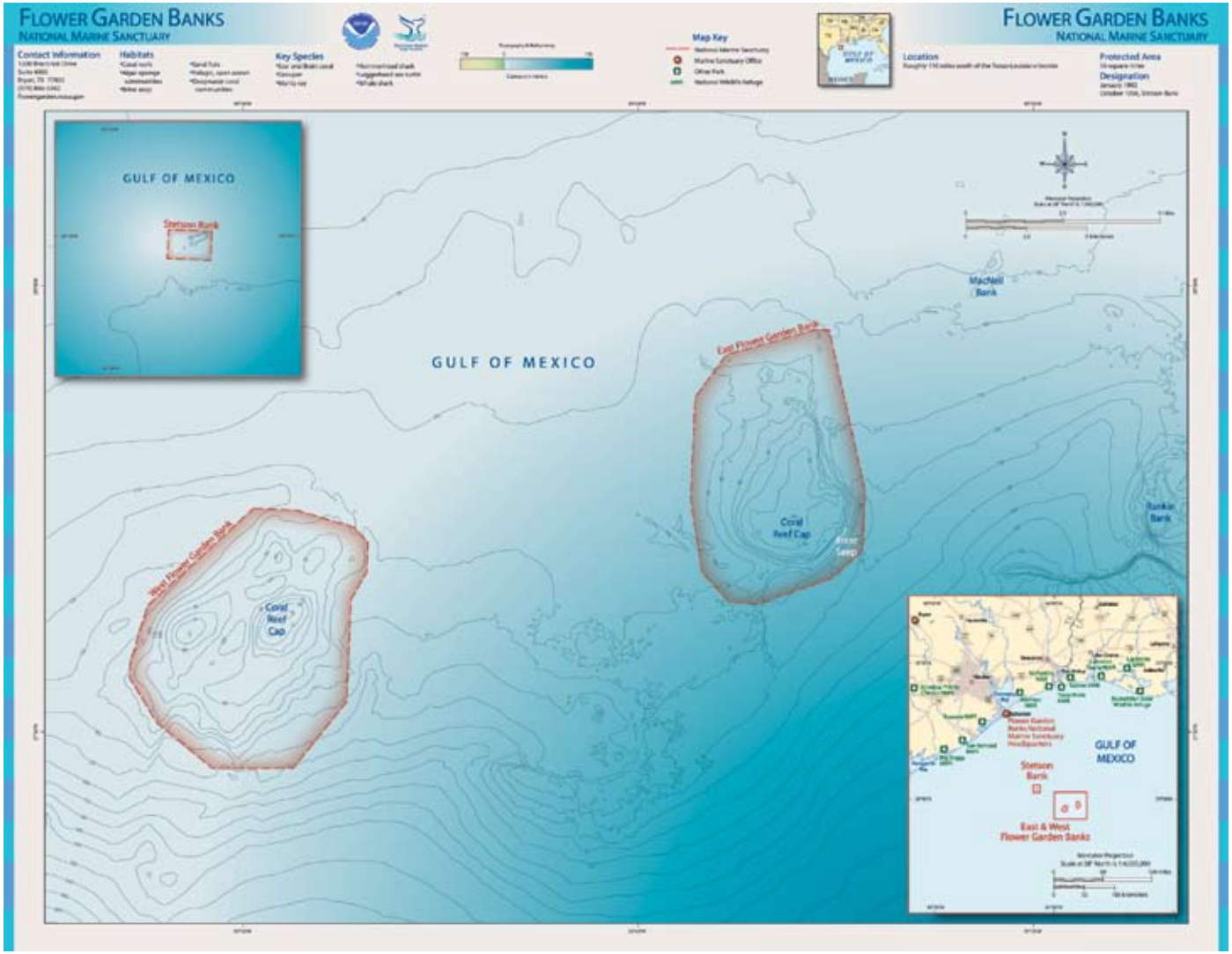
FLOWER GARDEN BANKS

NATIONAL MARINE SANCTUARIES

FLOWER GARDEN BANKS

STATE OF THE SANCTUARY REPORT

2006 2007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NATIONAL MARINE SANCTUARY

NATIONAL MARINE SANCTUARIES

FLOWER GARDEN BANKS

The National Marine Sanctuary Program

The National Marine Sanctuary Program serves as the trustee for a system of 13 national marine sanctuaries and the Northwestern Hawaiian Islands Marine National Monument that encompass more than 158,000 square miles of ocean and Great Lakes waters from Washington State to the Florida Keys, and from Lake Huron to American Samoa. The National Marine Sanctuary Program is part of the National Oceanic and Atmospheric Administration, which has managed sanctuaries since the 1972 passage of the National Marine Sanctuaries Act.

Our national marine sanctuaries contain deep ocean reefs and canyons, lush kelp forests, coral reefs, whale migration corridors and underwater archaeological sites. Sites within the National Marine Sanctuary System range in size from one-quarter square mile in Fagatele Bay, American Samoa, to almost 140,000 square miles in the Northwestern Hawaiian Islands Marine National Monument. While some activities are managed to protect nationally significant resources, certain uses, such as recreation, commercial fishing, and shipping, are allowed to the extent that they are compatible with the sanctuary program's resource protection mandate. The sanctuary program works to enhance the protection of our nation's ocean life and marine heritage through scientific research, monitoring, exploration, educational programs and outreach.

The National Marine Sanctuary Program strives to be a world leader in marine resource management by working cooperatively with the public and its partners to protect America's ocean and Great Lakes treasures.

National Oceanic and Atmospheric Administration

U.S. Secretary of Commerce
Carlos M. Gutierrez

Under Secretary of Commerce for Oceans and Atmosphere and Administrator, National Oceanic and Atmospheric Administration
Vice Admiral Conrad C. Lautenbacher, Jr.
U.S. Navy (Ret.)

Assistant Administrator for National Ocean Service
John H. Dunnigan

National Marine Sanctuary Program Director
Daniel J. Basta

Flower Garden Banks National Marine Sanctuary Superintendent
G.P. Schmahl

Front Cover: Manta Ray
Photographer: Kaile Tsapis

Back Cover: Yellowmouth Grouper
Photographer: FGBNMS/G.P. Schmahl

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Flower Garden Banks National Marine Sanctuary

Located in the northwestern Gulf of Mexico, the Flower Garden Banks National Marine Sanctuary (FGBNMS) includes three separate areas, known as East Flower Garden, West Flower Garden and Stetson Banks. Perched atop 'underwater hills' known as salt domes, the banks range in depth from 55 to greater than 450 feet, providing a wide range of conditions that support several distinct habitats, including the northern most coral reefs in the continental United States. These and similar formations throughout the northern Gulf of Mexico provide the foundation for essential habitat for a variety of species.

It is this combination of location and geology that makes the Flower Garden Banks special and presents a unique set of challenges for managing and protecting its natural wonders.

Top Photo: French Angelfish Adult and Juvenile
Joyce & Frank Burek

Bottom Photo: Hermit Crab Mary Wicksten

For More Information

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Contents

Sanctuary Mission and Goals

The following mission and goals of the Flower Garden Banks National Marine Sanctuary (FGBNMS) were developed through a collaborative process between the sanctuary staff and the sanctuary advisory council, and is draft language to be considered and revised through public input associated with the management plan review process.

Mission:
Identify, protect, conserve, and enhance the natural and cultural resources, values and qualities of the Flower Garden Banks National Marine Sanctuary and its regional environment for this and future generations.

Goal 1: Protect, maintain and, where appropriate, restore and enhance the characteristics of the FGBNMS including, but not limited to, the natural living and geological resources, ecological processes, and water quality.

Goal 2: Enhance conservation and protection of the region by supporting, promoting, and coordinating scientific research and monitoring of the FGBNMS environment.

Goal 3: Enhance and foster public awareness, understanding, appreciation and stewardship of the FGBNMS and the regional marine environment.

Goal 4: Manage and facilitate multiple sustainable uses of the FGBNMS compatible with the primary purpose of resource protection.

Goal 5: Promote and lead conservation and management partnerships to protect FGBNMS resources and the regional marine environment.

Goal 6: Promote ecosystem-based management of the region external to the FGBNMS.

Goal 7: Provide appropriate infrastructure and assets for FGBNMS programs to effectively conserve and manage sanctuary resources.

Executive Summary

It is an exciting time for the Flower Garden Banks National Marine Sanctuary. By the time we celebrate our 15th anniversary in January 2007, we will have witnessed many recent transformations: formation of our sanctuary advisory council; relocation of our offices to Galveston, Texas; initial construction of a new research vessel; and the start of a review of our original 1992 management plan. Each of these changes will provide new opportunities for management, research, education, and community outreach.

