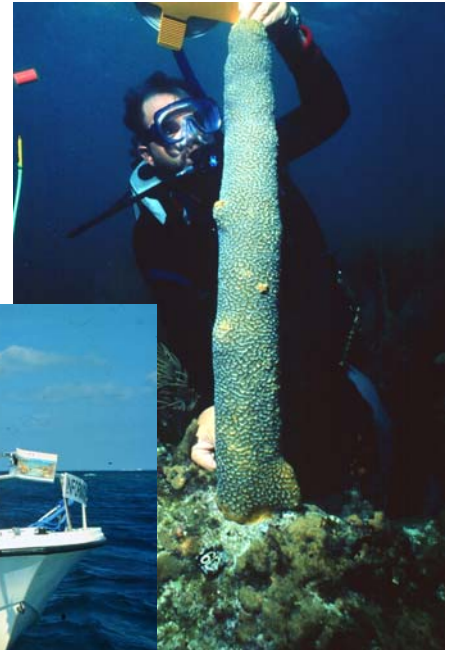


# Florida Keys National Marine Sanctuary Draft Revised Management Plan



February 2005

U.S. Department of Commerce

National Oceanic and  
Atmospheric Administration

National Ocean Service

National Marine Sanctuary Program

This document is the draft revised management plan for the Florida Keys National Marine Sanctuary. It replaces the management plan that was implemented in 1997 and will serve as the primary management document for the Sanctuary during the next five years.

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### **Note to Reader**

In an effort to make this document more user-friendly, we have included references to the Florida Keys National Marine Sanctuary web site rather than including the entire text of many bulky attachments or appendices that are traditionally included in management plans. Readers who do not have access to the Internet may call the Sanctuary office at (305) 743-2437 to request copies of any documents that are on the Sanctuary's web site. For readers with Internet access, the Sanctuary's web site can be found at: <http://floridakeys.noaa.gov>.

# ABOUT THIS DOCUMENT

This document is a report on the results of NOAA's five-year review of the strategies and activities detailed in the 1997 *Final Management Plan and Environmental Impact Statement* for the Florida Keys National Marine Sanctuary. It serves two primary purposes: 1) to update readers on the outcomes of successfully implemented strategies - in short, accomplishments that were merely plans on paper just five years ago; and, 2) to disseminate useful information about the Sanctuary and its management strategies, activities and products. The hope is that this information, which charts the next 5 years of Sanctuary management, will enhance the communication and cooperation so vital to protecting important national resources.

## *Sanctuary Characteristics*

The Florida Keys National Marine Sanctuary extends approximately 220 nautical miles southwest from the southern tip of the Florida peninsula. The Sanctuary's marine ecosystem supports over 6,000 species of plants, fishes, and invertebrates, including the nation's only living coral reef that lies adjacent to the continent. The area includes one of the largest seagrass communities in this hemisphere. Attracted by this tropical diversity, tourists spend more than thirteen million visitor days in the Florida Keys each year. In addition, the region's natural and man-made resources provide livelihoods for approximately 80,000 residents.

The Sanctuary is 2,900 square nautical miles of coastal waters, including the recent addition of the Tortugas Ecological Reserve. The Sanctuary overlaps six state parks and three state aquatic preserves. Three national parks have separate jurisdictions, and share a boundary with the Sanctuary. In addition, the region has some of the most significant maritime heritage and historical resources of any coastal community in the nation.

The Sanctuary faces specific threats, including direct human impacts such as ship groundings, pollution, and overfishing. Threats to the Sanctuary also include indirect human impacts, which are harder to identify but seem to be reflected in coral declines and increases in macroalgae and turbidity. More information about the Sanctuary can be found in this document and at the Sanctuary's web site: <http://floridakeys.noaa.gov>.

## *Management Plan Organization*

Within this document, the tools that the Sanctuary uses to achieve its goals, are presented under five management divisions: 1) Science; 2) Education, Outreach & Stewardship; 3) Enforcement & Resource Protection; 4) Resource Threat Reduction; and, 5) Administration, Community Relations, & Policy Coordination. Each management division contains two or more *action plans*, which are implemented through supporting *strategies* and *activities*. The strategies described in the 1997 *Management Plan* generally retain their designations in this document. As in the 1997 plan, two or more action plans may share a strategy where their goals and aims converge.

## *Accomplishments and Highlights*

The Sanctuary's programs and projects have made significant progress since the original management plan was implemented 1997. An overview of these accomplishments is provided in the Introduction. In addition, each action plan contains bulleted lists of accomplishments since the 1997 management plan was adopted.

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## Acronyms

ASA	Abandoned Shipwreck Act
ATBAs	Areas to Be Avoided
AWT	Advanced Wastewater Treatment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DARP	Damage Assessment and Restoration Program
DMR	Department of Marine Resources (Monroe County)
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
F.S.	Florida Statutes
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDHR	Florida Division of Historical Resources
FDEP	Florida Department of Environmental Protection
FFWCC	Florida Fish and Wildlife Conservation Commission
FKNMS	Florida Keys National Marine Sanctuary
FKNMSPA	Florida Keys National Marine Sanctuary Protection Act
FPS	Florida Park Service
FWRI	Fish and Wildlife Research Institute
FWS	Fish and Wildlife Service
GIS	Geographic Information System
GPS	Global Positioning System
HAZMAT	Hazardous Materials
MBTA	Migratory Bird Treaty Act
MEERA	Marine Ecosystem Event Response and Assessment
MHR	Maritime Heritage Resources
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Protection Act
NGO	Non-governmental Organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuary Act
NMSP	National Marine Sanctuary Program
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
OSDS	On-Site Disposal System
PSSA	Particularly Sensitive Sea Area



SAV	Submerged Aquatic Vegetation
SCR	Submerged Cultural Resources
SEFSC	Southeast Fisheries Science Center
SFWMD	South Florida Water Management District
SPA	Sanctuary Preservation Area
SWIM	Surface Water Improvement and Management Act
SWM	Stormwater Management
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOC	U.S. Department of Commerce
USDOI	U.S. Department of Interior
USDOS	U.S. Department of State
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

# 1.0 INTRODUCTION



# 1.1 The National Marine Sanctuary Program (NMSP)

The National Marine Sanctuary Program (NMSP) is a network of 13 marine protected areas (Figure 1.1), encompassing marine resources from Washington State to the Florida Keys, and Lake Huron to American Samoa. The National Oceanic and Atmospheric Administration’s (NOAA) National Ocean Service (NOS) has managed the nation’s marine sanctuaries since passage of the Marine Protection, Research and Sanctuaries Act of 1972. Title III of that Act is now called the National Marine Sanctuaries Act (NMSA), which is found in Appendix A.

Today, the national marine sanctuaries contain deep-ocean gardens, near-shore coral reefs, whale migration corridors, deep-sea canyons, and underwater archaeological sites. They range in size from one-quarter square mile in Fagatele Bay, American Samoa, to more than 5,300 square miles off Monterey Bay, California – one of the largest marine protected areas in the world. Together, these sanctuaries protect nearly 18,000 square miles of coastal and open ocean waters and habitats. While some activities are managed to protect resources, certain multiple uses, such as recreation, commercial fishing, and shipping are allowed to the extent that they are consistent with a sanctuary’s resource protection mandates. Research, education, outreach, and enforcement activities are major components in each sanctuary’s program of resource protection.

The NMSP is recognized around the world for its commitment to management of marine protected areas within which primary emphasis is placed on the protection of living marine resources and our nation’s maritime heritage resources.

Figure 1.1. The National Marine Sanctuaries



**The NMSP Vision:**  
*People value marine sanctuaries as treasured places protected for future generations.*

**The NMSP Mission:**  
*To serve as the trustee for the national system of marine protected areas to conserve, protect, and enhance their biodiversity, ecological integrity and cultural legacy.*

## 1.2 The Florida Keys National Marine Sanctuary (FKNMS)

### *Historical Setting*

Warning signs of the fragility and finite nature of the region's marine resources have been present in the Florida Keys for years. In 1957, a group of conservationists and scientists met at Everglades National Park to discuss the demise of the coral reef resources at the hands of those attracted by its beauty and uniqueness. The conference resulted in the 1960 creation of the world's first underwater park, John Pennekamp Coral Reef State Park. However, in the following decade, public outcry continued over pollution, overfishing, physical impacts, overuse, and user conflicts. The concerns continued to be voiced by environmentalists and scientists alike throughout the 1970s and into the 1990s.

As a result, additional management efforts were instituted to protect the Keys' coral reefs. In the Upper Keys, Key Largo National Marine Sanctuary was established in 1975 to protect 103 square nautical miles of coral reef habitat from north of Carysfort Lighthouse to south of Molasses Reef. In the Lower Keys, the 5.32 square nautical mile Looe Key National Marine Sanctuary was established in 1981.

Despite these efforts, oil drilling proposals and reports of deteriorating water quality occurred throughout the 1980s. At the same time, scientists were assessing coral bleaching and diseases, long-spined urchin die-offs, loss of living coral cover, a major seagrass die-off, and declining reef fish populations. Such threats prompted Congress to act. In 1988, Congress reauthorized the National Marine Sanctuary Program and ordered a feasibility study for possible expansion of Sanctuary sites in the Florida Keys - a directive that signaled that the health of the Keys ecosystem was of national concern.

The feasibility studies near Alligator Reef, Sombrero Key, and westward from American Shoal were overshadowed by several natural events and ship groundings that precipitated the designation of the Florida Keys National Marine Sanctuary (FKNMS). Three large ships ran aground on the coral reef during one 18-day period in the fall of 1989. Although people cite the ship groundings as the issue triggering Congressional action, it was, in fact, the cumulative degradation and the threat of oil drilling, along with the groundings. These multiple threats prompted Congressman Dante Fascell to introduce a bill into the House of Representatives in November of 1989. Congressman Fascell had long been an environmental supporter of South Florida and his action was very timely. Senator Bob Graham, also known for his support of environmental issues in Washington and as a Florida Governor, sponsored the bill in the Senate. Congress gave its bipartisan support, and on November 16, 1990, President George Bush signed the bill into law.

With designation of the Florida Keys National Marine Sanctuary in 1990, several protective measures were implemented immediately, such as prohibiting oil and hydrocarbon exploration, mining or otherwise altering the seabed, and restricting large shipping traffic. Additionally, protection to coral reef resources was extended by restricting anchoring on coral, touching coral, and collecting coral and live rock (a product of the aquarium trade). Discharges from within the Sanctuary and from areas outside the Sanctuary that could potentially enter and affect local resources were also restricted in an effort to comprehensively address water quality concerns.

### ***Administration and Legislation***

The Sanctuary uses an ecosystem approach to comprehensively address the variety of impacts, pressures, and threats to the Florida Keys marine ecosystem. It is only through this inclusive approach that the complex problems facing the coral reef community can be adequately addressed.

