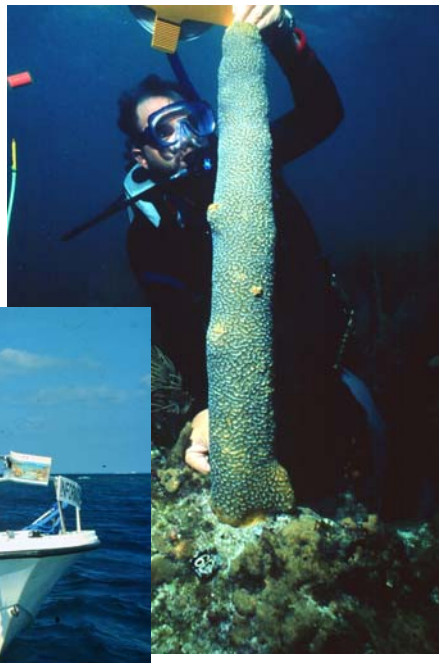
Florida Keys
National Marine Sanctuary
Draft Revised Management Plan



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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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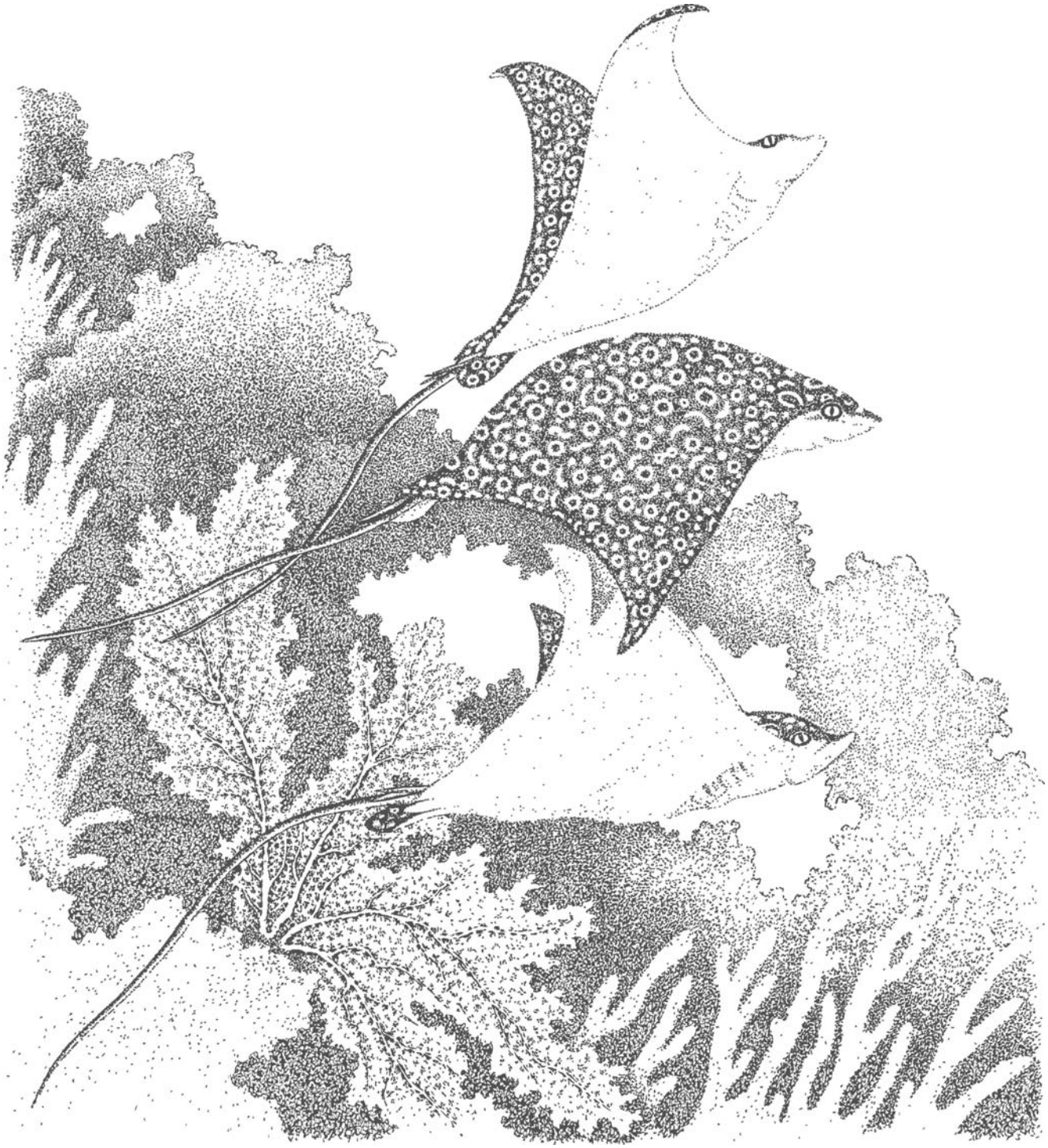
Acronyms