In November of 2005, the Flower Garden Banks Sanctuary Advisory Council held its inaugural meeting. This volunteer council consists of locally appointed community and agency representatives. The expertise and enthusiasm of this body will allow the sanctuary to establish a greater presence in the region, expand its scope of programs, and complete a management plan review with greater participation from our constituents.

The new sanctuary headquarters in Galveston is co-located with NOAA Fisheries at the historic Fort Crockett campus. Our new location will enhance our ability to work jointly with NOAA Fisheries and to advance the one-NOAA concept. We are now positioned in a coastal community where we can build greater awareness of the Flower Garden Banks National Marine Sanctuary.

Globally, coral reefs are in decline. We have an opportunity to conserve a relatively healthy coral reef ecosystem and its associated biological communities. Both global and local pressures have created a different climate in which the sanctuary exists, and it is time to revisit our regulations and management plan to align us with the needs and concerns of the marine resources in the northwestern Gulf of Mexico. This report opens the door for public involvement in the management plan review process. It provides insight into the sanctuary's natural resources, our research, and our education programs. The report also details current topics, issues of concern, and the many opportunities for resource protection that lay ahead for the sanctuary. We have accomplished many of the tasks identified in the original 1992 management plan, and look forward to a future of continuing to fulfill our mission of resource protection.

The sanctuary staff hope that this report will stimulate public interest in the review of our existing management plan. We encourage you to become involved in shaping the future management of the Flower Garden Banks National Marine Sanctuary.

About This Document

The State of the Sanctuary document is an overview of the current status of the sanctuary, and is used as a basis for revising the management plan. This document discusses issues, ecosystems, management activities and accomplishments of the Flower Garden Banks National Marine Sanctuary since its designation in 1992.

Management Plan Review

Management plans are sanctuary-specific planning and management documents required by law for all National Marine Sanctuaries. These plans describe regulations, boundaries, resource protection, research, and education programs to guide future management activities. They specify how sanctuaries can continue to conserve, protect, and enhance their nationally significant living and cultural resources.

The Flower Garden Banks National Marine Sanctuary is embarking on its first management plan review. Since 1992, significant discoveries and resource issues have emerged. Using a community-based process that will provide numerous opportunities for public input, the sanctuary will determine whether current issues and threats to the resources are the same as when the initial Environmental Impact Statement was created, and whether the management plan put in place at that time is still effectively protecting current sanctuary resources. The review will also evaluate management strategies, regulations, and boundaries. Ultimately, this review ensures that the Flower Garden Banks National Marine Sanctuary will better protect, conserve, and enhance its marine resources for current and future generations.

How to Get Involved

Public participation is vital to the management plan review. This is an opportunity for the public to provide input regarding the future of the Flower Garden Banks National Marine Sanctuary. The management plan review will begin with a series of scoping meetings in October 2006. Public comment during these meetings and through written submission will help identify the issues to be addressed in the updated plan.

A Draft Management Plan and Draft Environmental Impact Statement will be developed, and additional public comment will be solicited. Public meetings will be advertised through various media outlets, including local papers and the sanctuary Web page (http://flowergarden.noaa.gov). To get on the mailing list, write to: Flower Garden Banks National Marine Sanctuary (Management Plan Review), 4700 Avenue U, Bldg. 216, Galveston, TX 77551. The sanctuary can also be contacted by calling the office at (409) 621-5151 Ext. 103 or by email at flowergarden@noaa.gov.

Sanctuary Advisory Council Members

Voting Members:
One representative from each of the following constituent groups.

Commercial Fishing
Conservation
Dive Operations
Education
Oil and Gas Industry
Recreational Diving
Recreational Fishing
Research

Ex-officio (non-voting) Members:
Minerals Management Service
NOAA Fisheries
U.S. Coast Guard

Aplysina Sponges, Joyce & Frank Burek

Sanctuary Timeline

Late 1800s Snapper and grouper fishermen discover the banks; nickname them "Texas Flower Gardens."

1930s First charts showing topographic features of the Flower Garden Banks (FGB).

First recorded discovery of the FGB.

1950s Ocean research accelerates, including the first investigations specifically targeting the FGB.

1961 Thomas Pulley substantiates the FGB as a living coral community.

1970s Bureau of Land Management funds series of intensive studies at FGB by Texas A&M University.

1973 FGB first proposed as a National Marine Sanctuary.

1974 Minerals Management Service imposes strict, and unprecedented, regulations on drilling around the FGB and other banks containing sensitive communities.

1979 FGB again proposed as a National Marine Sanctuary.

1981 Gas production platform erected within one mile of East Flower Garden Bank.

1981 Coral Reef Fishery Management Plan proposed no anchoring above 50 fathoms at FGB.

1982 FGB sanctuary nomination removed.

1982 Anchoring prohibition removed by determination that National Marine Fisheries Service jurisdiction limited to fishing-related activities.

1983 Tug with attached barge anchors on FGB, causing considerable damage to reef.

1990-91 Recreational divers lead charge to re-energize designation process by installing mooring buoys, writing letters and visiting with government officials and legislators.

1992 The Flower Garden Banks are designated a National Marine Sanctuary.

1996 Stetson Bank is added to the sanctuary.

Introduction

Purpose

National Marine Sanctuaries are special marine protected areas that have been established because of their natural and/or cultural significance. The Flower Garden and Stetson Banks were designated based on their unique ecology and geology, which provides a regional reservoir of Caribbean species in the northwestern Gulf of Mexico.

Designation

The Flower Garden Banks National Marine Sanctuary was officially designated on January 17, 1992. Stetson Bank was added to the sanctuary in 1996.

Discovery & Exploration

The Flower Garden Banks have a rich history of exploration and discovery. Although snapper fishermen nicknamed the area "Texas Flower Gardens" in the late 1800's, the first official documentation of the banks did not occur until the 1930's. Following that, the banks were occasionally included in investigations of larger portions of the Gulf of Mexico. Despite these investigations and rumors of coral reefs from the fishing community, many scientists believed that any coral reefs located here must be dead, primarily because of the depth and supposed cool temperatures.

Then, in the 1960s, expeditions conducted by the Houston Museum of Natural Science, the Navy, and volunteer divers settled the debate. They dove on the reefs and brought back specimens and reports of living, healthy coral reefs that were stunning in their beauty. The age of exploration began in earnest, as the banks became a popular spot for both researchers and recreational divers.

As new technology allowed oil and gas production to move offshore into deeper water in the 1970s, concerns about detrimental impacts to the reefs increased. The Minerals Management Service established "No Activity Zones" around most of the banks in the northern Gulf of Mexico. While these measures controlled impacts from oil and gas-related activities, they did not cover activities such as diving, fishing and shipping. The recreational dive community took action to address some of these issues and formed the Gulf Reef Environmental Action Team (GREAT). This group raised funds and recruited volunteers to install mooring buoys and offer their services to researchers involved in characterizing and monitoring the banks. It soon became apparent that additional formal protection was needed.

It would take the combined efforts of recreational divers and researchers to get the Flower Garden Banks designated as a National Marine Sanctuary in 1992.

A strong tradition of discovery and community involvement continues today. The sanctuary science team, in concert with a wide array of partners, continues to explore, research and monitor the sanctuary ecosystems, as well as those around it that are most likely to influence the sanctuary's continued health.

Regional Context

The Flower Garden and Stetson Banks are only three among dozens of reefs and banks scattered along the edge of the continental shelf throughout the northern Gulf of Mexico. All of these banks are part of a regional ecosystem, heavily influenced by current patterns within the Gulf. Inflows from the large Mississippi and Atchafalaya watersheds that drain two-thirds of the continental United States also play a significant role in the health of this region.

Currents

From the south, the Gulf of Mexico is fed by a current of warm water from the Caribbean, which enters the Gulf between Mexico's Yucatan Peninsula and Cuba. This water movement forms the Gulf Loop Current, which curves east and south along Florida's coast and exits through the Straits of Florida.

The Gulf Loop is variable, sometimes barely entering the Gulf before turning, and at other times, traveling almost to Louisiana's coast before swinging towards Florida. When that happens, the main current passes directly over the eastern banks along the continental shelf. Simultaneously, bits of the loop often break away from the main current and form circular eddies that move westward, in the vicinity of the Flower Garden, Stetson and other banks to the west. This influx of water brings with it animal larvae, plant spores and other imports from the south, which accounts for the many Caribbean species found in the northern Gulf of Mexico. As it continues, the main current also carries similar 'passengers' from the northern Gulf to destinations along its route back to the Caribbean and Atlantic.

In addition to the loop current, wind driven surface water circulates northwestward, following the coastline of Mexico up toward the Texas-Louisiana shelf. These wind driven currents also cross over the Flower Garden, Stetson and other banks and add to the Caribbean influence in the region.