The goal of the Sanctuary is to protect the marine resources of the Florida Keys. It also aims to interpret the Florida Keys marine environment for the public and to facilitate human uses of the Sanctuary that are consistent with protection of this particular marine ecosystem. The Sanctuary is administered by NOAA and is jointly managed with the State of Florida under a co-trustee agreement. The Florida Governor and Cabinet, sitting as the Board of Trustees for the State of Florida, designated the Florida Department of Environmental Protection (FDEP) as the State's partner for Sanctuary management. Additionally, the Florida Fish and Wildlife Conservation Commission (FWC), created in 1999, enforces Sanctuary regulations in partnership with Sanctuary managers. FWC also houses the Fish and Wildlife Research Institute (FWRI), which conducts and coordinates scientific research and monitoring.

National Marine Sanctuaries are typically designated by the Secretary of Commerce through an administrative process established by the NMSA. However, recognizing the importance of the Florida Keys ecosystem and the degradation of the ecosystem due to direct and indirect physical impacts, Congress passed the Florida Keys National Marine Sanctuary and Protection Act (FKNMSPA) in 1990, (P.L. 101-605) (Appendix B) designating the Florida Keys National Marine Sanctuary. President George Bush signed the FKNMSPA into law on November 16, 1990.

The FKNMSPA requires the preparation of a comprehensive management plan and implementing regulations to protect Sanctuary resources. This draft *Revised Management Plan* responds to the FKNMSPA's requirements. The implementing regulations, effective as of 1 July 1997, are found at 15CFR922 and in Appendix C. The designation document for the FKNMS is found in Appendix D.

### ***Sanctuary Boundaries***

The Sanctuary's enabling legislation designated 2,800-square-nautical miles of coastal waters off the Florida Keys as the Florida Keys National Marine Sanctuary. The Sanctuary's boundary was amended in March 2001 when the Tortugas Ecological Reserve was designated, significantly increasing the marine resources requiring protection.

Currently, the boundary encompasses approximately 2,900 square nautical miles (9,800 square kilometers) of coastal and ocean waters and submerged land (Figure 1.2). The boundary extends southward on the Atlantic Ocean side of the Keys, from the northeastern-most point of the Biscayne National Park along the approximate 300-foot isobath for over 220 nautical miles to the Dry Tortugas National Park. The boundary extends more than 10 nautical miles to the west of the Park boundary, where it turns north and east. The northern boundary of the Sanctuary extends to the east where it intersects the boundary of the Everglades National Park. The Sanctuary waters on the north side of the Keys encompass a large area of the Gulf of Mexico and western Florida Bay. The boundary follows the Everglades National Park boundary and continues along the western shore of Manatee Bay, Barnes Sound, and Card Sound. The boundary then follows the southern boundary of Biscayne

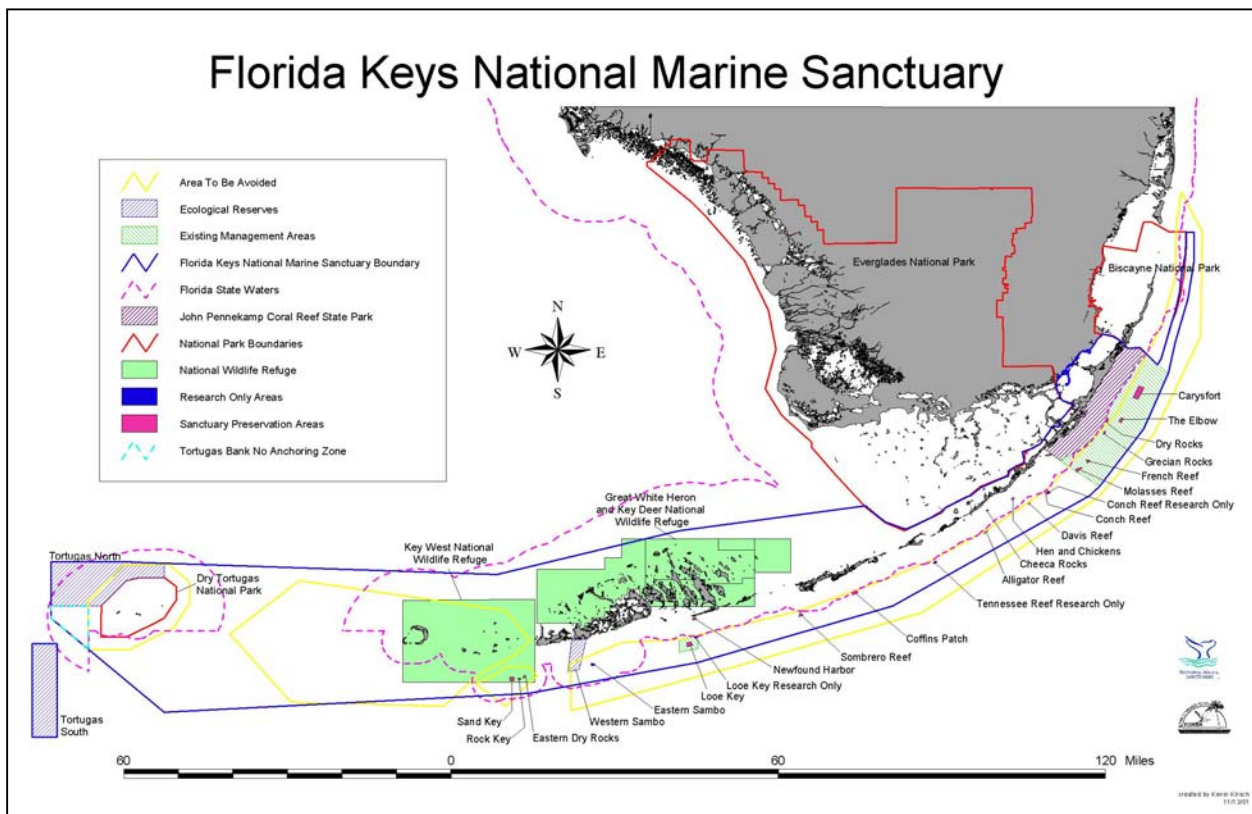
National Park and up its eastern boundary along the reef tract at a depth of approximately 60 feet until its northeastern-most point.

A separate, non-contiguous, 60 square nautical mile area off the westernmost portion of the Sanctuary is called the Tortugas Ecological Reserve South. The area's shallowest feature is Riley's Hump.

The Sanctuary boundary overlaps two previously existing National Marine Sanctuaries (Key Largo and Looe Key); four U.S. Fish and Wildlife Service (USFWS) refuges; six state parks, including John Pennekamp Coral Reef State Park; three state aquatic preserves; and other jurisdictions. Everglades National Park, Biscayne National Park and Dry Tortugas National Park are excluded from Sanctuary waters, but each shares a boundary with the Sanctuary.

The shoreward boundary of the Sanctuary is the mean high-water mark, except around the Dry Tortugas where it is the boundary of Dry Tortugas National Park. The Sanctuary boundary encompasses nearly the entire reef tract, all of the mangrove islands of the Keys, and a good portion of the region's seagrass meadows.

Figure 1.2. The Florida Keys National Marine Sanctuary Boundaries



### *Socio-Economic Context*

The environment and the economy are inextricably linked in the Florida Keys, making management and protection of existing resources and reducing impacts critical if the economy is to be sustained. Tourism is the number one industry in the Florida Keys, with over \$1.2 billion dollars being spent annually by over 3 million visitors. The majority of visitors participate in activities such as snorkeling, SCUBA diving, recreational fishing, viewing wildlife and studying nature. Recreational and commercial fishing are the next most important sectors of the local economy, annually contributing an estimated \$500 million and \$57 million respectively (<http://marineeconomics.noaa.gov>).

Because of the recreational and commercial importance of the marine resources of the Florida Keys, protecting these Sanctuary resources is valuable not only for the environment but also for the economy. The special marine resources of the region, which led to the area's designation as a National Marine Sanctuary, contribute to the high quality of life for residents and visitors. Without these unique marine resources, the quality of life and the economy of the Keys would decline.

## 1.3 The Management Plan Review Process

### *What is management plan review?*

In 1992, when Congress reauthorized the NMSA, it required all National Marine Sanctuaries to review their management plans every five years in order to monitor and evaluate the progress of the national mission to protect national resources. The Florida Governor and Cabinet, as trustees for the State, also mandated a five-year review of the Florida Keys National Marine Sanctuary Management Plan in their January 28, 1997 resolution.

The Sanctuary's management plan review creates a road map for future actions based on past experience and outcomes. The review reevaluates the goals and objectives, management techniques, strategies, and actions identified in the existing management plan. It provides the opportunity to take a close and comprehensive look at outcomes and plan for future management of the Sanctuary.

### *The 1997 Florida Keys National Marine Sanctuary Management Plan*

After the initial six-year FKNMS planning process, a comprehensive management plan for the Sanctuary was implemented in July 1997. The management plan focused on ten action plans which were largely non-regulatory in nature and involved educating citizens and visitors, using volunteers to build stewardship for local marine resources, appropriately marking channels and waterways, installing and maintaining mooring buoys for vessel use, surveying maritime heritage resources, and protecting water quality. In addition to action plans, the 1997 management plan designated five types of marine zones to reduce pressures in heavily used areas, protect critical habitats and species, and reduce user conflicts. The efficacy of the marine zones is monitored Sanctuary-wide under the Research and Monitoring Action Plan.

The implementing regulations for the FKNMS became effective July 1, 1997. The 1997 management plan was published in three volumes: Volume I is the Sanctuary management plan itself (which this document updates); Volume II describes the process used to develop the draft management alternatives, including environmental and socioeconomic impact analyses of the alternatives, and the environmental impact statement; Volume III contains appendices, including the texts of Federal and State legislation that designate and implement the Sanctuary. All three volumes of the 1997 management plan are available on the Sanctuary web site (<http://floridakeys.noaa.gov/>) and from the Sanctuary's Marathon office. Volume II is not being revised as part of this review. After public input, government review and final adoption of this five-year review and revised Management Plan, this document will replace Volumes I and III.

### *How does management plan review work?*

Review of the 1997 management plan began in early 2001 with a meeting in Tallahassee, Florida, among Federal and state partners responsible for Sanctuary management and various FKNMS and NMSP staff. The review included the Sanctuary Advisory Council (SAC) and the general public in every step of the process.

In the late spring and summer of 2001, FKNMS staff, working closely with the SAC, held scoping meetings and re-convened working groups that had been created during development of the 1997 plan. The scoping meetings were held in Marathon, Key Largo, and Key West, and gave the public the opportunity to meet with SAC members, Sanctuary managers, and FKNMS staff. The meetings



included round-table discussions on every action plan, and participants had the opportunity to move freely between the various topics being discussed at each table.

The scoping period for the revised management plan lasted from June 8 through July 20, 2001.