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 Statues
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

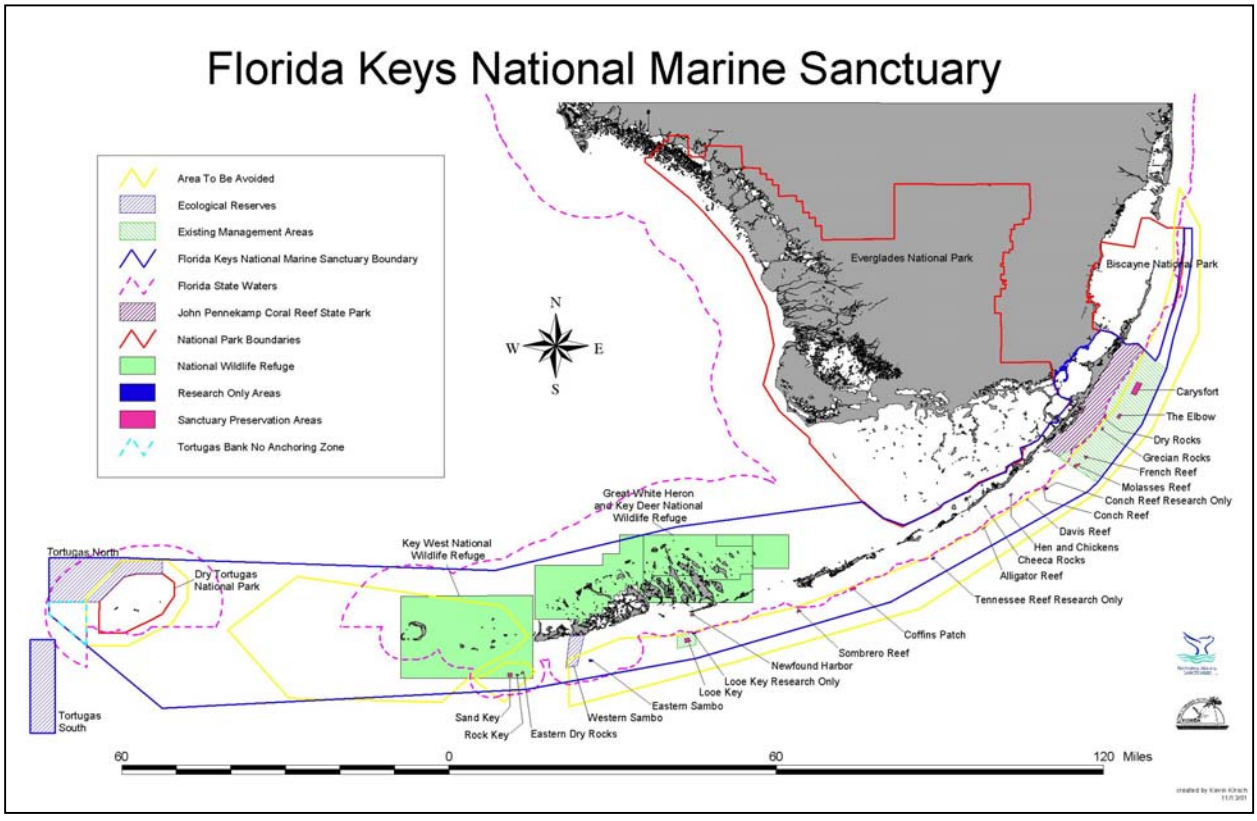
National Park and up its eastern boundary along the reef tract at a depth of approximately 60 feet until its northeastern-most point.