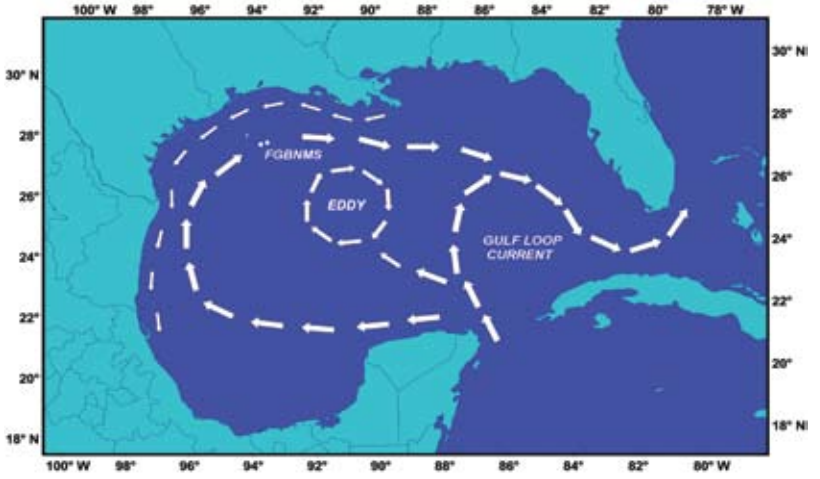
Watershed

Multiple rivers drain the interior of North America, as much as two-thirds of the United States, ultimately depositing their outflow in the northern Gulf of Mexico. These rivers bring with them all of the runoff accumulated from cities, suburbs, rural areas and wild lands along their routes. Before reaching the Gulf, this replenishing source of water is partially depleted by extractions for municipal, industrial and agricultural consumption, thus reducing freshwater inflows that sustain coastal estuaries. When healthy, the estuaries filter sediments and pollutants from the water, export organic material for the near shore food chain, and provide nursery areas for many species, some of which later move offshore to the system of banks along the continental shelf.

Connectivity

We have long been aware that ocean currents connect the dozens of banks along the continental shelf by transporting larvae of various marine organisms. Recent explorations, however, indicate that there may also be more direct connections along the seafloor. Technological advances have allowed higher resolution mapping efforts that reveal systems of low relief geological features (such as rock outcroppings) between those banks that have been more extensively explored in the last few years. Such areas may allow much more direct exchange of organisms via migration between the banks than previously believed. As we build upon the knowledge-base established by the discoveries to date, we may discover that these interactions play a crucial role in maintaining the health of the sanctuary's living marine resources.

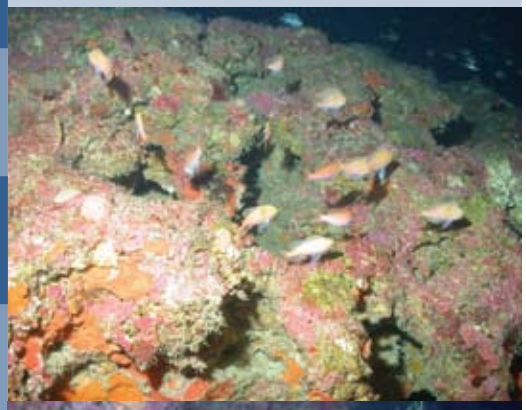
Added to this mix of influences are the thousands of oil and gas production platforms that serve as artificial reefs by providing hard surfaces to which larvae and spores may attach themselves. Scientists are still assessing the extent to which this system of platforms affects the overall biological productivity of the Gulf.

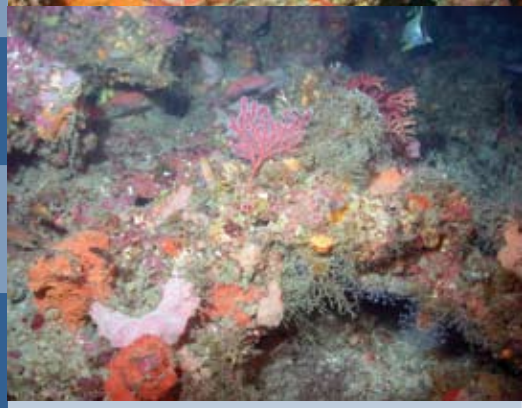


Current patterns in the Gulf of Mexico, FGBNMS/Weaver

TABS Buoy, Joyce & Frank Burek

Algal Nodule Fields, FGBNMS/NURC-UNCW





Top Photo: Honeycomb Reef, FGBNMS/NURC-UNCW
Bottom Photo: Eroded Reef, FGBNMS/NURC-UNCW

Living Marine Resources

East & West Flower Garden Banks

The Flower Garden Banks are unique among ecosystems in the Gulf of Mexico. They contain the northernmost coral reefs in the continental United States. The nearest neighboring tropical coral reefs are 400 miles away in the Bay of Campeche, off the Yucatan peninsula of Mexico, while the closest U.S. coral reefs are located 750 miles southeast, in the Florida Keys.

The East Flower Garden Bank is a pear-shaped dome, 5.4 by 3.2 miles in size, capped by 250 acres of coral reef that rise to within 62 feet of the surface. The West Flower Garden Bank is an oblong-shaped dome, 6.8 by 5 miles, that includes 100 acres of coral reef area starting 59 feet below the surface.

Boulder size heads of brain and star corals dominate the coral caps of the Flower Garden Banks, some exceeding nine feet in diameter. There are at least 21 species of coral on the coral cap, covering over 50% of the bottom to depths of 100 feet, and exceeding 70% coral cover to at least 130 feet. Interestingly, the coral caps do not contain some species commonly found elsewhere in the Caribbean, such as staghorn coral and most sea whips and sea fans. In fact, despite the high cover, only about a third of Caribbean hard coral species are found at the Flower Garden Banks National Marine Sanctuary.

The coral reef community and its associates include algae, sponges, worms, crabs, lobsters, shellfish, sea urchins, fish, sharks, rays, sea turtles, marine mammals and birds. Large schools of jacks and the presence of large grouper make this reef even more enjoyable for divers.

Less well known is the deepwater habitat of the Flower Garden Banks that makes up over 98% of the area within the sanctuary boundaries. Habitats below recreational SCUBA limits include algal-sponge zones, “honeycomb” reefs, coralline algae reefs, highly eroded outcroppings, mud flats, mounds, mud volcanoes and at least one brine seep system. A different assemblage of sea life resides in these deeper habitats, including colorful sea fans, sea whips and black corals, deep reef fish, batfish, sea robins, basket stars and feather stars.

Stetson Bank

Stetson Bank is located 70 miles south of Galveston, Texas, and 30 miles to the northwest of the West Flower Garden Bank. Environmental conditions at Stetson Bank, such as temperature fluctuations and turbidity, do not support the growth of most reef forming corals like those found at the East and West Flower Garden Banks. Divers have described Stetson as having a “moonscape” appearance – with distinct pinnacles that push out of the seafloor for 1,500 feet along the northwest face of the bank.

An area referred to as the “flats” stretches out behind the pinnacles region, and is dotted with low relief outcroppings.

The pinnacles of Stetson Bank are dominated by fire coral and sponges. There are at least nine coral species at Stetson Bank, and coral coverage along the pinnacles can be as high as 30%. Algae, sponges and rubble dominate the flats.

Divers enjoy seeking out the colorful invertebrates and fish tucked away in the nooks and crannies along the pinnacles – crabs, lobsters, octopi, moray eels, and the elusive longlure frogfish. Southern stingrays, spotted eagle rays, mantas and sandbar sharks surprise divers as they glide up over the pinnacles. Stetson is a favorite destination for fish watchers on the lookout for sailfin blennies popping in and out of holes in the claystone substrate.

Lying mostly outside the sanctuary boundaries is a ring of claystone outcroppings that form a halo around the main feature of Stetson Bank. This feature was unknown when the sanctuary boundaries were designated and later identified during high resolution seafloor mapping. Sponges, gorgonians and black corals dominate this impressive ring of outcroppings, which sits at about 180 feet in depth. Deep reef fish and invertebrates are prominent inhabitants of the Stetson Ring.

