

Gulf of Mexico Science

Volume 23
Number 1 *Number 1*

Article 2

2005

Introduction: Flower Garden Banks National Marine Sanctuary

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DOI: 10.18785/goms.2301.02

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Recommended Citation

Hickerson, E. L. and G. P. Schmahl. 2005. Introduction: Flower Garden Banks National Marine Sanctuary. *Gulf of Mexico Science* 23 (1).

Retrieved from <https://aquila.usm.edu/goms/vol23/iss1/2>

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DEDICATED ISSUE

Flower Garden Banks National Marine Sanctuary

Introduction

Moving into the second decade as a National Marine Sanctuary—exploration, research, and protection continues to evolve through advancements in technology and a sense of adventure. A program of targeted research prepares this Sanctuary to address critical management priorities and to adapt management programs as new issues arise. Recent research demonstrates that the reefs of the Flower Garden Banks are not isolated islands of diversity but are an integral part of a network of interconnected biological features of the northwestern Gulf of Mexico.

The flourishing tropical coral reefs of the East and West Flower Garden Banks, located approximately 200 km south of the Texas–Louisiana coasts (Fig. 1), continue to be the foremost habitat that comes to mind to those familiar with the Flower Garden Banks National Marine Sanctuary (FGBNMS), and continue to be the focus of most scientific research conducted within the Sanctuary. This is the second special issue of *Gulf of Mexico Science* dedicated to highlighting recent studies conducted within and near the FGBNMS. As with the first special issue (Gittings and Hickerson, 1998), this volume demonstrates that scientific interest in the coral reefs has not slowed down and discoveries continue to be made. Monitoring of the health of the coral reef is ongoing through a long-term monitoring program cofunded by the National Oceanic and Atmospheric Administration (NOAA) and the Minerals Management Service (Aronson et al., and Precht et al., this issue). Continuing support for research by students and academics is also a high priority of the FGBNMS (Vize et al., Wicksten, and DeBose, this issue). In this time of worldwide decline of coral reefs, the continuing health of the Flower Garden Banks coral reef system is remarkable and provides a nearly pristine example for comparison with other reefs in the Western Atlantic and Caribbean region. The location, isolation, and depth of this coral reef appear to protect it from many types of detrimental impact, but as pointed out in Eric Borneman's study (this issue), the reef is not impervious to insult, and some initial warning signs may be beginning to appear.

It is the responsibility of NOAA to manage and protect the resources of the FGBNMS. We are mandated to periodically revisit the programs, policies, and regulations of the Sanc-

tuary to assess their effectiveness, gaps, or applicability. The Sanctuary is poised to embark on such a programmatic review. However, it became evident that although a great deal was known about the coral reef portions, much less information existed for the other areas of the Sanctuary. More than 90% of the Sanctuary is outside normal SCUBA diving range, and therefore, has not been explored to the extent of the shallower coral reefs. Therefore, during the past 5 yr, the FGBNMS research team has expanded our efforts not only by supporting research on the coral reefs but also by exploring the Sanctuary in its entirety, so that we are able to tackle management issues with a more thorough understanding of the habitats within our boundaries.

Large, colorful sea fans, ornate black coral bushes, numerous variations of sponges, lush fields of red and green leafy algae, spectacular plumes of gas-filled bubbles billowing out of underwater mud volcanoes, clouds of planktivorous fish, eroded rocky outcroppings covered with crinoids, and bottlebrush corals—all part of the Sanctuary, but up until now, only a handful of people connect these habitats with the Flower Garden Banks.

Texas A&M University researchers Dr. T. Bright, Dr. R. Rezak, Dr. D. McGrail, and others, conducted the first true explorations of both the coral reefs and the deeper portions of the Sanctuary more than 25 yr ago (for background, see Gittings and Hickerson, 1998). They also explored other reefs and banks in the northwestern Gulf of Mexico—the banks of the FGBNMS are only three of dozens of features that parallel the edge of the continental shelf in this region (Rezak et al., 1985). These initial explorations were the last time many of these features had been visited by scientists and the last time the deeper portions of the Sanctuary had been explored.