Approximately 30 comments were received - a sharp contrast to the more than 6000 public comments received during the comment period for the 1997 plan. In addition, the working groups held more than three dozen meetings between June and September 2001 to discuss, evaluate, revise and update action plans. SAC members and FKNMS staff who had served on the working groups presented the proposed revisions to the Sanctuary Advisory Council at three meetings in October 2001. The full advisory council recommended minor changes and approved each action plan in this document. The Advisory Council membership and Working Group membership lists are included in Appendix E.

### *The Role of Sanctuary Management as Facilitators*

A Sanctuary management plan is designed to identify the best and most practical strategies to achieve common goals, while getting the most out of public investment. Achieving this aim cannot be accomplished solely through the authorities and resources of an individual Sanctuary management authority. It requires a broad partnership of programs, authorities, and resources, coordinated to meet the needs of both the sanctuary site and the broader region of which it is a part.

Consequently, the management plan review process first focuses on finding the most effective strategies to accomplish common goals. These strategies are the product of a process that brings together constituents, institutions, and interested parties in directed working groups to address specified problem areas. How these strategies are to be implemented – with whose authorities, investments, and personnel – is determined subsequently to developing the best strategies. While the Sanctuary program commits to carrying out specific strategies as budgets allow, in many cases implementation becomes the responsibility of other institutions such as state, Federal, or local partners, that have either the authorities, the appropriate program, and/or the resources required.

In this process, the sanctuary management plan becomes a framework in which the role of all partners is codified. The Sanctuary assumes the role of facilitator and integrator of a far larger body of activities and outcomes than are within the immediate authorities, programs, and resources of the site. This facilitation role provides the mechanism for continued implementation, evaluation, and adaptation of the partnership activities documented by the plan, ensuring its continuity and overall success.

## 1.4 Accomplishments

There have been many accomplishments in the sanctuary beginning with the authority established under the Florida Keys National Marine Sanctuary and Protection Act of 1990 and the implementation of the management plan in 1997. An overview of the Sanctuary's accomplishments is given here, and more details are provided within each Action Plan.

**1. Area To Be Avoided.** The "Area To Be Avoided" (ATBA) designation has resulted in a significant decrease in the number of major ship groundings on the coral reefs. As Figure 1.3 illustrates, prior to 1990 there was a major ship grounding involving vessels greater than 50 m in length, nearly every year, while only two have occurred since the creation of the ATBA. The International Maritime Organization agreed that the ATBA should be given additional strength as a Particularly Sensitive Sea Area (PSSA) in 2002 (see Accomplishment 5 below). The ATBA regulations are at 15 CFR Part 922, Subpart P, Appendix VII. Figure 1.4 shows the ATBA and the Sanctuary boundary.

Figure 1.3. Reef groundings of vessels greater than 50m before & after ATBA designation.

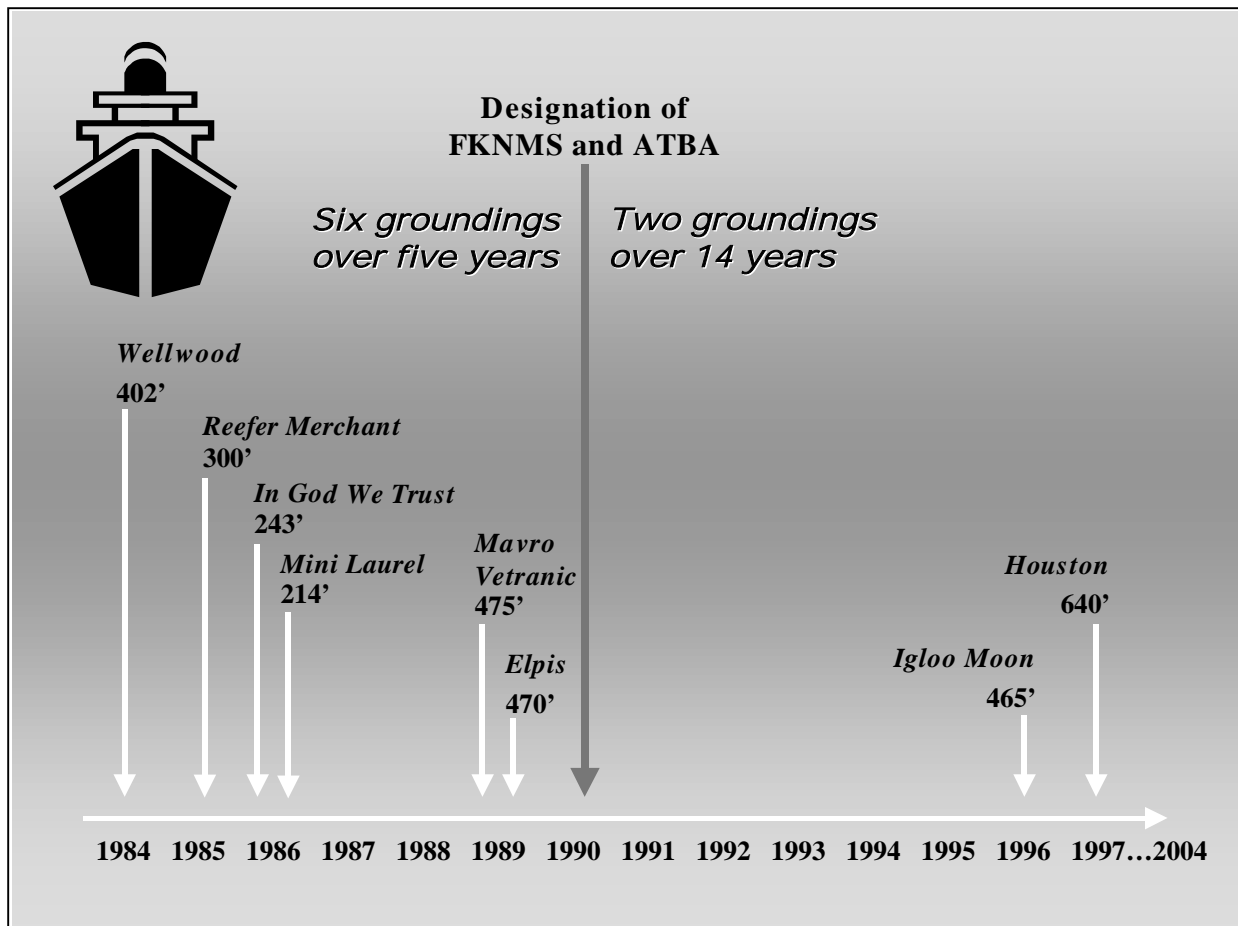
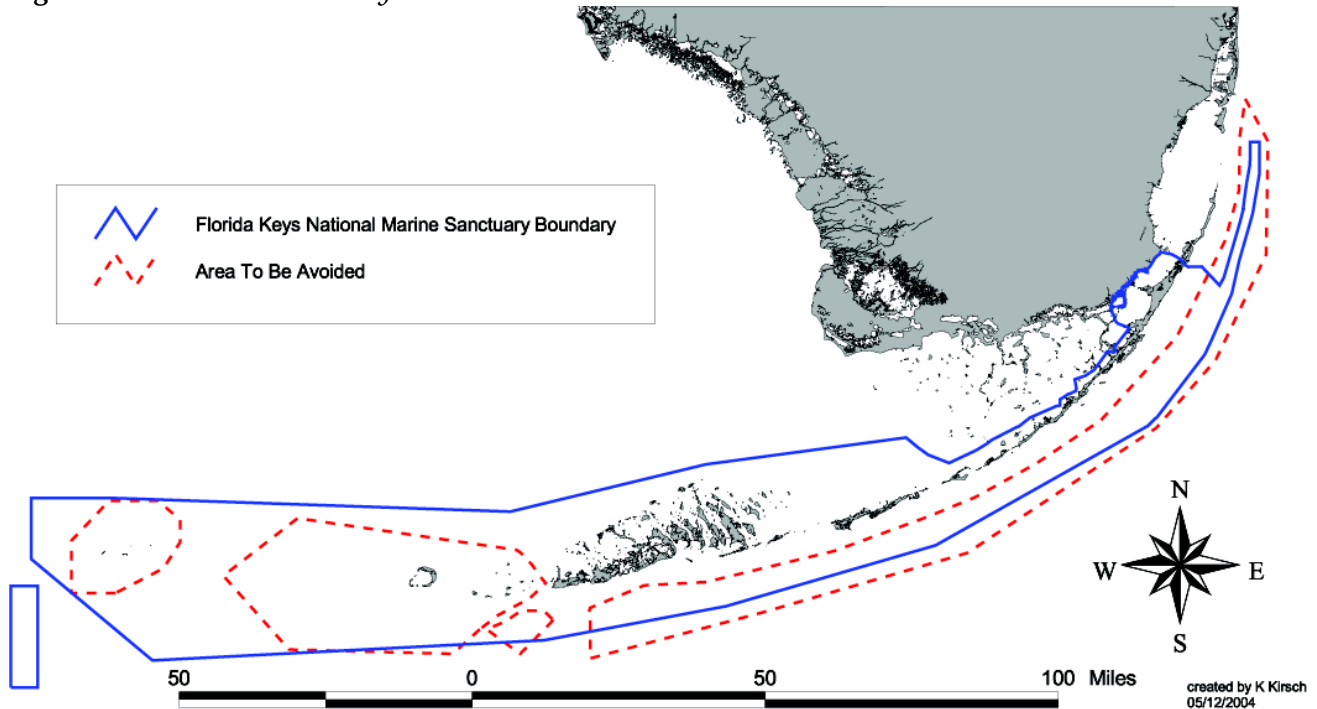


Figure 1.4. FKNMS boundary and ATBA



**2. Oil Drilling and Hard Mineral Mining Ban.** A ban on these activities was established when the Sanctuary was created, and has prevented these activities from occurring in the Sanctuary.

**3. The Water Quality Protection Program.** This program has produced the first Water Quality Protection Program for a national marine sanctuary and has fully implemented 26 of 49 high-priority activities, many of which are carried out in cooperation with other action plans.

**4. The Comprehensive Everglades Restoration Plan.** The Sanctuary continues to participate in the Comprehensive Everglades Restoration Plan. Sanctuary staff have been active on this project since 1993, including chairing a working group for the South Florida Ecosystem Restoration Task Force and staffing its science and education committees. The Sanctuary's participation seeks to protect the ecosystem's water quality by eliminating catastrophic releases of freshwater into Florida Bay following rain events.

**5. Designation of the Florida Keys as a Particularly Sensitive Sea Area.** In November 2002, the United Nations International Maritime Organization approved designation of the Florida Keys as a PSSA. The designation is not accompanied by additional rules and regulations, but seeks to elevate public awareness of the threat of oil spills and hazardous materials to sensitive marine environments and will ensure that the previously mentioned ATBA is noted not only on U.S. charts but also on nautical charts worldwide.