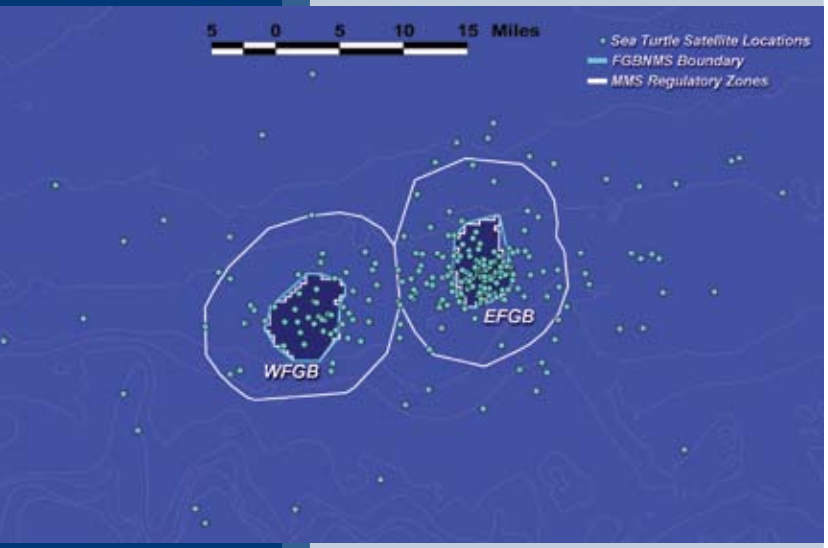
Fish

The benthic habitat of the Flower Garden Banks National Marine Sanctuary provides critical protection, food, and shelter for the associated fish community. At least 280 species of fish have been documented within the sanctuary, including colorful reef inhabitants such as parrotfish, wrasse, angelfish, boxfish, and squirrelfish. Avid fish watchers visit the Flower Garden Banks hoping to see the unique golden morphology of the smooth trunkfish, or a new species of wrasse that was first discovered in 1997.

Enormous schools of barracuda, pelagic jacks, mackerel, and snapper greet divers as they enter the waters of the sanctuary seasonally. The conspicuous deeper water fish in the sanctuary include roughtongue bass, red snapper, scamp, and marbled grouper. Commercially targeted species include the snapper, grouper, jacks, wahoo, and mackerel.

In June 1997, a new type of wrasse (Halichoeres n. sp.) was first observed by the Reef Environmental Education Foundation (REEF) at the East Flower Garden Bank, and subsequently in large schools at Stetson Bank. This wrasse turned out to be not only new to the FGBNMS, but may also be new to science! Joyce and Frank Burek, sanctuary volunteers, first photographed the wrasse at Stetson Bank. FGBNMS/NURC-UNCW

Smooth trunkfish (Lactophrys triqueter) are common throughout the Caribbean, but not with this color scheme! The golden morphology was first described at the Flower Garden Banks, and has since been rumored to occur in just one other place in the Caribbean. Avid fish counters put this one at the top of their list to watch out for during their dives at all three of the banks, and they don’t have to look too hard! Joyce & Frank Burek



Satellite Tracking of Sea Turtles, FGBNMS/Weaver

Loggerhead Sea Turtle, Joyce and Frank Burek

Sea Turtles

Loggerhead and hawksbill sea turtles reside at all three banks of the sanctuary throughout the year. Loggerheads are most often seen at night or in the late afternoon, resting underneath ledges or coral heads. In the early morning, they often leave the reef to feed in deeper areas of the sanctuary. They can also be seen on the surface catching a breath. Sea turtles surface about once an hour for a couple of minutes, and then submerge to sleep or forage.

The most frequently observed loggerheads are juveniles close to reaching adulthood, perhaps suggesting that the sanctuary reefs serve as a temporary residence for these animals while they prepare to move on to adult feeding areas. Adult female loggerheads have also been sighted on several occasions. Recent satellite and radio tracking studies have shown that the resident loggerhead sea turtles have home ranges that are quite specific, but not entirely within sanctuary boundaries.

Because hawksbill sea turtles are primarily sponge-eaters, Stetson Bank offers an abundant food source and is likely a superior habitat for these turtles. A young hawksbill sea turtle, nicknamed “Swimmy,” has been a resident of Stetson Bank since 1999. A small number of transient hawksbills have also been reported at both the Flower Garden Banks and Stetson Bank.

Sharks & Rays

Approximately 20 species of sharks and rays have been documented at the Flower Garden Banks, some more seasonal than others. During the winter months, schooling scalloped hammerhead sharks and spotted eagle rays are visitors to all three banks. The reason for their seasonal visit is unclear, but the occurrence is quite predictable. Other winter visitors include occasional sandbar and tiger sharks, as well as spinner sharks, which are often seen leaping out of the water in pursuit of schooling fish.

Summer months usually entice whale sharks to visit the area. Divers are awestruck by encounters with these massive, filter-feeding creatures. Nurse sharks are often seen resting under ledges or in crevices in the coral, while large schools of silky sharks are known to aggregate around the structure of oil and gas platforms in the vicinity of the sanctuary.

Manta and mobula rays are regular inhabitants of the sanctuary. At least 35 different manta rays have been documented and identified by distinctive markings on their undersides. These animals swoop gracefully through groups of divers, leaving a lasting impression.

Sanctuary Uses

Recreational Diving

Recreational divers constitute the largest user group within the sanctuary. By some estimates, around 3,000 divers visit the sanctuary each year. Although the Flower Garden Banks is often a challenging dive site, recreational divers consistently rate it among their favorite dive sites in North America. The sanctuary is also a popular site for underwater photography.

Fishing

Conventional hook and line fishing, both recreational and commercial, is allowed within the sanctuary. All other fishing methods, including bottom trawling, spear fishing, trapping and bottom lining are prohibited, to protect sensitive bottom habitat. Although fishing pressure is perceived to be moderate, the impact on local fish populations is unknown at this time. Snapper, grouper, wahoo, king mackerel and jacks are believed to be the primary species targeted at the Flower Garden Banks.

Research

The Flower Garden Banks has historically been the target of scientific studies by academia. For example, during the 2005 field season, sanctuary personnel, scientists, and volunteer divers conducted approximately 700 SCUBA dives for research purposes. Because of its isolated location, the sanctuary has remained relatively untouched by problems that plague many other reefs and has become a benchmark for evaluating the health of other reef systems.

Education & Outreach

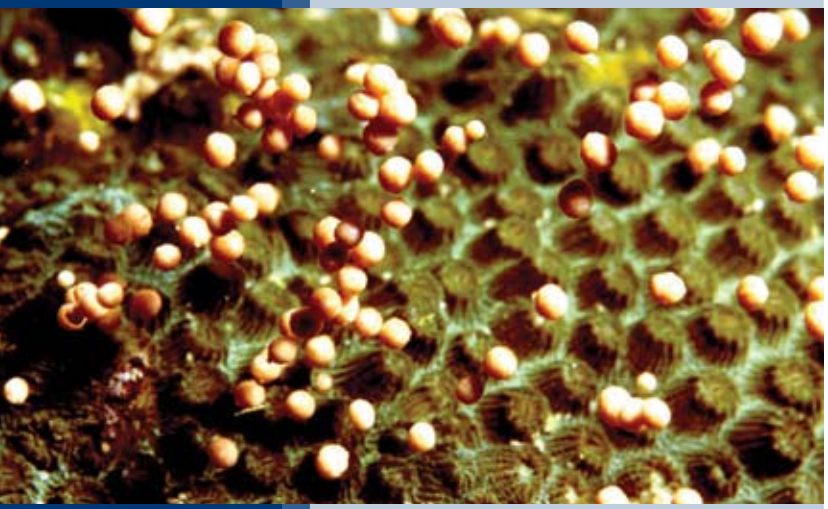
As the only coral reef ecosystem in this part of the country, the Flower Garden Banks is a valuable experiential learning site for a variety of educational programming. Instead of just learning about coral reefs, program participants can experience them first-hand, thus adding another dimension to their appreciation of this resource in their own backyard.

Oil & Gas

Approximately 150 oil and gas production platforms are located within 25 miles of the Flower Garden Banks. Platform High Island A389A is actually located within the sanctuary boundaries. Constructed in 1981, prior to sanctuary designation, this platform continues to actively drill, produce gas, run pipes, and discharge drilling fluids and lubricants. The structure itself also serves as an artificial reef, providing habitat for a variety of organisms that live on and around it, as well as an exciting dive opportunity for sanctuary visitors.

Recreational Diver, FGBNMS

High Island A389A Production Platform, FGBNMS



Coral Spawning Event, FGBNMS/Hickerson

Coral Spawning

High coral coverage and massive colonies of spawning corals make the East and West Flower Garden Banks coral spawning event one of the most visually impressive in the Caribbean. Mass spawning at the Flower Garden Banks was first documented by recreational SCUBA divers in 1991. Subsequent research has found that, depending on the species, between seven and ten days after the full moon in August and/or September, the corals release eggs and sperm into the water column in a highly synchronous, consistent, and thus predictable manner. Many other organisms spawn during the same period, including fish, brittle stars, sponges, and Christmas tree worms.

