The Flower Garden National Marine Sanctuary -- A Success Story With Strange Bedfellows

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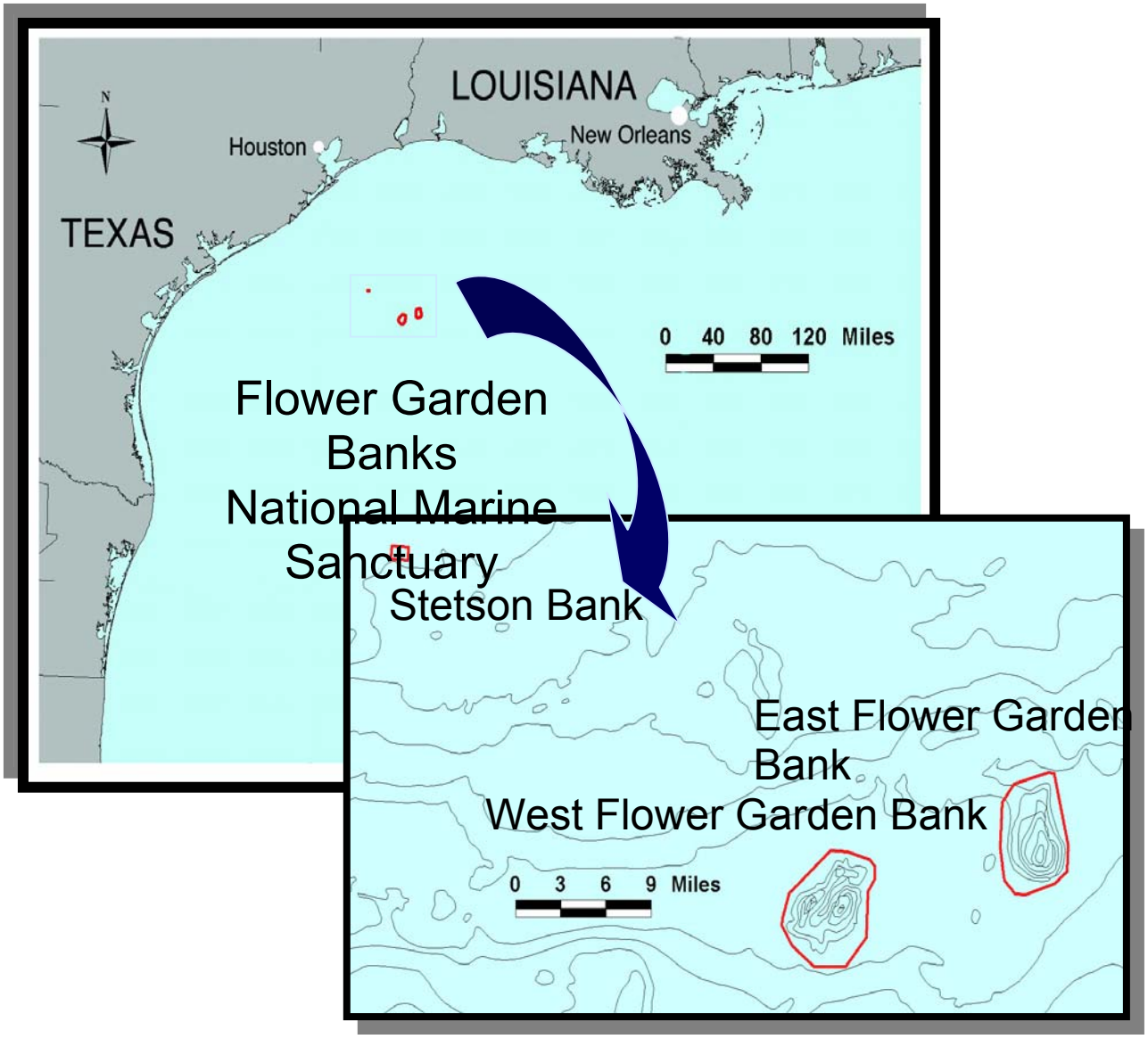
This presentation, instead of chronicling the demise of coral reef ecosystems, will take an interestingly different journey. It will lead us down the path of the successful development and management of a marine protected area with a mixed group of interested parties. These have included the Minerals Management Service, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the U.S. Coast Guard, the oil and gas industry, academic institutions, diving organizations, diving operators, public school teachers and environmental groups.

Back in 1970, as a young graduate student just embarking on my Ph.D. research program, I was invited to be part of a coral reef ecology team being put together by the University of Texas Medical Branch and Texas A&M University. My response was an immediate yes, which has lead to over 32 years of association with the Flower Garden Banks. At the time, I had no idea I would eventually work for the oil industry. In the early 70's, we conducted a wide range of studies to delineate the ecological realm of the Flower Garden Banks. In 1974, I joined Shell Oil Company in Houston as an environmental advisor. Since that time, I have repeatedly been involved in Flower Garden issues. In the mid-70's, I wrote an industry newsletter article advising against anchoring on the banks because of coral damage. In subsequent years, I served on a NOAA site selection team for the Gulf of Mexico which proposed the Flower Gardens as a National Marine Sanctuary.