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.

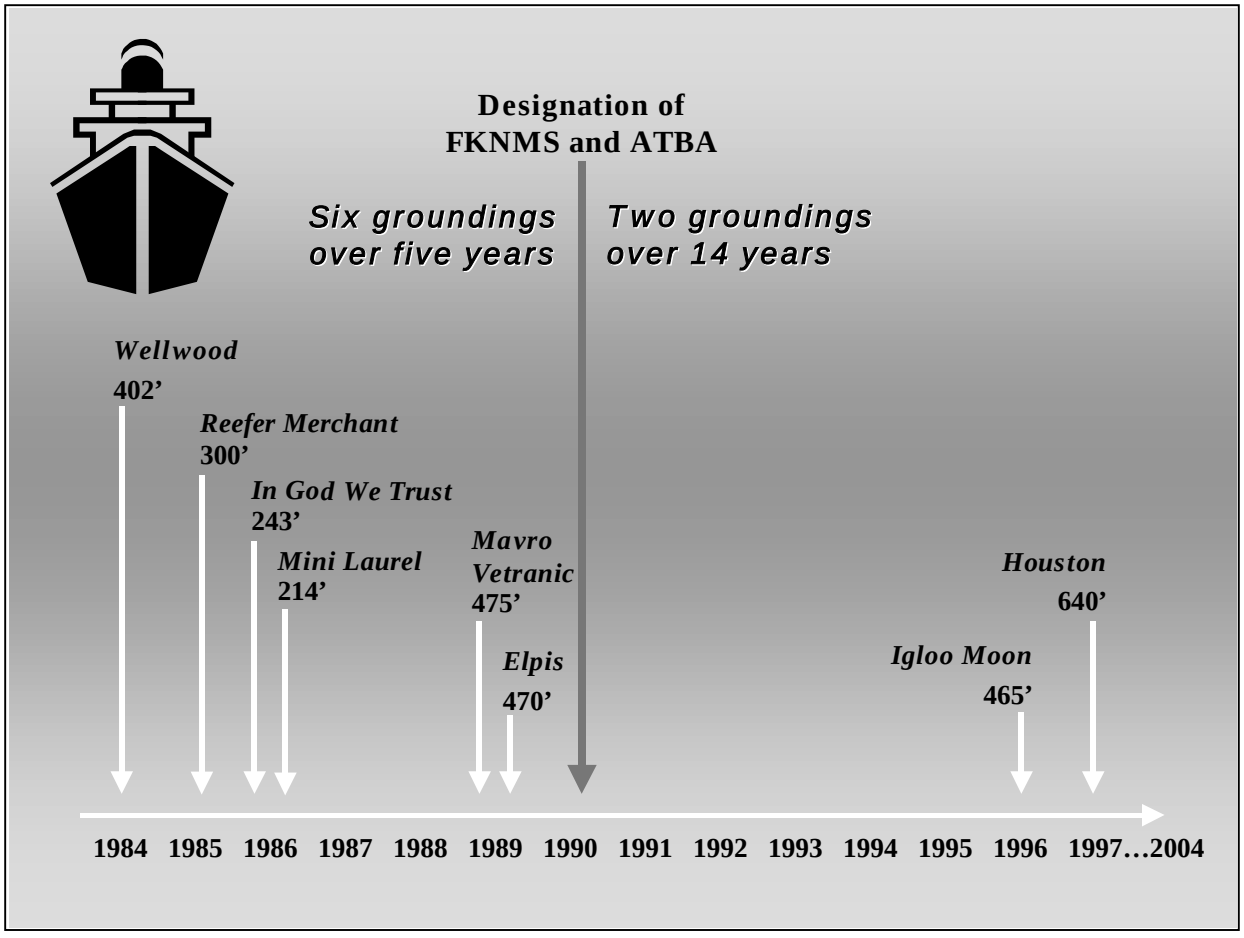
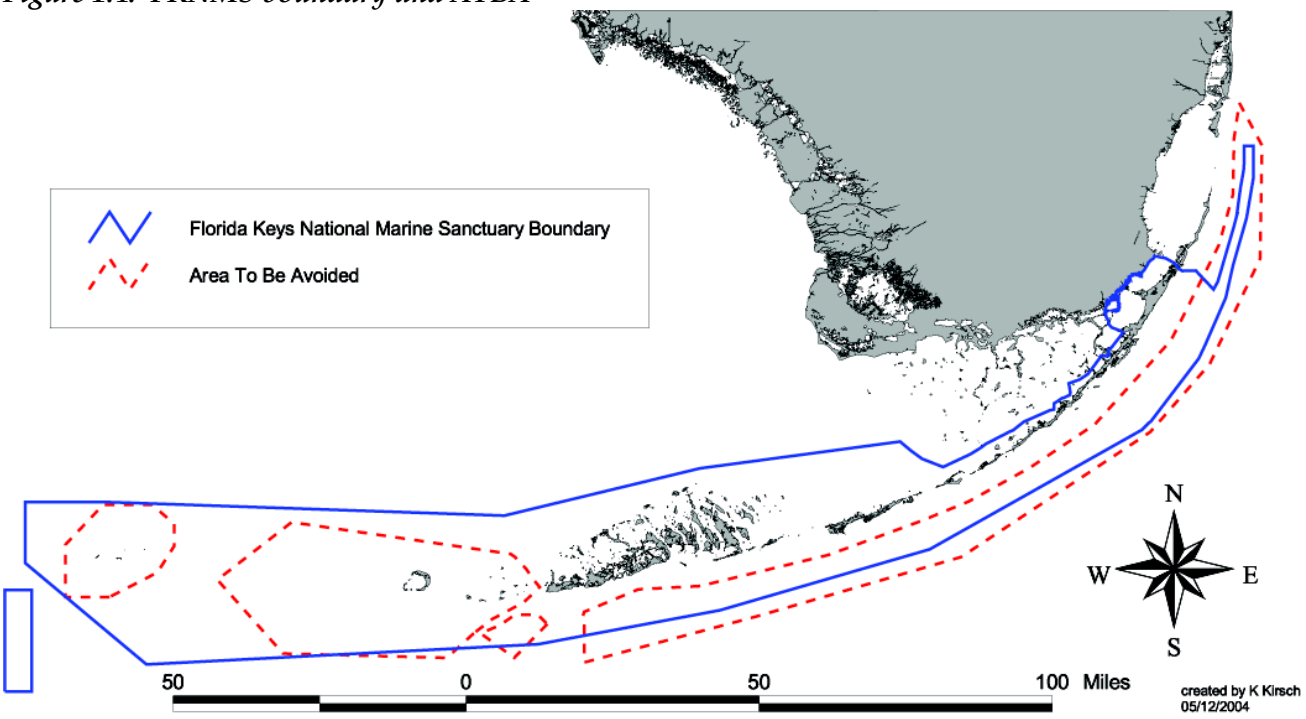