Sanctuary Management Activities

Flower Garden Banks National Marine Sanctuary (FGBNMS) staff uses an array of tools to manage the sanctuary. Research and monitoring provide the information to determine where protective measures are needed. Resource protection manages human activities that affect living marine resources. Education and outreach help the public understand why the sanctuary resources are important and increases the likelihood of voluntary compliance with regulations and policies. Each of these management tools requires partnerships to make their use effective.

Research

The sanctuary strongly encourages researchers and students to conduct scientific studies at the site. In particular, the sanctuary encourages science that supports management concerns: What are the baseline populations within the sanctuary? What are the genetic links of these reefs to other coral reefs in the Caribbean? What are the implications of human use on the health of the resources?

The logistics of conducting research at this site can often be challenging, given the distance from shore, and limited access to the reef. Although the FGBNMS is usually unable to provide funding for projects, it supports research by facilitating access to the site through research cruises several times a year.

The coral reefs of the FGBNMS have historically been the target of scientific studies by academia, but are more recently becoming a standard for a healthy coral reef system in the Caribbean and Gulf of Mexico. Despite the challenging logistics encountered by conducting research at the FGBNMS, researchers are actively pursuing projects. These include, but are not limited to:

- Characterization of the deeper water areas within the sanctuary.
- Acoustic and satellite tagging of sharks and rays – to determine their movement and habitat use within the FGBNMS.
- Coral diseases – to determine the severity and occurrence of coral diseases.
- Coral paleoclimatology – to determine the age of the coral reefs at the FGBNMS and enhance the knowledge of regional winter climate variability over the centuries.
- Coral genetics – to determine the genetic variability and population of corals.
- Tagging of queen conch – to determine the population structure, and movement of queen conch in the FGBNMS.

Research partners include academic institutions, international conservation organizations, state and federal government agencies, and private organizations.

Monitoring

Long-term monitoring of the coral cap regions of the sanctuary is designed to examine the health of the reef through direct measurements of the percent of coral cover, the occurrence of coral mortality, coral diversity, and growth or retreat of coral tissue. By tracking changes in these parameters from year to year, the monitoring acts as an early warning system for the sanctuary to take immediate steps to prevent any further loss of health on the reef.

The earliest quantitative data on coral and other reef invertebrates at the East and West Flower Garden Banks was collected in 1972. Although not formally part of a planned long-term monitoring study, it was recognized that the data could provide a baseline against which future information could be compared. This original work was funded by the Flower Garden Ocean Research Center, a division of the Marine Biomedical Institute of the University of Texas Medical Branch at Galveston.

The first regularly collected data on benthic communities began in 1978 with Continental Shelf Associates, Inc. and Texas A&M University researchers, and continued through 1983. This industry-sponsored monitoring effort was prompted by the drilling and production activity of Mobil Exploration and Producing U.S., Inc. within one mile of the coral cap of the East Flower Garden Bank.

A comprehensive long-term monitoring program was developed for the Flower Garden Banks by academia, industry, and the Minerals Management Service (MMS) in the late 1980's. A contract for the first monitoring effort under this program was initiated in 1988. This long-term monitoring contract continues today and is maintained by both the MMS and the FGBNMS.

Data from the long-term monitoring have been encouraging. In general, this reef system continues to be one of the healthiest reef systems in the Caribbean, with no identifiable impacts to coral reefs from oil and gas activity and little occurrence of disease and bleaching. Data from 2005 show high coral cover (of around 57%) on the top of the reef, and over 75% in the plating coral zone at depths of 100 to 130 feet.

In 1993, the Gulf Reef Environmental Action Team established repetitive photo stations at Stetson Bank for long-term monitoring. This task was handed over to the FGBNMS in 1996. To date, 16 cruises have taken place to collect the photographs. Initial analysis indicates long-term stability of the marine communities.

Seafloor Mapping and Habitat Characterization

A recent focus of sanctuary research has been to characterize the deeper water habitats within the sanctuary and the surrounding reefs and banks of the northwestern Gulf of Mexico. What is the habitat? What is the biology of the deepwater regions? What controls are necessary to protect these habitats? The resulting mapping and characterization data have been used to make recommendations for regulations by other agencies to protect these sensitive habitats.

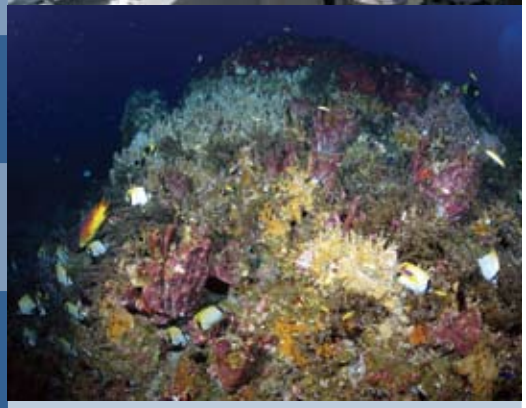
Partnerships

Part-ner-ship *noun* A relationship between individuals or groups that is characterized by mutual cooperation and responsibility, as for the achievement of a specified goal.

Partnerships are vital to the sanctuary's success. Without the mutual cooperation of the many individuals and groups who take personal responsibility for the well-being of the Flower Garden and Stetson Banks, achieving sanctuary management goals would be impossible. From individual volunteers to non-profit organizations to commercial coalitions, our partners offer diverse perspectives and resources. From responding to requests for public comment to staffing sanctuary exhibits to sponsoring workshops and expeditions, they each make their own unique contribution. Partnerships strengthen all aspects of sanctuary management. They make it possible to achieve the sanctuary goal of protecting resources for current and future generations, while allowing resource uses that are compatible with the sanctuary's continued health.

Repetitive Photo Station, Franklin Viola

North Reef at the East Flower Garden Bank, FGBNMS/Schmahl



Top Photo: Launching ROV
Bottom Photo: Geyer Bank, GP Schmahl

Seafloor Mapping

Over the past five years, over 1,428 square miles of the northwestern Gulf of Mexico have been mapped using high-resolution multibeam echo sounding systems. This effort included areas both within and outside the boundaries of the sanctuary. Twelve additional reef features were mapped, as well as the area between the East and West Flower Garden Banks. The coral caps of the East and West Flower Garden Banks were surveyed at half-meter resolution – an incredible dataset that allows for detailed maps and monitoring.

Habitat Characterization

The multibeam charts have been crucial in the planning and orchestration of submersible surveys. We have utilized technology to explore and describe the deeper water habitats both inside and outside sanctuary boundaries. Since 2001, the sanctuary research team has conducted 187 submersible surveys, using both remotely operated vehicles (ROVs) and manned submersibles, accruing close to 220 hours of bottom time. During most surveys, the location of the ROV or submersible is tracked through a system of transmitters and hydroacoustic receivers.

Surveys have taken place at 12 different reefs and banks and captured over 8,000 high-resolution images that document the marine life and geology of the target sites. Over 240 marine organisms, including black corals, sea fans, sponges, and algae, have been sampled during these surveys and sent to experts for identification.

Data obtained from these surveys suggest that the sanctuary serves as an important location for potential spawning aggregations of grouper, as well as habitat for juvenile and subadult red snapper. The deeper water habitats also harbor a much greater number of species and populations of black corals, gorgonians, and deepwater corals than previously known.

Education & Outreach

Education and outreach activities at the FGBNMS presume that no one is too young or too old to learn about this national treasure. Education and outreach efforts currently focus on those who have the greatest probability of directly impacting sanctuary resources, both now and in the future.

Primary target audiences include recreational divers, the oil and gas industry, and teachers and students. To a lesser extent, efforts are directed toward fishermen, other government agencies and interested members of the public. Education and outreach efforts are implemented through partnerships with other government agencies and the private sector, along with the valuable assistance of trained, dedicated volunteers. These efforts aim to:

- Increase awareness about the sanctuary's resources and how they can be impacted;
- Educate users about how they can minimize or eliminate impacts to the natural resources; and,
- Develop a sense of personal stewardship for this special place.

Divers

Outreach with divers is conducted through participation in dive-related trade shows, interactions with dive clubs and interpretive programs. One such effort is the ever-evolving Naturalist on Board program aimed at recreational divers visiting the sanctuary aboard commercial dive charter vessels. The sanctuary purchases berth space on dive vessels during peak season weekends so that qualified volunteers can join the dive trip to interpret sanctuary resources and convey educational messages. This program raises awareness of and appreciation for sanctuary resources among both volunteers and visiting divers.

Oil & Gas Industry

Several training and information sharing strategies are used to maintain collaborative relationships with the oil and gas industry. These include shared research and learning activities, one-on-one interactions with industry personnel and presentations at training sessions sponsored by industry for their offshore operations personnel.