**6. Long-term and continuing progress in the Research and Monitoring and Zoning action plans.**

Research and Monitoring has produced significant scientific data, hypothesis testing, mapping, trend documentation, and wide dissemination of these findings. Especially notable is the Keys-wide benthic map which provides valuable information for Sanctuary managers. In addition to the new protected zone in the Tortugas Ecological Reserve, the Sanctuary's zoning programs continue to provide invaluable data that crosses simple category boundaries.

**7. Education, Public Outreach, Sanctuary Stewardship, and Volunteerism.** Through these inter-related efforts, information is flowing from scientists to managers and then to educators, who reach the next generation. More than 120,000 volunteer hours, a \$1.8 million value, have been donated to the Sanctuary between 1996 and 2000. Even more valuable than the dollar worth of the program is the stewardship created through volunteerism, which uniquely contributes to the long-term effectiveness of the Sanctuary.

**8. Enforcement and Regulations.** Both the city of Key West and the State of Florida have declared Florida Keys waters under their jurisdictions as "no-discharge" zones. Additional accomplishments in implementing the Enforcement and Regulatory Action Plans are largely a tribute to the cooperative efforts among the State, the Florida Fish and Wildlife Conservation Commission, the Florida Park Service, the U.S. Coast Guard and NOAA. Notable among these is the cross-deputization of state-certified law enforcement officers, which allows them to enforce some Federal laws, including fisheries regulations.

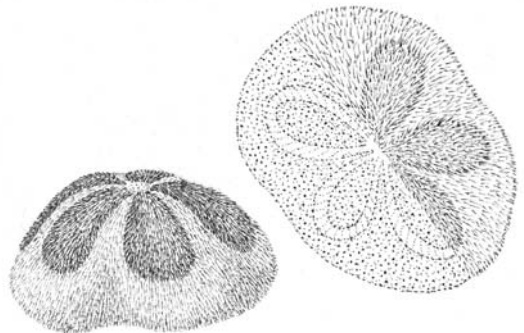
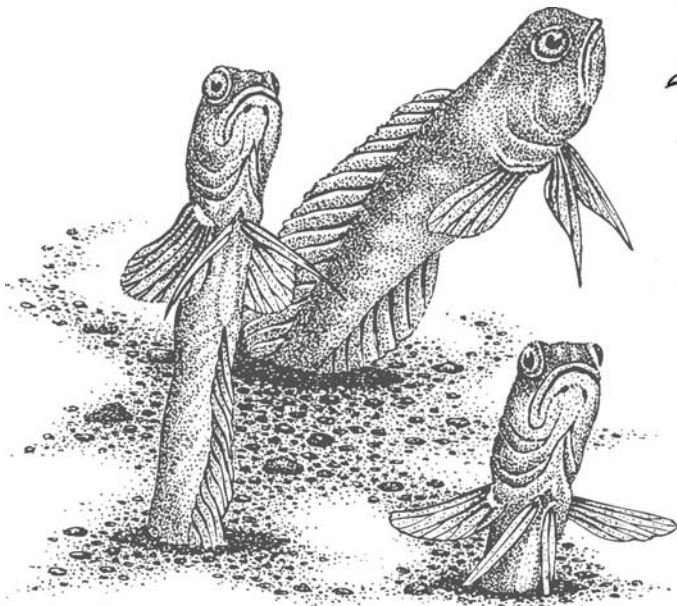
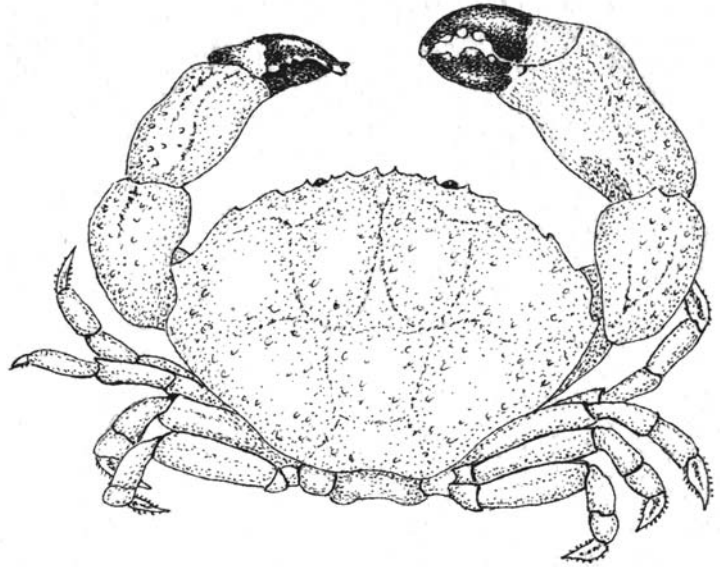
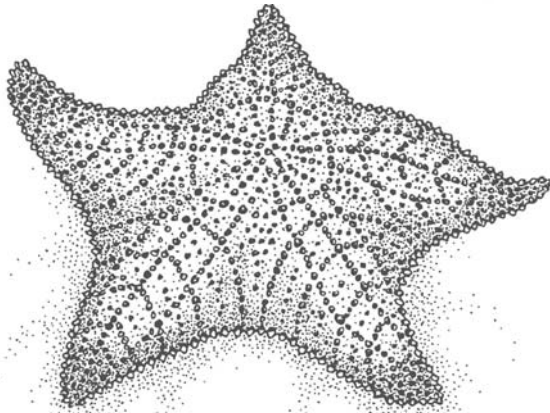
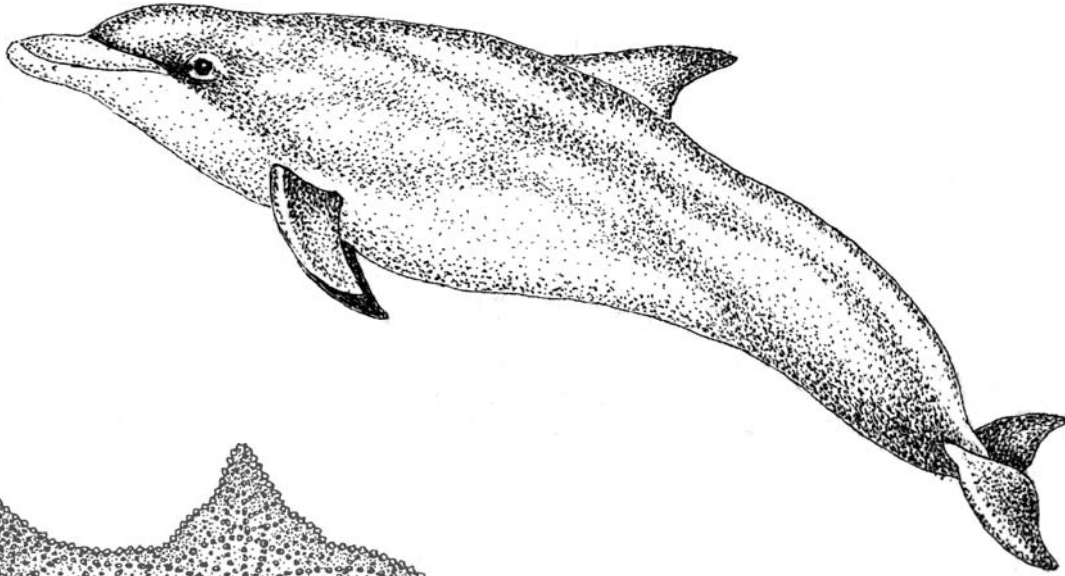
**9. Damage Assessment and Restoration.** The Damage Assessment and Restoration Action Plan is new to this document but is based on accumulated data and lessons learned since 1982. The cross-disciplinary strategies will prove useful in reducing the number of vessel groundings in Sanctuary waters as well as restoring Sanctuary resources damaged by vessels.

**10. Maritime Heritage Resources.** The Maritime Heritage Resources Action Plan includes a close partnership of the State, NOAA, and the Florida Advisory Council on Historic Preservation described in a 1998 programmatic agreement for resource management (see Appendix F). More recently, the 2002 discovery of a previously unknown wreck within the Sanctuary has brought about a community-endorsed research and interpretation plan for the site. Overall, the Action Plan represents excellent progress in balancing resource protection, investigation and interpretation.

**11. Mooring Buoys and Waterway Management (formerly Channel Marking).** The Mooring Buoy and Waterway Management Action Plans have implemented simple but effective strategies for reducing vessel damage to the coral reef and to seagrass beds. The long-term success of these programs – mooring buoy strategies have been used in local Sanctuary waters since 1981 when they were introduced at the Key Largo National Marine Sanctuary – has largely been due to a unique interface of education, outreach, enforcement, and research and monitoring activities.

**12. Operations.** Since 1997, the Sanctuary has integrated the administrative functions of two former sanctuaries – at Key Largo and Looe Key – into a single headquarters umbrella with two regional offices. This integration streamlined delivery of human resources, community relations, and policy development. It also resulted in a series of accomplishments, ranging from an updated electronic financial reporting system to the 130-episode television series, *Waterways*.

## 2.0 THE SANCTUARY ENVIRONMENT: A SUBTROPICAL ECOSYSTEM



## 2.1 Introduction

Adjacent to the Keys' land mass is a complex marine ecosystem that supports a variety of spectacular, unique, and nationally significant seagrass meadows, mangrove islands, and extensive living coral reefs. This ecosystem is the marine equivalent of a tropical rain forest in that it supports high levels of biological diversity, is fragile and easily susceptible to damage from human activities, and possesses great value to humans if properly conserved. The ecosystem supports over 6,000 species of plants, fishes, and invertebrates, including the nation's only coral reef that lies adjacent to the continent, and one of the largest seagrass communities in this hemisphere.

## 2.2 Living Marine Resources

The Florida Keys ecosystem contains one of North America's most diverse assemblages of flora and fauna. The Florida peninsula and Florida Keys serve as a partial barrier between the temperate waters of the Gulf of Mexico and the tropical to subtropical waters of the Atlantic Ocean, resulting in a unique distribution of marine organisms.

The coral reef tract, arching in a southwesterly direction for 220 miles, comprises one of the largest communities of its type in the world. It is the only emergent coral reef system off the continental U.S. All but the northernmost extent of the reef tract lies within the sanctuary.

The reef tract is a bank-barrier system comprised of an almost continuous reef community. One of its most noticeable features is its seaward-facing spur-and-groove formation. Over 6000 patch reefs, circular to oval in shape, lie in nearshore to offshore areas.

The ecosystem also supports one of the world's largest seagrass beds, among the richest, most productive, and most important submerged coastal communities. Seagrasses provide food and habitat for commercially and recreationally important species of fish and invertebrates. Without the seagrass community, the coral reef community would likely collapse.

Mangroves form an important component of the ecosystem, fringing most of the more than 1600 islands and 1800 miles of shoreline. Mangroves provide important ecological functions such as habitat for juvenile fishes and invertebrates, sediment traps, and surface area for attached organisms such as oysters, sponges, and algae.