Figure 1.4. FKNMS boundary and ATBA



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 were 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.

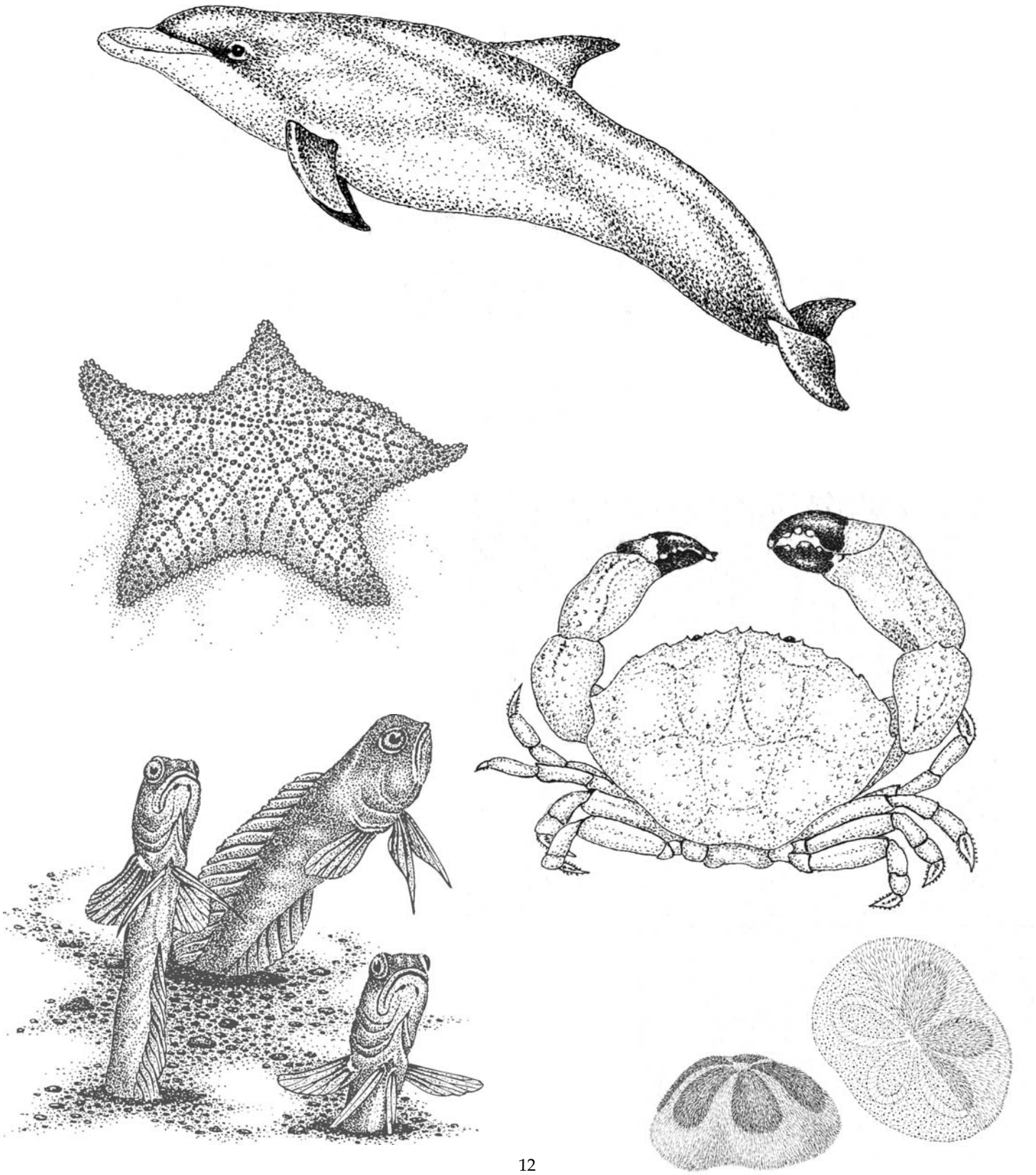
9. Damage Assessment and Restoration. The Damage Assessment and Restoration Action Plan is new to this document but is based on accumulated data and lessons learned since 1982. The cross-disciplinary strategies will prove useful in reducing the number of vessel groundings in Sanctuary waters as well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

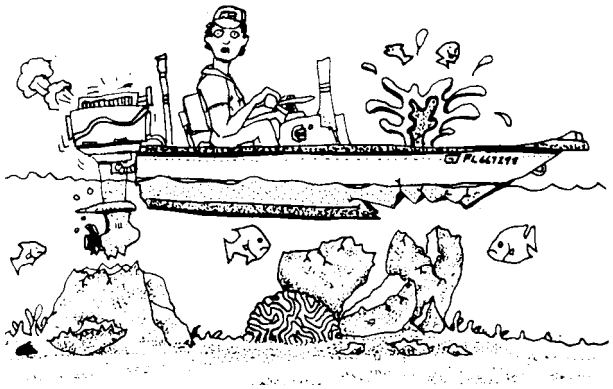
Most pressures stem from the 5 million annual visitors and 80,000 year-round residents. Their high levels of use in the Sanctuary have significant direct and indirect effects on the ecosystem. Sanctuary visitors primarily seek water-related recreation, including fishing, diving, snorkeling, and boating.