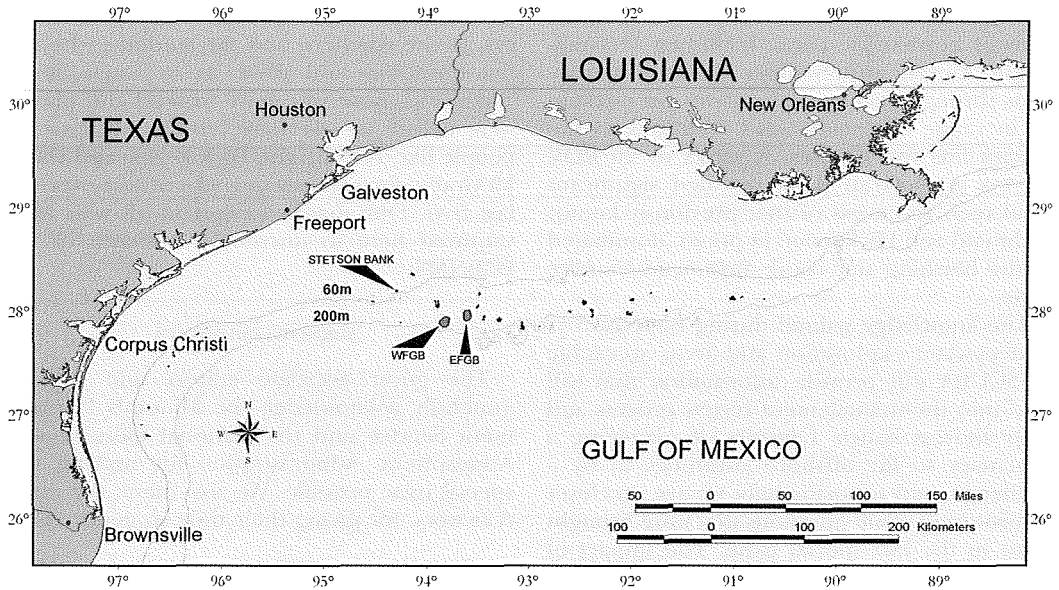


Fig. 1. Location of the Flower Garden Banks National Marine Sanctuary

The development of high-resolution multi-beam mapping technologies inspired and facilitated the recent exploration efforts by revealing seafloor features that are much more complex and interesting than previously thought, and provided opportunities to build on the work conducted by the Texas A&M explorers (Rezak et al., 1985). Gardner et al. (1998) presented spectacular images of the three features of the FGBNMS—East and West Flower Garden Bank and Stetson Bank. These data sets have been invaluable for the FGBNMS program to plan and explore the deeper regions of the Sanctuary. In this issue, Dr. Jim Gardner presents a second set of stunning images generated from bathymetry data collected from 13 additional reef and bank features in the northwestern Gulf of Mexico. This data set demonstrates conclusively that the northwestern Gulf of Mexico reefs and banks are linked through intricate webs: ecologically, biologically, and geologically. The direct linkages that exist among the reefs and banks of this area indicate what scientists and resource managers have long suspected—that small solitary features such as the Flower Garden Banks and Stetson Bank cannot be managed in isolation. The features that comprise the reefs and banks of the northwestern Gulf of Mexico are all part of an interconnected ecosystem.

During the past 5 yr, the Sanctuary research team has conducted over 160 submersible surveys at 12 reefs and banks, primarily using a remotely operated vehicle (ROV). Progress is

slow, but little by little, advances are made. Regional catalogs for several categories of biota are under development: gorgonians, antipatharians, and sponges. This effort has been painstaking; over 7,000 images have been obtained and scrutinized, and over 200 targeted organism samples have been collected for identification. The majority of these samples are not new to science but are only known through preserved specimens. The Sanctuary is working closely with experts in several fields who have joined our deepwater team (e.g., Fredericq, this issue) to identify the samples. Our goal is to be able to identify these organisms by direct observation or photographs, so that organisms do not have to be collected to be identified. As we work through the different surveys, taking into consideration the depths, geology, and biology, we are picking apart some of the webs and getting closer to being able to predict what may be found on a particular feature on the high-resolution bathymetric charts.

Surprisingly, we continue to add to our knowledge about the extent of the coral reefs of the Flower Garden Banks. During ROV surveys in May 2005, approximately 60,000 m² of exceptional coral reef was documented at the East Flower Garden Bank. Also, during these surveys, we documented for the first time the occurrence of the elliptical star coral, *Dichocoenia stokesii*, on the north reef and the rim of the East Flower Garden Bank. As reported by Rezak et al. (1985), several other banks of the

northwestern Gulf of Mexico harbor populations of hermatypic coral, including McGrail, Bright, Geyer, and Sonnier Banks. Observations through recent explorations have resulted in range extensions and additions to the species lists for all sites. A series of 20 ROV surveys at McGrail Bank revealed significant coral reefs in excess of that previously known (Schmahl and Hickerson, in press), dominated by the blushing star coral, *Stephanocoenia intersepta*.

The knowledge gained during the past 5 yr of deepwater exploration and areas accessible by SCUBA will provide information that will feed into the management review process and help address issues. Logistics of managing a Sanctuary so far offshore continues to be a challenge, and unfortunately, we are no closer to answering some questions that were brought forth in the last special issue. The impact of fishing activities, potential degradation of water quality, and the effects of climate change are still poorly known. However, we are confident that through the research that has been conducted to date, some of which is presented in this special issue, we are better prepared to address issues as they arise.

We look forward to the next 5 yr of Sanctuary evolution. We will be challenged to adapt our management strategies to address changing conditions and will continually be in need of directed science to confront these issues. We encourage researchers to continue looking to the FGBNMS as an ideal site for research not only on the coral reefs but also in the deeper regions of the Sanctuary. There is much to learn about this special place in the middle of the Gulf of Mexico.

Thanks go to all who have dedicated their research time, funding, and interests to the Flower Garden Banks. These thanks go beyond

the academic interests, to the recreational divers, to the teachers, and the students who ask the questions and drive us to learn more. Thanks to those who have worked and played here before us—we have felt the presence of people like Tom Bright, Dick Rezak, and David McGrail—throughout our adventures over the last 5 yr. Our thanks extend to all who have ventured here to uncover the secrets of the FGBNMS.

ACKNOWLEDGMENTS

The guest associate editors and authors gratefully acknowledge the Minerals Management Service and the National Oceanic and Atmospheric Administration for making this special issue possible. We also thank the many reviewers, for giving their time so generously.

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