The Florida Keys coral reef ecosystem is highly biologically diverse, and includes:

- 520 species of fish, including over 260 species of reef fish
- 367 species of algae
- 5 species of seagrasses
- 117 species of sponges
- 89 species of polychaete worms
- 128 species of echinoderms
- 2 species of fire coral
- 55 species of soft corals
- 63 species of stony corals

### *Coral Reefs and Coral Health*

The reefs of Florida have undergone change for millennia due to sea-level changes, storms, and other natural occurrences. More recently, human impacts have directly and indirectly damaged the reef structure and reef communities, and as a result corals are under stress.

In the Florida Keys, a decrease in coral cover and species diversity and an alarming increase in coral diseases and coral bleaching have been recorded in the Coral Reef/Hard-bottom Monitoring Project conducted by Florida's Fish and Wildlife Research Institute (FWRI). The project records biodiversity, coral condition (including diseases and bleaching), and coral cover at stations located in various habitat types. Since 1996, over 66 percent of the monitored sites have exhibited losses in stony coral

diversity, although some positive trends were noted in the 1999-2000 survey period. Significant gains and losses of several stony coral species have occurred both between years and over the entire sampling period, indicating fluctuations in coral species richness but no loss of species Sanctuary-wide.

In addition, FWRI monitoring has shown a declining trend in stony coral cover from 1996 to 2000, with the greatest relative change occurring in the Upper Keys. A reprieve from this decline has recently been observed and may be attributable to the lack of significant events such as bleaching, tropical storms, or hurricanes. As with species diversity, scientists find that coral cover is highly variable by both habitat type and region.

Recruitment (settlement of new individuals) of stony corals is an important factor in overall community dynamics. Two monitoring programs that are evaluating coral recruitment trends find that differences exist in coral recruitment among habitat types and regions. Juvenile corals in the lower Keys suffered significant mortality in 1998 due to a direct strike from Hurricane Georges.

Coral diseases increasingly threaten the overall health and vitality of reef systems in the Sanctuary. While over ten coral diseases are believed to exist at this time, only three pathogens have been positively identified. The monitoring project has documented increases in the number of research stations that contain diseased coral, the number of coral species with disease, and the number of diseases themselves. Regional differences in disease incidence have also been documented, with the highest concentration observed in the Key West and Lower Keys region.

Over the past 20 years, coral bleaching events in the Sanctuary have increased in frequency and duration. Massive coral bleaching was first recorded in the Lower Keys in 1983 along the outer reef tract, where shallow fore-reef habitats were the most affected areas. Bleaching expanded and intensified with events in 1987 and 1990, and culminated with massive coral bleaching in 1997 and 1998 that targeted inshore and offshore reefs throughout the Keys. Coral bleaching is undoubtedly responsible for some of the dramatic declines in stony coral cover observed Sanctuary-wide in the last five years. Similar observations of bleaching have been made regionally and internationally since 1987, and it is widely recognized that 1997 and 1998 were the worst coral bleaching years on record, causing significant loss of corals worldwide.

#### *Algae, Seagrasses, and Other Benthic Organisms*

Monitoring of benthic, or bottom, communities by the National Undersea Research Center at the University of North Carolina at Wilmington has documented that algae of various species dominate bottom habitats at all sites throughout the Sanctuary. Sponges and soft corals cover a much smaller percentage of the sea floor (from about 10 percent to 20 percent). Like algae, they are highly variable, depending on the region being surveyed and the time of year.

Seagrasses are comprehensively monitored by Florida International University as part of the Sanctuary's Water Quality Protection Program. Data indicate approximately 12,800 square kilometers of seagrass beds lie within and adjacent to the Sanctuary. Some variability in seagrass cover and abundance has been identified, although populations seem relatively stable. Continued monitoring will be invaluable for detecting human impacts on the seagrass communities.



### *Reef Fish*

Monitoring fish populations occurred for many years before the Sanctuary's designation and continues to this day. From 1979 through 1998, a total of 263 fish species representing 54 families were observed. Over half of all fish observed were from just ten species. Relatively few fish of legal size have been seen, which is consistent with several studies that indicate reef fish in the Florida Keys are highly overexploited.

Despite population declines throughout much of the Sanctuary, fish numbers in fully protected zones (Sanctuary Preservation Areas, Ecological Reserves, and Special-use and Research-only areas) are increasing to some degree. Years of data from one monitoring program show that the number of individuals of three exploited species are higher in protected zones than in fished sites. Researchers have also seen an overall increase in the average abundance of three snapper species at several sites after the sites were protected.

### *Mobile Invertebrates*

FWRI monitors mobile invertebrates, such as spiny lobster and queen conch. Spiny lobsters continue to be more abundant in the fully protected Sanctuary Preservation Areas and Ecological Reserves than outside these areas. Researchers have found their average size is larger and catch rates (number of lobsters per trap) are higher than in reference areas during both the open and closed fishing seasons.

Queen conch populations have remained low for the last decade despite a prohibition on their collection since 1985. Attempts to supplement wild populations with laboratory reared stock and experiments aimed at improving their reproduction are designed to ameliorate the long-term decline in queen conch populations in the region.

Sea urchins are also in very low abundances, especially the long-spined urchin, suggesting poor recovery of this species since its massive Caribbean-wide die-off in 1983. Two research efforts underway are exploring means by which populations of this key species may be restored.

## 2.3 Non-living Marine Resources

### *Maritime Heritage Resources*

The waters of the Florida Keys have some of the most significant maritime heritage and historical resources of any coastal community in the nation. Because of its unique geographical position on the European and American trade routes, shipwrecks in the Keys contain a record of the 500-year history of the Americas. Key West has been the crossroads of the Caribbean, and the sea has remained the common thread through the region's cultural and historic sites. The relative inaccessibility of underwater cultural sites has ensured that many delicate artifacts remain undisturbed. The importance of the region's maritime heritage resources is great, and the possibility exists for discovering some of the earliest archaeological sites in North America. A detailed description of the cultural and historical resources of the Florida Keys is contained in the "Description of the Affected Environment," of the Environmental Impact Statement (see Volume II of the Florida Keys Management Plan at <http://floridakeys.noaa.gov>).

### *Water Quality*

Many water-quality parameters have been monitored Sanctuary wide by Florida International University's Southeast Environmental Research Center since 1995 as part of the Water Quality Protection Program. Thus far, results indicate that some elements (dissolved oxygen, total organic nitrogen, and total organic carbon) are present in higher concentrations in surface waters, while other indicators (salinity, turbidity, nitrite, nitrate, ammonium, and total phosphorus) are higher in bottom waters.

Geographic differences in water quality include higher nutrient concentrations in the Middle and Lower Keys and lower nutrient concentrations in the Upper Keys and Dry Tortugas. Also, declining inshore-to-offshore trends across Hawk Channel have been noted for some parameters (nitrate, ammonium, silicate, total organic carbon and nitrogen, and turbidity).

Probably the most interesting findings thus far show increases over time in total phosphorus for the Dry Tortugas, Marquesas Keys, Lower Keys, and portions of the Middle and Upper Keys, and increases in nitrate in the Southwest Florida Shelf, Dry Tortugas, Marquesas Keys, and the Lower and Upper Keys. In contrast, total organic nitrogen decreased somewhat, mostly in the Southwest Florida Shelf, the Sluiceway, and the Lower and Upper Keys. These trends may be driven by regional circulation patterns arising from the Loop Current and Florida Current, and have changed as the period of record has increased.

Stationary instruments along the reef tract continuously monitor seawater parameters and ocean states. The data are analyzed by Florida Institute of Oceanography's SEAKEYS program and periodically transmitted to satellites and made available on the Internet. Additionally, water temperature data are recorded every two hours from a series of thermographs that the Sanctuary has maintained for the past ten years.

## 2.4 Threats to the Ecosystem

The deterioration of the marine ecosystem in South Florida is no longer a matter of debate. Visitors, residents and scientists alike have noted the precipitous decline in the health of the coral reef ecosystem. The threats causing these visible signs of decline are numerous and often complex, ranging from direct human impacts to global climate changes.

Direct human impacts include vessel groundings, anchor damage, destructive fishing, and damage to corals as a result of divers and snorkelers standing on them. Boat propellers and large ships have damaged over 30,000 acres of seagrasses and more than 20 acres of coral reef habitat in the Sanctuary.

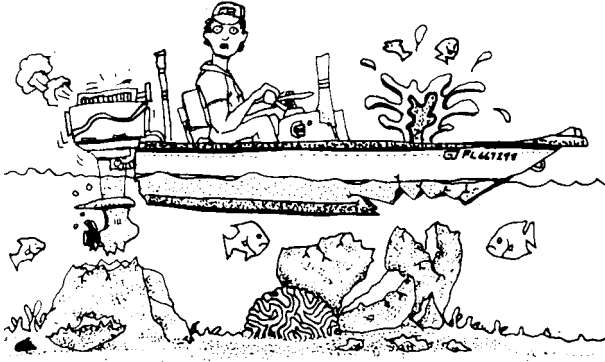
Most pressures stem from the 5 million annual visitors and 80,000 year-round residents. Their high levels of use in the Sanctuary have significant direct and indirect effects on the ecosystem. Sanctuary visitors primarily seek water-related recreation, including fishing, diving, snorkeling, and boating.

Although less immediate than direct physical damage to the corals, other stressors also significantly affect the Florida Keys ecosystem. Overfishing has dramatically altered fish and other animal populations on the coral reef, contributing to an imbalance in ecological relationships that are critical to sustaining a diversity of organisms. Eutrophication (an outcome of excess nutrients in the water, such as fertilizers) of nearshore waters is a documented problem. Wastewater and stormwater treatment and solid-waste disposal facilities are highly inadequate, directly affecting nearshore water quality. Some solutions to water quality problems are being implemented, but given the scope of the problem, more action is required.

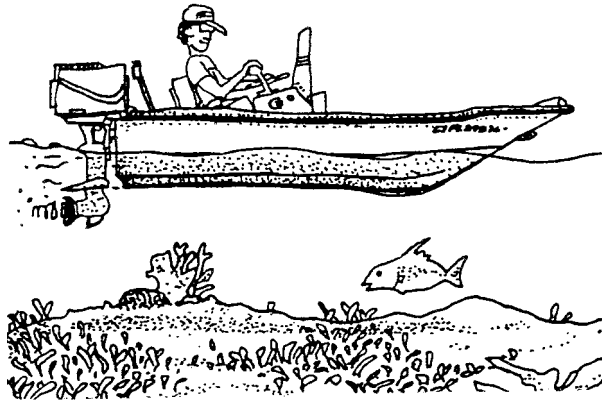
In Florida Bay, reduced freshwater flow has increased plankton blooms, sponge and seagrass die-offs, and fish kills. Since Florida Bay and nearshore waters provide important nursery and juvenile habitat for a variety of reef species, the declines in these areas affect the overall health and structure of offshore coral reefs. Therefore, regional strategies to address the quantity, quality, timing, and distribution of freshwater flows into the South Florida ecosystem and Florida Bay through the Comprehensive Everglades Restoration Plan are critical.