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.

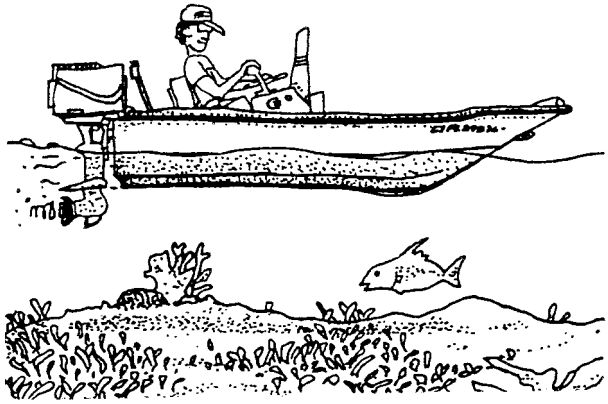
In Florida Bay, reduced freshwater flow has increased plankton blooms, sponge and seagrass die-offs, and fish kills. Since Florida Bay and nearshore waters provide important nursery and juvenile habitat for a variety of reef species, the declines in these areas affect the overall health and structure 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.

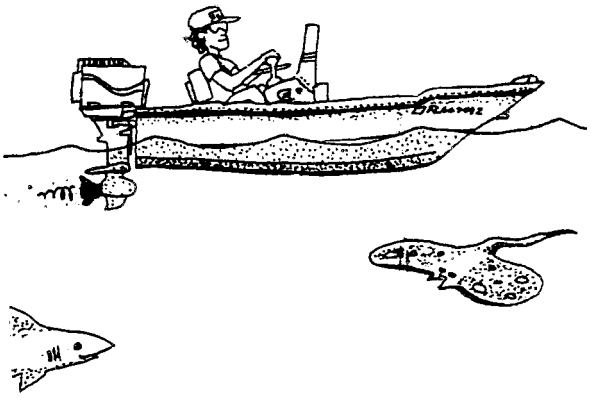
3.0 ACTION PLANS



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 ● - High ⦿ - Medium ○ - Low	Implementation* with Partner Funding ◆ - High ◈ - Medium ◇ - Low	**Scenario 1: Level Funding**	**Scenario 2: 5% per year increase**	**Scenario 3: 10% per year increase**
Sanctuary Science				
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	⦿◈	⦿◈	●◆
Education, Outreach and Stewardship					
	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	○	○	⦿
Enforcement and Research Protection					
	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	●◈	●◈	●◈
Resource Threat Reduction					
	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	◇	◇	◈
Administration					
	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	●	●	●

STRATEGY V.1 MAINTAINING VOLUNTEER PROGRAMS

Strategy Summary
The Sanctuary volunteer programs are as varied as the people who donate their time. The activities range from assisting the vessel maintenance staff to picking up litter on a reef by participating in the Adopt-A-Reef program. There are several activities associated with this strategy.

Activities (9)

(1) Reef Medics. Reef Medics is an innovative, hands-on program designed to use volunteers to assist in Sanctuary restoration efforts. Volunteers have experience in vessel navigation and operation, snorkeling, and SCUBA diving. The Damage Assessment and Restoration Program (DARP) staff trains the volunteers in salvage and restabilization techniques. Currently, SCUBA certification is required for restoration efforts and DARP staff assists with the necessary approvals for diving through the NOAA Dive Program, The Nature Conservancy, Mote Marine Lab and other agencies. Reef Medics primarily assist DARP staff if the injury size falls below the threshold of a Natural Resources Damage Action claim or the responsible party is determined to be unviable or unknown, as in "hit and run" or "orphan" sites. Salvage and restabilization efforts of smaller viable fragments can be conducted by Reef Medics and trained volunteer divers using hand tools and cement or adhesives specifically formulated for marine applications.

