E.L. Hickerson, and G.P. Schmahl. 2015. Long-term monitoring at East and West Flower Garden Banks National Marine Sanctuary, 2011–2012, volume 2: appendixes. U.S. Dept. of Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, Louisiana. OCS Study BOEM 2015-028. 416 p.

Johnston, M.A., M.F. Nuttall, R.J. Eckert, and J.A. Embesi. 2015. Long-Term Monitoring at East and West Flower Garden Banks National Marine Sanctuary: 2014 Annual Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Flower Garden Banks National Marine Sanctuary, Galveston, TX. 63 pp.

Figure 21. Close up of a ruby brittle star (*Ophioderma rubicundum*) and a species of leafy green algae (*Dictyota sp*). The pink underneath the brittle star is coralline algae – an important settlement cue for coral larvae. Image credit: FGBNMS/G.P. Schmahl

FUNDING

- Funding received from BSEE to conduct HIA389A monitoring activities in association with platform removal
- Funding received from BOEM for FGBLTM East and West FGB Long-Term Monitoring partnership
- Funding received from Texas State Aquarium to support lionfish removal activities
- Funding received from NOAA's Deep Sea Coral Research and Technology Program for data analysis
- Funding received from The Nature Conservancy to support historical image digitalization, lionfish data processing, and to initiate a coral recruitment study
- Funding received from SeaWorld and Busch Gardens Conservation Fund to support acoustic tracking project
- Support from ONMS HQ for Acquisition of AIS data
- Support from NOS for purchase of dive safety gear
- Support from ONMS HQ for purchase of dive supplies

NEW SANCTUARY BIOLOGICAL RECORDS

FGBNMS collected sediment samples for Dr. Gil Rowe and Tommy Heathman (TAMUG) in August 2013. Undergraduate student James Kuslich conducted a thesis project to analyze the samples. As a result the following species and Families were added to the FGBNMS species list:

- Class Polychaeta
  - *Paleanotus heteroseta*
  - Family Saccocirridae - *Saccocirrus sp.*
  - Family Paraonidae - *Paraonidae sp.*
  - *Polydora aggregata*
  - *Caulleriella sp.*
  - *Mooreonuphis pallidula*
  - *Sphaerosyllis*
  - *Aricidea taylori*

RESEARCH AND SCIENCE PARTNERSHIPS

- American Museum of Natural History
- Bryan Museum
- Bureau of Ocean Energy Management (BOEM)
- Bureau of Safety and Environmental Enforcement (BSEE)
- Catlin Seaview
- Cooperative Institute of Ocean Exploration, Research and Technology (CIOERT)
- City University of New York (CUNY)
- Fling Charters
- Harbor Branch Oceanographic Institute (HBOI)
- Haven Restaurant
- Houston Zoo
- National Centers for Coastal Ocean Science (NCCOS)
- National Coastal Data Development Center (NCDDC)
- National Coral Reef Monitoring Program (NCRMP)
- Oregon State University (OSU)
- Reef Environmental Education Foundation (REEF)
- Sam Houston University
- Texas A&M University (TAMU)
- Texas A&M University – Galveston (TAMUG)
- Texas A&M University - Corpus Christi (TAMU-CC)
- Texas State Aquarium
- The Nature Conservancy – TNC
- University of Louisiana – Lafayette (UL-LA)
- University of North Carolina – Wilmington (UNCW)
- University of Texas Institute for Geophysics (UTIG)
- University of Texas – Brownsville (UT)

HONORS

A new species of squat lobster, named after Marissa Nuttall: *Uroptychus marissae*, was described by Dr. Mary Wicksten (TAMU) and Dr. Keiji Baba (Kumamoto University, Japan).

RESEARCH STAFFING

1. Ryan Eckert, Research Assistant, Water Quality Instrument Technician
2. John Embesi, HIA389A Project Manager
3. Emma Hickerson, Research Coordinator
4. Michelle Johnston, FGBLTM Project Manager
5. Alyson Kuba, Hollings Scholar and Research Intern – PSBF project
6. Marissa Nuttall, Stetson Bank Project Manager
7. G.P. Schmahl, Sanctuary Superintendent
8. Travis Sterne, Research Assistant

R/V MANTA core crew –services provided by Shetler Marine, Inc., owned and operated by Captain Michael Shetler

1. Captain Michael Shetler
2. First Mate Mike Petry
3. Deck Brett Mayberry
4. Galley Tina Thompson

FGBNMS NOAA Divers:

1. Kelly Drinnen
2. Ryan Eckert
3. John Embesi
4. Emma Hickerson (Unit Diving Supervisor)
5. Michelle Johnston
6. Marissa Nuttall
7. Jamie Park
8. G.P. Schmahl
9. Michael Shetler
10. Travis Sterne

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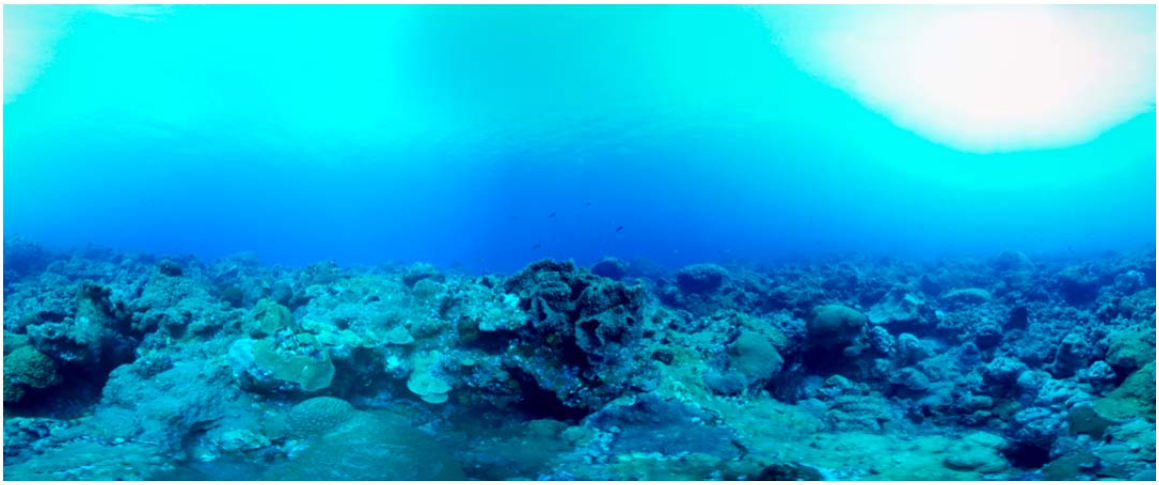

Figure 22. 360 degree panoramic image at the West Flower Garden Bank near buoy #2. For those in the know – this is the sponge to look for when locating the lone *Acropora palmata* colony on this bank. Image credit: FGBNMS/Hickerson


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