In addition, seasonal and yearly seawater temperature fluctuations, increasing solar radiation, and atmospheric changes all affect the ecosystem. The impacts are seen in coral disease and bleaching, which have increased in frequency, duration and range, coinciding with the ten warmest years on record. Under normal conditions, corals and reef organisms would be expected to tolerate and recover from sporadic events such as temperature variation. However, additional human-induced stresses are likely affecting the ability of these organisms to adequately recover from climate fluctuations.

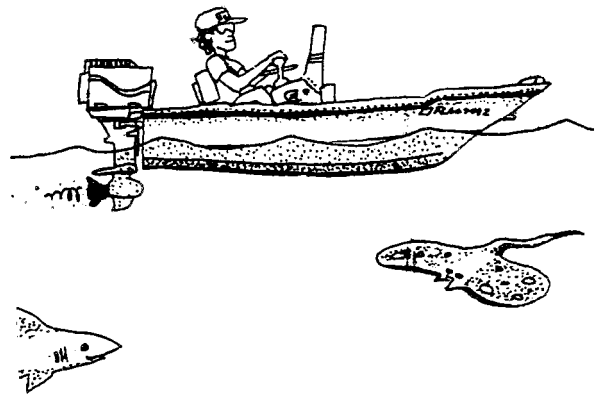
### 3.0 ACTION PLANS



**BROWN, BROWN, RUN AGROUND**



**GREEN, GREEN, NICE AND CLEAN**



**BLUE, BLUE, SAIL ON THROUGH**

## What Are Action Plans?

Action plans are the means by which the Sanctuary identifies and organizes the wide variety of management tools it employs to manage and protect its marine resources. “Road maps” for management, action plans articulate the programs and projects used to address the resource issues identified in the Sanctuary and to fulfill the purposes and policies of the NMSA. Each action plan is composed of *strategies* sharing common management objectives and *activities*, which are the specific actions the Sanctuary and its partners will take to implement the strategies.

## What Are The Action Plans In This Document?

The following chapters are the action plans that guide every aspect of sanctuary management. Readers should note that the 1997 *Final Management Plan* for the Sanctuary included ten action plans, presented in alphabetical order to address management needs related to:

- Channel/Reef Marking
- Education and Outreach
- Enforcement
- Mooring Buoys
- Regulatory
- Research and Monitoring
- Submerged Cultural Resources
- Water Quality
- Volunteer
- Zoning

In this revised management plan, four new action plans have been added: Science Management and Administration Action Plan, Damage Assessment and Restoration Action Plan, Operations Action Plan, and, Evaluation Action Plan. The Submerged Cultural Resources Action Plan has been changed to the Maritime Heritage Resources Action Plan, while the Channel/Reef Marking Action Plan has been renamed to more accurately reflect the intent, which is “Waterway Management”, and the word “Marine” has been added to the Zoning Action Plan to clarify the title.

### *Management Divisions*

In this revised management plan, the individual action plans have been grouped into five management divisions. This was done to both improve the organization of the plan as well as to highlight the management goals for each of the plans. The individual action plans for the Sanctuary are organized in the following divisions:

#### **Sanctuary Science**

- Science Management and Administration Action Plan
- Research and Monitoring Action Plan

#### **Education, Outreach and Stewardship**

- Education and Outreach Action Pan
- Volunteer Action Plan

#### **Enforcement and Resource Protection**

- Regulatory Action Plan
- Enforcement Action Plan
- Damage Assessment and Restoration Action Plan
- Maritime Heritage Resources Action Plan

**Resource Threat Reduction**

- Marine Zoning Action Plan
- Mooring Buoy Action Plan
- Waterway Management Action Plan
- Water Quality Action Plan

**Administration, Community Relations and Policy Coordination**

- Operations Action Plan
- Evaluation Action Plan

**Implementing Action Plans**

The FKNMS defines a place where many governmental and non-governmental organizations work in partnership to achieve the Sanctuary’s goals: protect resources and their conservation, recreational, ecological, historical, research, educational, or aesthetic values through comprehensive long-term management. This management plan describes these collective efforts, and its implementation relies on resources and efforts from a variety of partners. Table 3.1 describes the extent to which each of the action plans and strategies within this revised management plan can be implemented under three funding scenarios. Funding from both NOAA and other partners, (e.g. EPA, Monroe County, etc.) is considered in ranking the level of implementation.

*Table 3.1 Action Strategy Implementation Over Five Years Under Three Funding Scenarios*

Implementation* with NOAA Funding	Implementation* with Partner Funding	Scenario 1: Level Funding	Scenario 2: 5% per year increase	Scenario 3: 10% per year increase
● - High ◎ - Medium ○ - Low	◆ - High ◇ - Medium ◇ - Low			
<b>Sanctuary Science</b>				
Science Management and Administration Action Plan				
	Strategy B.11 – Issuance of Sanctuary Research Permits	●	●	●
	Strategy W.29 – Dissemination of Findings	◎	◎	●
	Strategy W.32 – Maintaining a Technical Advisory Committee	●	●	●
	Strategy W.34 – Regional Science Partnerships and Reviews	◎	◎	●
	Strategy W.35 – Data Management	◇	◇	◆
Research and Monitoring Action Plan				

\* Implementation ranking considers the priority of each strategy as well as the percentage of activities that could be initiated, maintained, and/or completed under differing funding scenarios.

	Strategy W.33 - Ecological Research and Monitoring	⊙◇	⊙◇	●◆
	Strategy Z.6 - Marine Zone Monitoring	⊙	⊙	●
	Strategy W.36 - Conducting Socioeconomic Research	●	●	●
	Strategy F.3 - Researching Queen Conch Population Enhancement Methods	●◆	●◆	●◆
	Strategy F.7 - Researching Impacts from Artificial Reefs	⊙◇	⊙◇	●◆
	Strategy F.6 - Fisheries Sampling	⊙◇	⊙◇	●◆
	Strategy F.11 - Evaluating Fishing Gear/Method Impacts	○◇	○◇	⊙◇
	Strategy F.15 - Assessing Sponge Fishery Impacts	⊙◇	⊙◇	●◆
	Strategy W.18 - Conducting Pesticide Research	○◇	○◇	⊙◇
	Strategy W.22 - Assessing Wastewater Pollutants Impacts	●◆	●◆	●◆
	Strategy W.23 - Researching Other Pollutants and Water Quality Issues	⊙◇	⊙◇	●◆
	Strategy W.24 - Researching Florida Bay Influences	⊙◇	⊙◇	●◆
	Strategy W.21 - Developing Predictive Models	⊙◇	⊙◇	●◆
<b>Education, Outreach and Stewardship</b>				
Outreach and Education Action Plan				
	Strategy E.4 - Developing Training, Workshops and School Programs	○	⊙	⊙
	Strategy E.6 - Continuing the Education Working Group	●	●	●
	Strategy E.10 - Establishing Public Forums	⊙	⊙	●
	Strategy E.11 - Participating in Special Events	⊙	⊙	●
	Strategy E.1 - Printed Product Development and Distribution	○	○	⊙
	Strategy E.2 - Continued Distribution of Audio-Visual Materials	⊙	●	●
	Strategy E.3 - Continue Development of Signs, Displays, Exhibits, and Visitor Centers	⊙	⊙	⊙
	Strategy E.5 - Applying Various Technologies	⊙	⊙	⊙
	Strategy E.12 - Professional Development of Outreach and Education Staff	○	○	⊙
Volunteer Action Plan				
	Strategy V.1 - Maintaining Volunteer Programs	⊙	⊙	⊙
	Strategy V.2 - Working with Other Organization/ Agency Volunteer Programs	○	○	○
	Strategy V.3 - Providing Support for Volunteer Activities	○	○	⊙
<b>Enforcement and Research Protection</b>				
Regulatory Action Plan				
	Strategy R.1 - Maintaining the Existing Permit Program	⊙	⊙	●
	Strategy R.2 - Regulatory Review	⊙	⊙	●
Enforcement Action Plan				
	Strategy B.6 - Acquiring Additional Enforcement Personnel	●	●	●
Damage Assessment and Restoration Action Plan				
	Strategy B.18 - Injury Prevention	○	○	⊙
	Strategy B.19 - Implementing DARP Notification and Response Protocols	○	○	⊙
	Strategy B.20 - Damage Assessment and Documentation	⊙◇	⊙◇	●◇
	Strategy B.21 - Case Management	◆	◆	◆
	Strategy B.22 - Habitat Restoration	◇	◇	◆
	Strategy B.23 - Data Management	○	⊙	⊙
Maritime Heritage Resources Action Plan				

	Strategy MHR.1 - MHR Permitting	●◆	●◆	●◆
	Strategy MHR.2 - Establishing an MHR Inventory	○◆	○◆	◎◆
	Strategy MHR.3 - MHR Research and Education	○◇	○◇	◎◆
	Strategy MHR.4 - Ensuring Permit Compliance through Enforcement	●◆	●◆	●◆
	Strategy MHR.5 - Ensuring Interagency Coordination	●◆	●◆	●◆
<b>Resource Threat Reduction</b>				
Marine Zoning Action Plan				
	Strategy Z.1 - Wildlife Management Areas	○	◎	●
	Strategy Z.2 - Ecological Reserves	◎	●	●
	Strategy Z.3 - Sanctuary Preservation Areas	○	◎	●
	Strategy Z.4 - Existing Management Areas	●	●	●
	Strategy Z.5 - Special-use Areas	○	◎	●
Mooring Buoy Action Plan				
	Strategy B.15 - Mooring Buoy Management	●	●	●
Waterway Management Action Plan				
	Strategy B.1 - Boat Access	◆	◆	◆
	Strategy B.4 - Waterway Management/Marking	◆	◆	◆
Water Quality Action Plan				
	Strategy W.19 - Florida Bay Freshwater Flow	●◆	●◆	●◆
	Strategy W.3 - Addressing Wastewater Management Systems	◇	◇	◆
	Strategy W.5 - Developing and Implementing Water Quality Standards	◇	◇	◇
	Strategy W.7 - Resource Monitoring of Surface Discharges	◆	◆	◆
	Strategy W.11 - Stormwater Retrofitting	◇	◇	◆
	Strategy W.14 - Instituting Best Management Practices	◆	◆	◆
	Strategy B.7 - Pollution Discharges	◎◆	◎◆	●◆
	Strategy L.1 - Elimination of Wastewater Discharge from Vessels	◎◆	◎◆	●◆
	Strategy L.3 - Marina Operations	◆	◆	◆
	Strategy L.7 - Assessing Solid Waste Disposal Problem Sites	◇	◇	◆
	Strategy W.15 - HAZMAT Response	○◆	○◆	◎◆
	Strategy W.16 - Spill Reporting	○◆	○◆	◎◆
	Strategy L.10 - HAZMAT Handling	◇	◇	◆
	Strategy W.17 - Refining the Mosquito Spraying Program	◇	◇	◆
	Strategy W.10 - Addressing Canal Water Quality	◇	◇	◆
<b>Administration</b>				
Operations Action Plan				
	Strategy OP.1 - Addressing Administrative Policy Issues	◎	◎	◎
	Strategy OP.2 - Addressing Resource Policy Issues	◎	◎	◎
	Strategy OP.3 - Addressing Legal Issues	◎	◎	●
Evaluation Action Plan				
	Strategy EV.1 - Measuring Sanctuary Performance Over Time	●	●	●



## **3.5 ADMINISTRATION, COMMUNITY RELATIONS AND POLICY COORDINATION**

This management division includes two action plans: the Operations Action Plan and the Evaluation Action Plan. Effective Sanctuary management requires an administrative infrastructure and an operations program that supports the various management programs. The action plans in this management division describe the Sanctuary administrative and operations approaches to management and provide a mechanism to evaluate the effectiveness of Sanctuary management.