Reef Medics support comes from compensatory funds from vessel grounding settlements, grants, and Sanctuary Friends of the Florida Keys, including contributions to purchase equipment and supplies, and vessel support.

Reef Medics are involved in follow-up documentation and monitoring repaired sites for two years after repairs. Expansion of the Reef Medics program will include activities not requiring SCUBA diving, with opportunities for participation by non-divers and volunteers. Mote Marine Laboratory has conducted a pilot Reef Medics "Base Camp" project and further development is underway. The content and materials for a new volunteer training course has been developed.

> *Status:* Implemented and on-going.
> *Implementation:* Sanctuary staff

(2) Promote and Support Environmental Education in Monroe County and State Schools. Volunteers assist the education and outreach staff in bringing environmental education to schools in Monroe County. Coral Reef Classroom volunteers chaperone middle-school students during a snorkel trip to the reef and help students with water quality testing. The program is offered tin the spring and fall. Volunteers are trained in the use of the equipment and procedures. Volunteers are also used to take programs such as Build a Coral Reef, Build a Seagrass Community, and Coral Reef Play to elementary classes in Monroe County.

> *Status:* Implemented and on-going.
> *Implementation:* Sanctuary staff, The Nature Conservancy, the Ocean Conservancy, Monroe County Schools.

(3) Provide Mechanisms Outside of the Law Enforcement Sector that can Deliver Resource Education at the Site of the Resource - Team OCEAN. Team OCEAN volunteers donate their time promoting safe and enjoyable public use of the marine environment of the Florida Keys National Marine Sanctuary, while advocating the protection of our natural resources. Trained volunteer teams using Sanctuary owned vessels are stationed at heavily visited reef sites during the peak recreational boating seasons. They educate and inform the public about the Florida Keys National Marine Sanctuary, and encourage proper use of Sanctuary resources and basic safety precautions. Team OCEAN volunteers directly prevent groundings by being present, watching for errant boaters, and waving them off when they attempt to cross the shallow reef crest.

Status: Implemented and on-going.
Implementation: The Sanctuary

(4) Adopt-A-Reef. Local dive operators and volunteer divers "adopt" a reef and run special trips to the site so scuba divers can remove trash, fishing line and other debris. Many shops offer substantial discounts or social events to mark the clean-up. Certified divers are briefed on proper methods of cleaning the reef without damaging resources.

Status: On-going; looking for opportunities to expand.
Implementation: The Sanctuary, The Ocean Conservancy, and dive operators.

(5) Maritime Heritage Resources Inventory. A bibliographic database has been created in a standard format and made accessible over the Internet. Volunteers and Sanctuary staff survey and identify site locations and site characteristics including name, age, integrity, and historical and cultural significance, sensitivity, and recreational value. Volunteers assist staff in collecting existing information, locating unrecorded sites, recording and documenting sites, assessing site significance, and developing sites for improved public access, interpretation, and protection.

Status: Implemented and on-going.
Implementation: Continue with assistance from FDHR. This activity is conducted in conjunction with the Maritime Heritage Resources Action Plan.

(6) Vessel, Dock, and Mooring Buoy Assistance and Maintenance. Volunteers assist Sanctuary staff with marine and dock maintenance activities including mooring buoy installation, repair, and cleaning; vehicle and boat maintenance, grounds maintenance, and storage and dock cleaning. Qualified volunteers also assist as captains and mates. This activity is also included in the Waterway Management Action Plan.