For example, sanctuary staff and oil and gas industry representatives coordinate an annual *Agency-Industry Information Transfer Meeting & Expedition*. The expedition is funded equally by the sanctuary and industry and provides participants with an informal setting to become familiar with one another outside of an emergency situation, such as a pipeline leak. Presentations before and during the trip offer participants insight into issues and challenges faced by their colleagues. Dives in the sanctuary offer industry personnel a first-hand opportunity to see the resources they are helping protect when they comply with the highest operating standards.

Teachers & Students

The sanctuary coordinates a variety of workshops to help professional K-12 educators develop the knowledge and skills necessary to incorporate the Flower Garden Banks National Marine Sanctuary into the classroom through both existing curricula and aquarium field trips. Workshops range from hour-long sessions at science education conferences to a popular, five-day workshop called *Down Under, Out Yonder* (DUOY). Sponsored by the Gulf of Mexico Foundation, DUOY includes both classroom instruction and a diving excursion to the sanctuary for qualified teachers.

Interested Citizens

As an area of national significance, the sanctuary has an obligation to inform interested citizens about the natural resources of the Flower Garden Banks and the issues affecting them. Recent efforts have focused on partnerships with aquariums as well as participation in community events. There are currently four aquariums and one zoo, Texas State Aquarium, Audubon Aquarium of the Americas, National Aquarium in Baltimore, Tennessee Aquarium and the Cameron Park Zoo, with specific sanctuary exhibits, reaching millions of visitors annually. Additionally, sanctuary staff and volunteers convey key educational messages through participation in trade shows, involvement in local Earth Day festivals, and presentations to local civic groups.

DUOY Participant Running a Transect, FGBNMS

Down Under, Out Yonder

Each summer, the Flower Garden Banks National Marine Sanctuary partners with the Gulf of Mexico Foundation to invite SCUBA-certified educators from around the country to get out of their classrooms and into the Gulf of Mexico for a workshop called Down Under, Out Yonder (DUOY). Participants spend two days in the classroom learning about topics ranging from coral biology to science applications of technology, then head to the sanctuary for three days of diving in the sanctuary. Interactions with sanctuary staff, researchers and other educators are a highlight of the experience. Participation in the workshop is competitive. Selection is based on a written essay about how the experience will be used in the applicant's existing curriculum. In its eleven-year history, the program has reached almost 200 individual educators. Each of these educators teaches an average of 30 to 100 students every year, collectively reaching thousands of students annually. Many alumni have become dedicated representatives for the sanctuary outside the classroom as well.

Key Messages

The FGBNMS is surrounded by a variety of unique habitats, all of which contribute to its well-being.

The FGBNMS is a relatively healthy ecosystem, but is susceptible to impacts from land and resource use.

Management of the FGBNMS is a pro-active, rather than a reactive, process.

The FGBNMS has a long history of exploration and discovery that continues today.

Partnerships are an integral part of the FGBNMS management strategy.

Fishermen

Current outreach to this community is limited to occasional one-on-one encounters in the sanctuary and a summary of fishing regulations distributed through the NOAA Fisheries Service's Fishery Reporting Specialists (Port Agents).

Resource Protection

Our challenge is to facilitate sanctuary uses—commercial, recreational, scientific, and educational—that are compatible with long-term protection of this important marine ecosystem. We strive to promote positive human activities and attitudes to support a healthy coral reef ecosystem. In turn, it is necessary for us to prevent human activities that can adversely affect sanctuary resources. With a foundation of education and outreach to inform the public, we can promulgate regulations and provide enforcement within sanctuary boundaries.

Mooring Buoys

One of the major issues that led to the sanctuary designation was concern about anchor damage to the coral reefs. One anchoring incident can destroy thousands of years of reef growth within minutes. Prior to sanctuary designation, a concerned group of SCUBA divers installed mooring buoys at prominent dive locations at the Flower Garden Banks. Mooring buoys allow convenient access to sanctuary resources and eliminate the need for anchoring in these sensitive locations. Since designation, the sanctuary has provided for the maintenance and additional installation of mooring buoys at the East and West Flower Garden and Stetson Banks.

Regulations

A primary focus of sanctuary regulations is the protection of the living coral reef and associated habitats. Regulations are in place that prohibit anchoring, taking or injuring coral or coral reef organisms, discharging pollutants in sanctuary waters and disturbing the seafloor. Uses compatible with the goal of resource protection are allowed, but may be restricted. Conventional hook and line fishing is allowed within the sanctuary, but most other fishing gear types are prohibited. Oil and gas exploration and development is not allowed within most of the sanctuary, an area designated as the "No-Activity Zone." A summary of the existing regulations is found in Appendix A of this document.

International Vessel Restrictions

The northern Gulf of Mexico receives ship traffic from all parts of the world. Since vessels originating outside the United States may not be aware of local resource protection measures, the sanctuary worked through the International Maritime Organization (IMO) to designate the Flower Garden Banks as an international No-Anchor Zone, which is recognized by the worldwide shipping community. This was the first IMO designation ever to restrict anchoring for the purpose of coral reef protection.

Contingency Planning

The sanctuary is located within one of the most active oil and gas exploration and development areas in the world. While the offshore oil and gas industry in the Gulf of Mexico has an excellent environmental record, the chance of an oil spill or other incident always exists. The sanctuary works actively with the Minerals Management Service, the U.S. Coast Guard, and oil and gas companies to ensure that adequate plans and resources are in place and available to respond to and mitigate an oil spill incident.

Enforcement

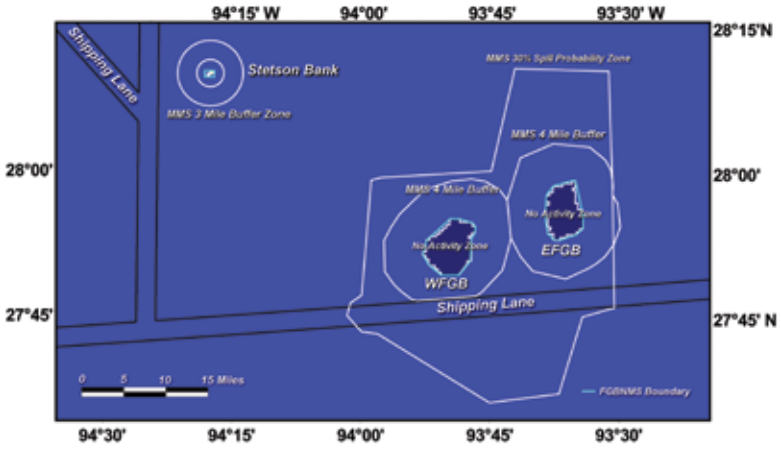
Enforcement of regulations is difficult since the sanctuary is located 70 to 110 miles from shore. Staff and infrastructure are also limited for this purpose. Therefore, the sanctuary works closely with the U.S. Coast Guard, NOAA Fisheries, and the state enforcement agencies of Texas and Louisiana to ensure that the area is adequately monitored. Information from the dive industry and oil and gas entities in the vicinity also alerts the sanctuary staff to potential enforcement violations. Education is a key component for regulatory compliance. The sanctuary makes every effort to provide user groups with appropriate information on sanctuary regulations so that enforcement issues can be avoided.

Sanctuary Advisory Council

An advisory council has been formed to provide input on issues related to sanctuary management and operations. The council is a community-based advisory group consisting of representatives from each of the major user and constituent groups in the Flower Garden Banks region. The council also includes representatives of relevant government agencies. Each council member serves as a conduit for information to and from the segment of the community that they represent.

Jurisdictional Coordination

The sanctuary works closely with other federal agencies in the northwestern Gulf of Mexico to ensure that the Flower Garden Banks and Stetson Bank are protected. Direct consultation is facilitated with the Minerals Management Service regarding any proposed oil and gas development within a four mile buffer area around the sanctuary boundaries. In this way, sanctuary concerns are incorporated in the review of those proposals so that resource protection issues can be addressed. The sanctuary also works closely with NOAA Fisheries to address potential fishery issues that may impact sanctuary resources.



Regulatory Zones, FGBNMS/Weaver

Coast Guard Aircraft, FGBNMS

Charter Dive Boat at Mooring Buoy, Russ Wilkins

Emerging Issues

The following is a list of topics of potential concern that have been initially identified by sanctuary staff. These issues may become important in the future management of the sanctuary.

Artificial Reefs

There is an active artificial reef program in Texas and Louisiana. Some artificial reefs have already been located in close proximity to the sanctuary. The potential impact of nearby artificial structures to natural habitats is unknown.

Bioprospecting

Many marine invertebrates, such as sponges and sea squirts (tunicates), have been found to contain biologically-active chemicals that can be used to develop drugs for human use. As scientists look to the oceans for answers to curing modern day illnesses and disease, requests for the collection of marine organisms for the purpose of biomedical or pharmaceutical research may become more frequent.