The Flower Gardens have been known for quite some time. Grouper and snapper fisherman named the Banks back in the late 1890's due to the bright colored corals and sponges that came up on tangled on their nets and lines. In the 1930's, the first topographic maps of the Banks were developed. The first research on these Banks was conducted in the 1950's. The Marine Protection, Research, and Sanctuaries Act was passed in 1972, and it laid the ground work for today's marine sanctuaries. In 1974, the Minerals Management Service instituted strict oil and gas regulations around the Flower Garden Banks, restricting activity and discharging within four miles. They unfortunately, had no jurisdiction to stop anchoring by non-industry boats. In 1979, the Banks were placed on the active nomination list to be a marine sanctuary, but due to an inadequate environmental impact statement, and various pockets of resistance, even in Washington, the nomination was withdrawn in 1982. A draft Coral Reef Fisheries Management Plan issued in 1981 recommended no anchoring in water depths shallower than 50 m, but this was withdrawn in 1982, when it was determined that the National Marine Fisheries Service had jurisdiction over fishing but not anchoring.



In these early days, the oil and gas industry was amongst the numerous skeptics that were not overly supportive of the creation of a marine sanctuary. There was a general concern that large areas would be designated as sanctuary, and they would have overly restrictive regulations, and/or have "no activity" zones that would severely impact future exploration and development of oil and gas reserves.

Finally, adequate support and awareness were generated and the area gained marine sanctuary status on January 12, 1992. One group that helped convey the public's message about the importance of the banks was an environmentally concerned divers group known as G.R.E.A.T (Gulf Reef Environmental Action Team). In 1990, due to the efforts of G.R.E.A.T., and with assistance from NOAA and MMS personnel, and Rinn Boats (a

charter diving operator), they began the installation of a series of mooring buoys on the Flower Garden Banks for the anchoring of boats. In subsequent years, they installed additional buoys on Stetson Bank (which was added to the marine sanctuary in 1996) to help eliminate anchor damage. There are now a total of 14 buoys at the three locations.

Much to the surprise of many, and thanks to the many years of prior studies and surveys by MMS, NOAA, universities, and industry, the final regulations and restriction zones were reasonable and provided a workable solution. Based on good science, the regulations that were put into action were protective of the reefs and surrounding area, and yet allowed exploration and development to proceed. Today, discharges from industry operations continue to be regulated by the Environmental Protection Agency. Aerial surveillance of the area continues to be conducted by both U.S. Coast Guard and MMS overflights.

So what is so unique about the Flower Gardens? The Flower Gardens are two separate reef areas, approximately 12 miles apart, that are located approximately 110 miles southeast of Galveston, Texas, in clear, blue, oceanic water. They are relatively small reefs, perched on top of two salt dome features that rise up from water depths of over 300 feet to within 60 feet of the surface. The reef building corals primarily occupy the pinnacle of each salt dome, covering only 250 acres on the East Flower Gardens and 100 acres on the West Flower Gardens.

Stetson Bank is a smaller feature, only being about 35 acres at its crest. Overall the three areas encompass 19.2, 22.5 and less than 1 square nautical mile respectively (totaling approximately 42 square nautical miles). These reefs are unique in numerous ways. The first point that stands out is that they are the northern most reefs on the continental shelf of the U.S. They are located over a 100 miles offshore, and at their shallowest, still lie 60 feet underwater. As a result of the depth, and being at the northern edge of the range for reef building corals, their faunal balance differs from more traditional Caribbean reefs. The reef s have over 21 species of corals, but lack the large branching corals, sea fans and sea whips common to shallow water reefs. The coral coverage is dominated by a variety of brain coral species. There are over 80 species of algae, more than 250 species of macro-invertebrates, and over 200 species of fish. Three species of turtles have been seen on the Banks, but there are no resident species of marine mammals. An interesting contrast is a comparison of the percent live coral coverage at the Flower Gardens (~ 51%) when compared to other areas, such as Cayman Islands (21%), Cuba (15-23%), Florida Keys (3-22%), and Bonaire (48%). This is another indicator of the overall health of the reef system.

Long prior to the establishment of the Banks as a marine sanctuary, the oil and gas industry recognized the potential held by adjacent areas as possible sources of oil and gas. In 1973, the first two wells were drilled in the general vicinity of the Flower Garden Banks. Since that time, 402 wells have been drilled within a 10 mile radius of the Sanctuary boundary, with the latest two wells having been drilled this past year at the Sanctuary boundary. A similar pattern of development had occurred in the area adjacent to Stetson Bank, which lies about 70 miles offshore, and only 30 miles from the Flower

Gardens. The first three wells were drilled in 1975, and subsequently, 158 wells have been drilled.