While often overlooked in the development of a management plan, this management division is an essential element to the overall management of the Sanctuary. This section describes the necessary administrative needs and operational requirements to support effective marine protected area management.

## 3.5.2 EVALUATION ACTION PLAN

### *Introduction*

As part of an effort to improve overall management of sanctuaries, on-going and routine performance evaluation is a priority for the NMSP. Both site-specific and programmatic efforts are underway to better understand the Program's ability to meet stated objectives and to address the issues identified in this management plan.

Throughout the management plan review process, FKNMS staff have been working with NMSP staff to develop performance measures for the action plans in this draft management plan.

### *Goals and Objectives*

The goals of the Evaluation Action Plan are to:

- Highlight successful (or not so successful) efforts of site management;
- Keep the public, Congress, and other interested parties apprised of Sanctuary effectiveness;
- Help managers identify resource gaps so that they may better manage their sites;
- Improve accountability;
- Improve communication among sites, stakeholders and the general public;
- Foster the development of clear, concise and, whenever possible, measurable outcomes;
- Provide a means for managers to comprehensively evaluate their sites in both the short and long term;
- Foster an internal focus on problem-solving and improved performance;
- Provide additional support for the resource-allocation process; and
- Motivate staff with clear policies and a focused direction.

The objectives of this Action Plan are to:

- Present a set of performance targets that demonstrate progress towards desired outcomes for each action plan.
- Effectively and efficiently incorporate performance measurement into the regular cycle of NMSP management.

### *Implementation*

Evaluating performance as part of the regular cycle of management is a relatively new concept for the NMSP. Periodic reviews have taken place over the course of the Program's existence, but a process for integrating a system for performance evaluation has not been implemented up to now. With the Program's new focus on the management plan review process, the importance of this system was elevated and the fact that very little had been done to measure management performance was an issue that staff (both site and headquarters), the Advisory Councils and the public recognized as one that should be addressed.

As a result, NMSP headquarters staff began working on models for integrating performance measurement into the management plan review process as well as for evaluating overall performance of the national program. The idea behind these models was simple, but implementing them has been challenging due to the inherent difficulties of performance measurement (developing quantifiable outcome-based targets, projecting outward for results, estimating needs, relying on outputs or products for results reporting, etc.). With the measures in this draft management plan, however, FKNMS is initiating the performance measurement process for the Sanctuary and, therefore,

beginning to establish a baseline of information that can be used by the NMSP to evaluate effectiveness of both the site and the Program over time. *Strategy EV.1-Measuring Sanctuary Performance Over Time* describes this process in more detail.

**Strategy**

There is one strategy in this Evaluation (EV) action plan:

- EV.1 Measuring Sanctuary Performance Over Time

This strategy is detailed below. Table 3.16 provides estimated costs for implementation of each strategy over the next five years.

**Table 3.16 Estimated Costs of the Evaluation Action Plan.**

Strategy	Estimated Annual Cost*					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
EV.1: Measuring Sanctuary Performance Over Time	-	-	-	-	-	-
<b>Total Estimated Annual Cost</b>	-	-	-	-	-	-

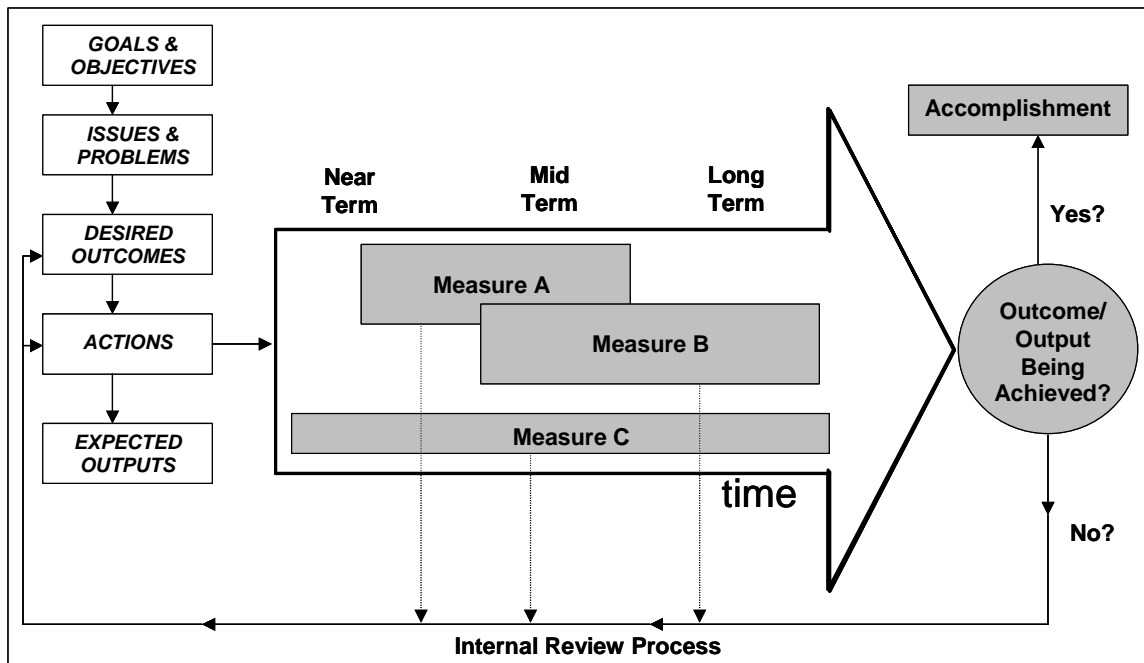
\* Because this is an internal exercise, it is estimated that costs for implementing this strategy will involve staff time only.

## STRATEGY EV.1 MEASURING SANCTUARY PERFORMANCE OVER TIME

### Strategy Summary

This strategy details the process by which the Sanctuary will measure its management performance over time. Figure 3.1 depicts the basic idea behind this process, which will be implemented in all sanctuaries undergoing management plan review.

Figure 3.1. NMSP Performance Evaluation Logic Model



Issues and problems are identified during the scoping process relative to site goals and objectives. Staff then work to develop desired outcomes (targets based on a desired change in the status quo of something, such as the sanctuary's environmental condition or management capacities). Actions (as identified in each of the action plans) are then grouped under the relevant outcomes. Expected outputs, or products, are also identified. Performance measures are then drafted, which identify the means by which the sanctuary will evaluate its progress towards achievement of the desired outcomes. As represented by the large arrow in Figure 3.1, measures can (and should) be developed to provide information on results over time, from the near term (within one year, for example) to the long term (over the span of ten years or more, for example). As these measures are monitored over time, data is collected on progress towards the achievement of outcomes and the production of outputs. Outcomes that are being achieved and outputs that are being produced are reported as accomplishments; inability to achieve outcomes or produce outputs are also reported, but as areas that are falling short of targets. In these areas, staff will work to identify the obstacles that are preventing management from reaching targets (represented in Figure 3.1 by the arrow that runs along the bottom of the graphic). This internal review is one of the primary benefits of performance evaluation process as it provides an opportunity for staff to think carefully about why particular actions are not meeting stated targets and how they can be altered to do so.

All performance measures for this draft management plan are found in table 3.17. The information produced by performance measures in sanctuary management plans will be used not only to improve the management of individual sanctuaries, but to inform programmatic performance evaluation as well. The NMSP Report Card will use action plan-specific performance information from the site management plans (along with information on headquarters-specific tasks) to evaluate the Program's performance in a wide variety of functional areas (such as education, research and monitoring, planning and policy, enforcement, and operations). Although this will be an internal process, results will be compiled, synthesized and then reported by the NMSP Director in a public document (such as the State of the Sanctuary Report).

There are two activities in this action plan. Each is designed to carry the Sanctuary through the performance evaluation process and integrate performance measurement into the regular cycle of site management. In the case of this action plan, it is not anticipated that there will be any additional costs beyond core operational expenses (labor and administrative overhead).

#### **Activities (4)**

**(1) Assess implementation of the FKNMS Management Plan annually.** This assessment will be conducted internally on an annual basis by FKNMS staff and will consider the progress and effectiveness of activities implemented over the previous year.

Status: Formal, annual assessments will begin with implementation of this draft management plan.

Implementation: Sanctuary staff will lead this effort, coordinating with direct partners – notably DEP and EPA – as appropriate.

**(2) Collaboratively evaluate the action plans found in this document.** As the NMSP continues to increase the rigor of its self-evaluation, the program would also like to increase the frequency with which partners formally join with the Sanctuary in assessing the effectiveness of our joint-management actions. Toward this end, regular evaluation of the action plans within this document is proposed. It is envisioned that each quarter, Sanctuary staff will facilitate collaborative evaluation of one action plan. As a result, a systematic rotation through the action plans will be completed every four years.

Status: Begins with implementation of this draft management plan.

Implementation: NOAA will lead this effort collaborating with appropriate partners, notably the SAC.

**(3) Monitor existing performance measures consistently over time.** FKNMS staff will conduct routine performance evaluations to collect and record data on Sanctuary performance over time. Using this data, staff will determine effectiveness by a) evaluating progress towards achievement of each action plan's desired outcomes and b) assessing the role or added value of those outcomes in the overall accomplishment of site goals and objectives. The performance measures that will be used in this exercise are outlined in Table 3.17.

Status: Begins with implementation of this draft management plan.

Implementation: NOAA will lead this effort, collaborating with partners – notably DEP and EPA – as appropriate.