Coral Bleaching

Seawater temperatures are rising in the Gulf of Mexico and throughout the world's oceans. Coral reefs typically respond to elevated seawater temperatures and other stresses by "bleaching," or expelling their algal symbionts. Historically, the FGBNMS corals have proven to be somewhat resilient to bleaching events that result in coral mortality. However, as seawater temperatures continue to rise, coral bleaching may become more significant. In 2005, the worst bleaching event on record occurred at the sanctuary. Up to 45% of the coral colonies were affected by bleaching to some degree. It is suspected that a measurable amount of fire coral was lost during this event.

Coral Disease

Coral reefs throughout the world have been impacted by a variety of diseases that have decimated coral populations in some areas. In general, most aspects of these diseases are poorly known. To date, very little coral disease has been documented at the FGBNMS, probably due to many factors, including distance from shore and excellent water quality. There is some evidence that a coral's immune system may be compromised by exposure to a variety of pollutants, thus lowering its resistance and making it more susceptible to invasion by a disease pathogen. In the winter of 2005, the first widespread coral disease event occurred at the FGBNMS. This event affected multiple colonies and species. A second disease event was documented in the winter of 2006. Coral disease researchers were called upon to investigate the disease.

Endangered and Threatened Species

The loggerhead sea turtle, listed as threatened under the Endangered Species Act, is a common resident of the reefs of the FGBNMS. Research utilizing satellite tracking on loggerhead sea turtles confirms that the FGBNMS is an essential habitat area for a sizeable population of sub-adult animals, and that the home range of these animals is larger than the existing sanctuary boundary. The endangered hawksbill sea turtle is not as frequently encountered, but also occurs in the sanctuary. The endangered leatherback sea turtle is a possible visitor to the FGBNMS.

Enforcement

Enforcement and surveillance is difficult within the FGBNMS due to the distance from shore and inaccessibility of the site. The sanctuary relies greatly on assistance from the U.S. Coast Guard, NOAA Fisheries and state enforcement agencies for an enforcement presence. Although these agencies have been extremely cooperative, there is very little enforcement activity within the sanctuary at this time.

Harvesting Impacts

Fishing

The impacts of fishing and associated fishing activities on the FGBNMS are not well documented. At this time, only conventional hook and line fishing is allowed in the sanctuary. However, illegal fishing by both commercial longliners and recreational spearfishermen has been reported. Targeted fishing efforts that are allowed under current regulations, could have a detrimental impact on snapper, grouper and wahoo populations.

By-catch

Discarded fishing bycatch (such as dead sharks) has occasionally been reported by SCUBA divers within the sanctuary. Shrimping bycatch has been illegally discarded on Stetson Bank on several occasions..

Lost Gear

Lost and discarded fishing gear, including longlines, floats and nets, have been observed at East and West Flower Garden and Stetson Banks. Such incidents can cause localized physical injury to coral reefs, and have been documented to entangle and injure resident and transient sea turtles and other organisms. Debris originating from historic activities, including seismic cables from acoustic surveys, remains embedded in the coral reef around the flanks of the East and West Flower Garden Banks.

Habitat Connectivity

There are dozens of other reefs and banks that occur along the edge of the continental shelf in the vicinity of the FGBNMS. These features provide critical habitat for a variety of fish and invertebrate species of commercial and recreational importance, and provide an interconnected ecological network of marine habitats in this region. Impacts to resources in areas within this network could have subsequent detrimental effects on the FGBNMS. Although they are protected from direct impacts of oil and gas extraction, these reef communities are susceptible to other potential impacts, including anchoring, fishing, and salvage operations. Critical gaps remain in the existing regulatory framework to adequately protect these important habitats including coral reef communities.

Stetson Bank Deep Reef, FGBNMS/NURC-UNCW

Marbled Grouper, Joyce and Frank Burek

Spawning Aggregations

The FGBNMS harbors populations of several species of snapper and grouper that may utilize areas within the sanctuary as spawning sites. On various occasions, some species have been observed aggregating in small groups, expressing courtship and reproductive behavior. It is critical to protect these animals from focused fishing efforts during these periods. The marbled grouper is of particular concern, as it is a rare species throughout the Gulf of Mexico and the Caribbean.

Invasive Species

In 2002, an invasive coral species, *Tubastraea coccinea* (orange cup coral), was documented at the East Flower Garden Bank. This species is native to the Indo-Pacific and may have entered the south Atlantic and Caribbean by attaching to a ship's hull or having its larvae discharged in ballast water. This coral species is common on oil and gas platforms in the Gulf of Mexico. It is suspected that artificial structures, such as oil and gas platforms, played a major role in the spread of this species. In 2004, around 50 colonies of this invasive species were removed from Geyer Bank, located outside of sanctuary boundaries. In 2006, a Pacific species of nudibranch was photographed mating at Stetson Bank. Time will tell whether this species will survive as a viable population.

Oil and Gas Infrastructure

Existing/Maintenance

The existing platform designated as High Island A389A is a fully-operational natural gas production facility. In 2000, additional exploratory wells were drilled from this platform, resulting in the allowable discharge of drilling muds and cuttings shunted to within ten meters of the sea floor. Periodic maintenance of this facility (sandblasting, painting, etc.) is required to control corrosion and ensure structural stability.

New Infrastructure

There are small areas outside the "No-Activity Zones" but inside the sanctuary boundary. Within these areas, the development of new oil and gas infrastructure could be considered. This could include new platform installation, exploratory drilling, and pipeline routing. A new pipeline was recently constructed to connect a gas well outside the sanctuary to the platform located within the sanctuary.

Aging Infrastructure

The gas production platform at High Island A389A is over 20 years old. It is probable that within the planning timeframe this platform could be taken out-of-service, or decommissioned. Current Minerals Management Service regulations require that when a platform is taken out-of-service, it must be removed. Issues related to infrastructure removal should be considered.

Pollutant Discharge

Discharge of pollutants from sources inside and outside the sanctuary may have potential detrimental impacts on sanctuary resources.

Oil and Gas

Impacts from an oil spill or other hydrocarbon release is an ongoing concern. Major oil spills in the Gulf of Mexico are very rare, but if one did occur, it could have significant effects. Ongoing operational effluents from oil and gas facilities include drilling muds (lubricant), produced water (water separated from the oil or gas after it is pumped from the reservoir), and operational discharges (sewage, gray water, deck wash).

LNG (Liquefied Natural Gas) facilities are proposed in regional waters in the northwestern Gulf of Mexico. Beacon Point facility, approximately 70 miles from the FGBNMS, is the closest proposed facility. LNGs are suspected to affect larval populations and water temperature.

Vessels

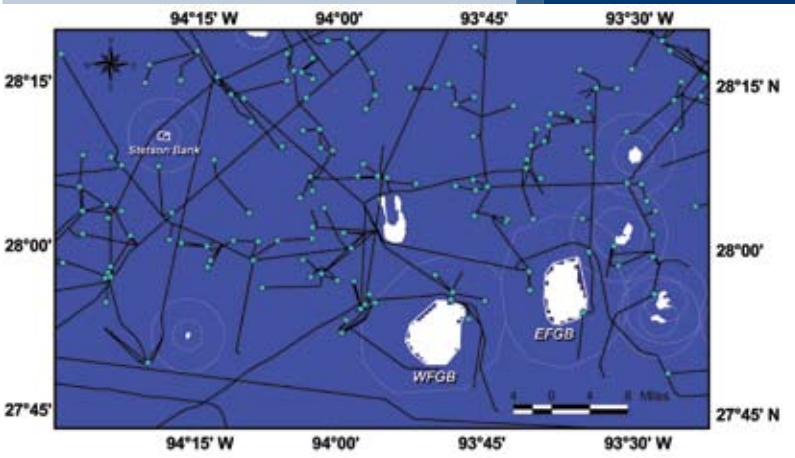
The discharge of untreated sewage from vessels is not allowed within the sanctuary. However, the discharge from a U.S. Coast Guard approved marine sanitation device (MSD) is currently allowed. Other vessel discharges include "gray water" from showers and galleys, deck runoff and incidental release of petrochemicals from engine use.

Regional water quality

The quality of coastal waters of the northern Gulf of Mexico is in decline due to pollutants associated with the discharge of major river systems (such as the Mississippi and Atchafalaya) and general coastal runoff throughout the region. Predominant current patterns direct much of this water away from the FGBNMS, but minor changes in circulation patterns could bring contaminated water to the sanctuary. In 2005, Hurricane Rita made landfall in the northern Gulf of Mexico. As Rita crossed onto land, a 'flushing out' of the coastal waters and infrastructure destroyed by the storm occurred, sending a large plume of polluted water out across the Gulf of Mexico directly over the Flower Garden Banks.