As the agency responsible for offshore leasing, the Minerals Management Service has been involved in wide ranging research, monitoring, and regulatory programs associated with the Flower Gardens. A mapping program of Gulf of Mexico submarine banks was started in 1974 and included the Flower Gardens. This program lasted over five years and cost over $6,500,000. The detailed mapping and photographic surveying was followed by a comprehensive descriptive program which characterized the geological structure of the features and described the oceanographic conditions. The biological communities and their zonation were also described. Later studies strived to understand the underlying processes occurring on the banks in order improve our ability to monitor the health of the banks. Biological studies were conducted to determine the species present and their relative abundances. Studies were conducted on sediment transport to better understand the movements of bottom sediments from nearby areas to the reefs.

All of this information was used by MMS to enhance their environmental assessment documents, to make regulatory leasing decisions, and to develop protective biological stipulations. Since their research and monitoring programs began, expenditures have been over $10,000,000. Throughout this process, MMS has coordinated closely with the industry, the diving and fishing community, and other resource agencies such as NOAA and EPA.

NOAA, via their Marine Sanctuary Office, have partnered with MMS in numerous studies and monitoring programs, and have also conducted their own independent research programs. Both the Flower Gardens and Stetson Bank are the subject of long term monitoring programs. These may be some of the longest duration coral reef monitoring programs anywhere in the world. A key objective of these programs is to continually monitor the overall health of these reefs. A cooperative fish census program was started in 1994 in partnership with R.E.E.F. (Reef Environmental Education Foundation) and sports divers to develop an inventory of fish species frequenting the Banks. Each winter, the Marine Sanctuaries Office sponsors a cruise to study the sharks and rays that congregate at the Flower Gardens. These congregation includes a very large assemblage of hammerhead sharks. A similar program monitors the presence and migration of turtle species in the vicinity of the Banks. A key component of these monitoring programs is the participation of the sport diving community which provides field observations back to the sanctuaries program.

Another phenomena that is studied annually at the Flower Gardens is the synchronized spawning of benthic reef organisms, which occurs around the 8th day after the full moon in August and September. The corals and a variety of other bottom invertebrates spawn in a short time frame, creating a scene that looks like an underwater snow storm. A range of other studies have been conducted that include the determination of growth rates, coral bleaching, water quality, and temperature and light levels. The Flower Garden Marine Sanctuary office and the Minerals Management Service have plans for a four year extension of the long term monitoring program.

Deeper water survey programs (beyond diver depths) have been conducted using submersibles and remote operated vehicles. In the early 1970's, a series of dives were made by the two person Nekton Gamma submersible on the Flower Garden Banks. In the past year, a NOAA/National Geographic Society survey program, under the leadership of Dr. Sylvia Earle, visited the Flower Gardens with the new one person Deepworker 2000 submersibles.

In recent years, via several participation programs, industry has helped fund two TABS buoys (Texas Automated Buoy System) near the Flower Gardens. These buoys provide real time wind, wave, current, and water temperature data from the Flower Garden reefs (see http://tabs.gerg.tamu.edu/Tglo/). Aside from the information that this provides for researchers, this real time information is easily retrievable from the Internet, and is routinely used by fisherman and divers who are planning to make the long trip offshore to the Flower Gardens.

One mandate of the marine sanctuaries program that often is overlooked because of its low profile is education. The Flower Garden Marine Sanctuary office has a unique program that brings together public school teachers each summer for a multi-day educational program on coral reefs. This program is partially funded by the oil and gas industry. The teachers participate in onshore seminars and are provided background and teaching materials to take back to their classes. The teachers invited to participate are all certified SCUBA divers. Following the classroom sessions, the marine sanctuaries staff takes them offshore to the marine sanctuary for several days of hands-on diving at the reefs and nearby platforms. This is a personal introduction to coral reef ecology, and it provides them with information and real life experiences to take back to the public classrooms. This program is affectionately known as DUOY, which stands for "Down Under, Out Yonder." Industry also helps provide information on the oil and gas business so that the school teachers can gain an appreciation for the operations that are occurring in the vicinity of the marine sanctuary.

For the past 4-5 years, the industry has sponsored a joint government/industry cruise to the Flower Gardens. This has provided the opportunity for a variety of state and federal government agency people to experience the Flower Garden National Marine Sanctuary and nearby platforms. Over the three days, seminars are conducted on topics ranging from reef fish identification to techniques for finding and developing offshore oil and gas. Attendees have ranged from scientists and coral reef experts to discharge permit writers. The program has been very successful in enhancing everyone's appreciation for the environment that is being protected and for fostering a better understanding between government and industry personnel with a mutual interest in the area.

So what is the bottom line to this long history of development, study, monitoring, management, and industrial development? The bottom line is a success story for the cooperative efforts of government regulators, industry, and the public. The many years of monitoring studies have verified that the protective measures put in place for the marine sanctuaries were appropriate and worked! The reefs are healthy, viable, and have shown

no contamination or degradation due to the nearby oil and gas activities. The public has a unique marine habitat, which is protected and available for future generations to enjoy. The industry has been able to continue exploring, developing, and delivering important energy resources to the country. This is a success story which spans many years, and that the many participants can be proud of.