**(4) Report Results.** Results from performance monitoring will be collected, analyzed and used to populate and inform the NMSP Report Card and, when necessary, NOS or NOAA-wide performance requirements. Performance data may also be presented in a site-specific annual report that would explain each measure, how it was evaluated, the site team that conducted the evaluation, and next steps. Based on this analysis, site staff, in cooperation with the Advisory Council, will identify accomplishments as well as work to determine those management actions that need to be changed to better meet their stated targets. The targets themselves may also be analyzed to determine their validity (if, for instance, they are too ambitious or unrealistic given current site capacities). The public may have opportunity to comment on the Sanctuary’s perception of its performance, ways in which the site could be more effective and methods for improving performance measurement when evaluation is on the agenda at future Advisory Council meetings.

Status: Begins with implementation of this draft management plan.

Implementation: NOAA will lead this effort, collaborating with partners – notably DEP and EPA – as appropriate.

**Table 3.17 Measures for Evaluating the Performance of FKNMS Action Plans**

Action Plan	Issue	Desired Outcome	Performance Measures
Science Management and Administration	An effective science program requires coordination, communication of findings, and engagement in related regional initiatives.	Facilitate, permit, and manage scientific projects that propose prohibited activities.	<i>Efficiency:</i> Funds and staff time are used in the most cost and time efficient manner possible.
		Broadly disseminate science program findings, with a focus on integrating this information into regional science efforts.	<i>Effectiveness:</i> Science projects are permitted in an appropriate and timely manner; Science findings are used by Sanctuary managers, partners, and a broad readership; regional science influences Sanctuary decision-making; data generated by the science program are readily available.
		Utilize technical expertise—both local and regional—in Sanctuary decision-making.	
		Define elements of a distributed data management strategy.	<i>Added Value:</i> Scientific collaborations contribute to a more integrated understanding of the ecosystem, predictive models, and more effective management.
Research and Monitoring	Threats to coral reefs are increasing faster than the scientific knowledge base needed to understand and eliminate them through active conservation measures. Without significant effort to strategically target research on coral reef conservation issues, this race may be lost within our life times.	Increased efforts to identify and target critical knowledge gaps through cooperative assessment and planning by resource and funding agencies with responsibilities for coral reef ecosystems.	<i>Efficiency:</i> Research and monitoring funds and staff time are used in the most cost and time efficient manner possible. <i>Effectiveness:</i> Results from research and monitoring program are being used to inform and influence the most current resource management decisions. <i>Added Value:</i> Scientific findings are used to inform the public about natural resource issues and enable more effective stewardship activities.

Action Plan	Issue	Desired Outcome	Performance Measures
Education and Outreach	The lack of environmental awareness, knowledge, and stewardship skills of residents and visitors leads to resource damage.	Increased understanding of, and voluntary compliance with, sanctuary resource management efforts and regulatory requirements.	<i>Efficiency:</i> Budget costs relative to the products and programs produced.
		Reduced amount of damage to Sanctuary resources due to the lack of stewardship skills.	<i>Effectiveness:</i> The increased demand and use of information, products and programs, and whether the level of compliance with zoning and regulatory provisions increases or decreases.
		Increased the awareness of, and support for, the FKNMS through community partners in education, outreach, awareness, enforcement, and management.	<i>Added Value:</i> Public attitudes towards the sanctuary are more positive and the public places more value on sanctuary resources.
Volunteers	Provide adequate training for Sanctuary volunteers to help accomplish site resource protection activities.	A corps of trained Sanctuary volunteers.	<i>Efficiency:</i> The retention of Sanctuary volunteers.
			<i>Effectiveness:</i> The retention and increased number of volunteers. The assistance provided to Sanctuary staff by volunteers.
			<i>Added Value:</i> Financial savings realized by Sanctuary staff as the result of volunteer efforts.
Enforcement	Enforcement of applicable Federal and state laws and regulations will result in increased sanctuary resource protection.	Compliance with Sanctuary resource protection laws and regulations.	<i>Efficiency:</i> Enforcement funds are used in the most cost and time efficient manner possible.
			<i>Effectiveness:</i> Adequate enforcement of Sanctuary regulations.
			<i>Added Value:</i> A trained and equipped Sanctuary Enforcement Squad.
Regulation	The lack of adequate, enforceable regulations would limit Sanctuary managers' ability to protect the resources.	To promulgate regulations that protect Sanctuary resources for all users.	<i>Efficiency:</i>
			<i>Effectiveness:</i> The protection, preservation, and management of sanctuary resources to minimize conflicts among users.
			<i>Added Value:</i> NOAA's regulations supplement existing laws and regulations and avoid unnecessary duplication.



Action Plan	Issue	Desired Outcome	Performance Measures
Damage Assessment and Restoration	There are between 500 and 600 reported vessel groundings within the Sanctuary each year, plus many groundings that damage Sanctuary resources but are never reported.	To protect or restore Sanctuary resources whenever possible and to support the legal processes related to resource damages. Establish program to require towing and salvage operators working within the Sanctuary to use minimal impact gear.	<p><i>Efficiency:</i> Increased number of sites restored with the cooperation of the party responsible for the damage. Increased number of volunteers supporting the Damage Assessment and Restoration program.</p> <p><i>Effectiveness:</i> Decreased number of vessel groundings and resource damage resulting from better public education about Sanctuary resources and use of minimal impact gear by towing and salvage operators.</p> <p><i>Added Value:</i> Enhanced damage assessment and restoration program which can be shared with other marine protected areas around the world.</p>
Maritime Heritage Resources	The large number, geographic range, and complex stratigraphy of maritime heritage resources in the Sanctuary has prevented the comprehensive documentation, evaluation, and interpretation of these resources.	Enhance program archaeological capacity through staffing, contracting and partnerships.	<p><i>Efficiency:</i> Investment in MHR research and education is comparable to other similar managed areas with MHR trustee responsibilities. Measurable increases in the monetary and product value of partnership activities related to MHR's.</p> <p><i>Effectiveness:</i> Professional archaeological oversight and coordination achieved at site level within 3 – 5 years.</p> <p><i>Added Value:</i> Measurable increase in the number of MHR research and monitoring projects, field schools, volunteer participation projects, and novel MHR educational initiatives based on these activities. Measurable decrease in MHR site degradation achieved through increased monitoring and responsiveness.</p>

Action Plan	Issue	Desired Outcome	Performance Measures
Marine Zoning	Overall deterioration of the marine environment of the Florida Keys, including a decline in healthy corals due to diseases and coral bleaching, an invasion by algae into seagrass beds and coral reefs, increases in plankton blooms and marine life die-offs, and a decline in certain fisheries. In addition, a high level of human use of the Sanctuary has led to degradation of water quality, direct and indirect impacts to habitat quantity and quality, and the reduced ability of marine life to recover from naturally occurring stresses.	Maintain or increase species diversity within zoned areas; maintain or increase habitat quality within zoned areas; maintain or increase populations of key species within zoned areas; increase user compliance and satisfaction with zoned areas; and, establish appropriate scientific monitoring sites and increase research on the effects of human activities using zoned areas.	<p><u>Efficiency:</u> User groups displaced from zoned areas will incur little to no net economic losses; and, user groups allowed within zoned areas will incur little to no net economic losses.</p> <p><u>Effectiveness:</u> Numbers of species will remain stable or increase relative to normal, expected fluctuations; benthic cover of key sessile organisms will remain stable or increase relative to normal, expected fluctuations, and habitat quality will remain stable or improve; populations of key species will remain stable or increase relative to normal, expected fluctuations; users of zoned areas will report increased satisfaction with their performance.</p> <p><u>Added Value:</u> Effective implementation and evaluation of zones will increase sustainable resource use within these areas; effective implementation and evaluation of zones will increase conservation of Sanctuary resources outside of zoned areas; and, the public will support marine zoning as a management tool to conserve and protect special habitats and species found elsewhere in the nation.</p>

Action Plan	Issue	Desired Outcome	Performance Measures
Mooring Buoy	Careless anchoring damages coral and seagrass, mooring buoys protect Sanctuary resources from the ravages of anchors and anchor chains that have been laid on sensitive bottom habitats by visitors.	To protect sensitive habitat from anchor damage.	<p><i>Efficiency:</i> Through education and outreach as well as enforcement, reinforce the importance of the use of mooring buoys to manage or restrict activities that have detrimental impact on resources.</p> <p><i>Effectiveness:</i> Sanctuary staff and volunteers will monitor mooring buoy sites and compare them to similar nearby areas without mooring buoys to determine if the mooring buoys are protecting Sanctuary resources versus the areas that do not have mooring buoys.</p> <p><i>Added Value:</i> Effective maintenance, management and monitoring of mooring buoys in the Sanctuary will protect resources. In addition, Sanctuary staff will continue to travel world-wide assisting groups with mooring buoy installations.</p>
Waterway Management	Over 600 vessels are reported to run aground each year. Over 30,000 acres of grassflats are heavily scarred by boat propellers. Boating activity has been historically correlated with Florida's human population growth, which is expected to double within 25 – 50 years. As population increases, the pressure of boating activity on the marine environment (including vessel groundings, disturbance of the biota, and abandonment of derelict vessels) also increases.	Even with predictions of increased boating activity, boating related environmental damage will decline with navigation improvements contained in the Waterway Management Action Plan, as well as the implementation of education, enforcement, restoration and other management tools contained within other action plans.	<p><i>Efficiency:</i> Waterway Marking. Efficiency of the Monroe County channel marking program will be gauged by the completion of its master plan with project funding sources and levels.</p> <p><i>Effectiveness:</i> The effectiveness of waterway marking will be evaluated based on observed trends in prop scarring, vessel grounding events and successes in implementing new marking schemes.</p> <p><i>Added Value:</i> The added value of the management action will be measured through a qualitative assessment of changes in prop scar formation and reported vessel grounding trends before and after the management action.</p>

Action Plan	Issue	Desired Outcome	Performance Measures
Water Quality	Severe water quality problems have developed in the South Florida ecosystem in recent years. Problems have included a massive seagrass die-off; phytoplankton blooms; sponge die-offs mangrove die-backs and a localized explosion in sea-urchin populations. All of these phenomena have the potential to cause catastrophic, cascading ecological effects throughout the ecosystem.	Improved water quality in and around the Sanctuary.	<p><i>Efficiency:</i> Improved water quality in and around the Sanctuary.</p> <p><i>Effectiveness:</i> Establishment of no-discharge zones for the entire Sanctuary, increased public awareness of water quality issues, increased adherence to best management practices.</p> <p><i>Added Value:</i> Increased protection of Sanctuary resources.</p>
Administration	The Florida Keys National Marine Sanctuary has an extremely complicated management plan that encompasses 12 action plans which are staffed by more than 60 individuals. The efficiency of the administrative staff is critical to successful implementation of this plan.	Increased protection of Sanctuary resources.	<p><i>Efficiency:</i> Increased budget and staff to implement the Sanctuary management plan.</p> <p><i>Effectiveness:</i> Adequate implementation of action plans included in Sanctuary management plan.</p> <p><i>Added Value:</i> Increased protection of Sanctuary resources.</p>