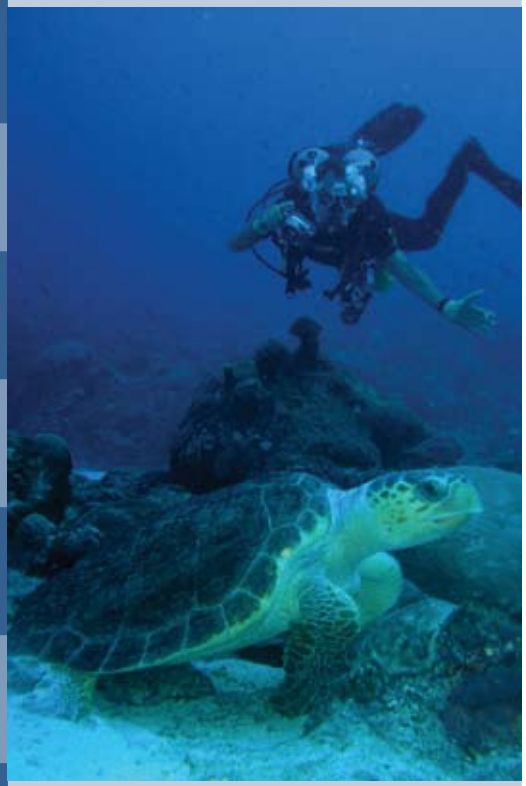
Shipping/Transport

The sanctuary is located adjacent to a major shipping lane leading to one of the busiest ports in the nation. Historically, significant impact to coral resulted from anchoring of large ocean-going vessels at the FGBNMS. This impact has been minimized by the establishment of a "No-Anchor" area by the International Maritime Organization (IMO) and through sanctuary regulations. However, an anchoring incident could still occur. The practice of exchange of ballast waters within nearby lightering zones may unintentionally introduce exotic species into the sanctuary, or surrounding sensitive habitats. Sanctuary resources could also be impacted by tow cables that are not properly attended.



Oil and Gas Infrastructure around the FGBNMS, FGBNMS/Weaver

Gulf of Mexico Watershed Map, EPA



Diver with Loggerhead Sea Turtle, FGBNMS/Hickerson

Visitor Use

Increasing Numbers

Visitation by SCUBA divers and fishermen is relatively low at present, but is expected to increase. The FGBNMS is becoming internationally known as a prime dive destination. Coral reef areas in other parts of the world have experienced degradation associated with intense visitor use. Currently, the size of individual vessels is restricted to 100 feet, but the number or type of vessels is not addressed.

User Conflicts

As interest and use increases, there will potentially be conflicts arising from different objectives by competing users (divers, fishermen, etc.). User conflicts have occurred at the current user level, and will only intensify as numbers increase.

Mooring Buoys

As numbers of users increase, it is anticipated that competition for mooring buoys will also increase. Use of the mooring buoys is currently guided by a "first-come, first-served" policy. Consideration should be given to the number of mooring buoys and management of the mooring buoy system.

Wildlife interactions

Physical Contact

The experience of swimming and diving with large charismatic animals is one of many draws to the FGBNMS. However, physical contact with animals, such as whale sharks, manta rays, and sea turtles, may be detrimental to the species.

Underwater Sound

The sanctuary has been subjected to increasing sources of underwater sounds that could attain levels that are detrimental to marine animals. These sources include boat engines and generators, as well as commercial, experimental and exploration activities.

Light

There is some evidence that unnatural night-time levels of artificial light have altered the behavior of some marine animals. Intense light from underwater photography and video has been shown to have an impact on sea turtles and other species.

Coral Impacts

It has been suggested that divers may act as coral disease vectors, by unknowingly carrying pathogens on diving equipment (wetsuits, etc.) that originated at other dive sites in the region or world.

Looking to the Future

As the 21st century progresses, the sanctuary will continue to build upon the illustrious history of exploration and discovery that began with the snapper fishermen's discovery of the Flower Garden Banks.

Exploration

The science team will continue to explore the sanctuary and surrounding areas, using the best available technology. Expanded focus on identifying ecological relationships between the sanctuary and the greater Gulf of Mexico, including the watershed, will provide crucial information for protecting these national treasures. Recognizing that protecting nature depends heavily on managing human activities, the sanctuary team will continue to examine the ecological, sociological and economic issues related to effective resource management. Interpretive products will continue to deliver science to the public using outlets such as the internet, video, and posters.

Discovery

The education and outreach team will take the lead in helping individuals embark on their own journeys of personal discovery of the Flower Garden Banks National Marine Sanctuary. Future programs will address issues regarding impacts to the sanctuary from the sizable Gulf of Mexico watershed by expanding efforts to educate the "middle America" populace residing in that watershed. In anticipation of the changing demographics in Texas, the team may also need to initiate specific programs to reach the rapidly growing Hispanic community.

Continuing the Legacy of Resource Protection

Nature does not recognize human society's political boundaries and the Flower Garden and Stetson Banks are no exception. Events in the Caribbean and southern Gulf of Mexico can have a profound effect on sanctuary resources. By establishing relationships with reef management counterparts in Mexico and other nations, the sanctuary team will be in a position to exchange information and expertise, as well as develop agreements for reef management and protection on a regional level.

Current infrastructure plans include procuring a new vessel designed specifically for research in the unpredictable Gulf of Mexico environment. In 2006, the sanctuary office moved to Galveston. Sanctuary staff are housed within the NOAA Fisheries complex, part of historic Fort Crockett, where renovations have begun. These expanded capabilities will be key to developing strategic partnerships and continuing the legacy of exploration, discovery and resource protection of the Flower Garden Banks National Marine Sanctuary.

Sea Urchins and Spanish Lobster, Joyce and Frank Burek

Octopus, Joyce and Frank Burek

Appendix: Regulations

The following is a list of prohibited or otherwise regulated activities within the Flower Garden Banks National Marine Sanctuary (Including Stetson Bank)

Anchoring and Mooring

The following activities are prohibited:

- Anchoring any vessel within the sanctuary
- Mooring a vessel over 100 feet in registered length on a sanctuary mooring buoy

Discharges

Sanctuary regulations prohibit discharging or depositing any material or other matter with a few exceptions, including:

- Fish, fish parts, chumming materials or bait used in or resulting from fishing with conventional hook and line gear in the sanctuary
- Biodegradable effluents incidental to vessel use and generated by an approved marine sanitation device
- Water generated by routine vessel operations (e.g., cooling water, deck wash down, and gray water) excluding oily wastes from bilge pumping
- Engine exhaust

Marine Mammals and Sea Turtles

Regulations prohibit taking any marine mammal or turtle within the sanctuary.

Take or taking includes, but is not limited to: to harass *(e.g. to touch, ride, or shine bright lights into an animal's eyes),* harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or injure, or to attempt to engage in any such conduct. This includes, but is not limited to, the collection of any dead or injured marine mammal, sea turtle or seabird, or any part thereof, no matter how temporarily; to operate a vessel or aircraft or to do any other act that results in the disturbance or molestation of any marine mammal, sea turtle or seabird.

The following activities are generally prohibited:

- Injuring or removing, or attempting to injure or remove, any coral or other bottom formation, coralline algae or other plant, marine invertebrate *(e.g., spiny lobster, queen conch, shell, sea urchin*), brine-seep biota or carbonate rock within the sanctuary.

- Possessing within the sanctuary (regardless of where collected, caught, harvested or removed), any carbonate rock, coral or other bottom formation, coralline algae or other plant, or fish (except for fish caught by use of conventional hook and line gear).
- Drilling into, dredging or otherwise altering the seabed of the sanctuary; or constructing, placing or abandoning any structure, material or other matter on the seabed of the sanctuary.

Injure means to change adversely, either in the short or long term, a chemical, biological or physical attribute of, or the viability of. This includes, but is not limited to, to cause the loss of or destroy.

Fishing and Related Activities

The following activities are generally prohibited:

- Injuring, catching, harvesting, collecting or feeding, or attempting to injure, catch, harvest, collect or feed, any fish within the sanctuary by use of any gear, device, equipment or means *(e.g. spear guns, nets)* except by use of conventional hook and line gear.
- Possessing (except while passing through the sanctuary without interruption) any fishing gear, device, equipment or means except conventional hook and line gear.
- Possessing, or using explosives or releasing electrical charges within the sanctuary.

Conventional hook and line gear means any fishing apparatus operated aboard a vessel and composed of a single line terminated by a combination of sinkers and hooks or lures and spooled upon a reel that may be hand or electrically operated, hand-held or mounted.