Status: Implemented and on-going.
Implementation: Sanctuary staff

(7) Gathering Support for Geographic Information Systems. Geographic information systems (GIS) technology can be used for scientific investigations, and resource management. Volunteers work with Sanctuary staff using GIS software and imagery to provide Sanctuary managers with information and photographs. Some of volunteer products include:

- Aerial photographs of sea bottom features near coral reefs that provide baseline data on the percent of coral cover at the various reefs.
- Research regarding the location of monitoring stations in relation to benthic cover, and assistance to the mooring buoy specialists in pinpointing a location of a mooring buoy anchor when the mooring balls have been torn away.
- A comparison between the 1995 and 1999 color infrared photographs that show the damage over time of seagrass destruction and turbidity increases by boats transiting shallow areas.
- Baseline information on the current status of nearshore areas as baseline information to measure future changes.
- Satellite views of the entire Florida Keys that can be used to show areas of Sea Steward monitoring and other monitoring efforts.
- Nearshore aerial photos of research areas where benthic habitat studies are being conducted.

Status: Implemented and on-going.
Implementation: Sanctuary staff and other non-governmental organizations, also included in numerous other Action Plans.

(8) Maintain the Eyes On the Water Program. This new Program will provide professionals on the water, such as dive-boat captains and crew, with the opportunity to be the Sanctuary's "eyes and ears," by letting staff know when someone is behaving in a manner inconsistent with regulations. The Sanctuary will follow up on the report with a letter and educational materials to the vessel owner. This activity also included in the Damage Assessment and Restoration, Education and Outreach and Enforcement Action Plans.

Status: Implemented and on-going.
Implementation: Sanctuary staff trains volunteers and facilitates this program. Project lead and partners include the Sanctuary, non-governmental organizations, and the public,

(9) Maintain Support For Other Volunteer Projects. Volunteer assistance is an integral part of Sanctuary projects not associated with specific strategies, such as general office and computer support tasks, maintenance activities, fundraising, and other special projects.

Status: Implemented and on-going.
Implementation: Sanctuary staff

STRATEGY V.2 WORKING WITH OTHER ORGANIZATION/AGENCY VOLUNTEER PROGRAMS

Strategy Summary
The National Marine Sanctuary Program has a history of using volunteers to assist with activities ranging from maintenance to public education. Volunteers also work with organizations not associated directly with the Sanctuary but whose interests coincide with Sanctuary goals. The volunteer programs and projects are an integral part of the Sanctuary and the community, providing information relating to the overall health of the ecosystem. The information presented by the organizations assists Sanctuary managers in making better resource management decisions.

Activities (11)

(1) Florida Keys Watch. (formerly Florida Bay Watch). This program trains volunteers to collect seawater samples and environmental data using standard scientific methods; Florida Keys Watch is designed to augment and assist scientific studies conducted by universities, agencies, and other institutions. This activity is also included in the Water Quality and Sanctuary Science Action Plans.

Status: A redesign of this project is underway.
Implementation: The Nature Conservancy and Florida International University

(2) Reef Environmental Education Foundation. The Reef Environmental Education Foundation (REEF) is a grassroots, nonprofit organization that uses recreational divers who regularly conduct fish biodiversity and abundance surveys in the Keys and the Caribbean. These surveys are conducted as part of REEF''s Fish Survey Project (The Great Annual Fish Count) and become part of a publicly accessible database. This activity is also included in the Research and Monitoring Action Plan.

Status: Implemented and on-going.
Implementation: REEF, Sanctuary staff,

(3) Queen Conch Restoration Activities. Volunteers assist with raising juvenile queen conchs at a hatchery located at Keys Marine Lab in Long Key, Florida. They also locate and tag wild adult conchs for population and reproduction studies and help relocate nearshore populations and monitor their progress. This activity is also included in the Research and Monitoring Action Plan.

Status: Implemented and on-going.
Implementation: FWC and The Nature Conservancy

(4) Dolphin Ecology Project. Throughout the year, Dolphin Ecology Project staff, scientists and volunteers photograph individual dolphins for identification, observe their activities, sample environmental parameters, and identify and measure the abundance of important dolphin prey. Volunteers and experienced boat operators conduct photo-identification surveys of Atlantic Bottlenose Dolphin. The project's educational goal is to increase public awareness about dolphins, the interrelated nature of the Keys' habitats, and the importance of South Florida ecosystem restoration. This activity is also included in the Research & Monitoring Action Plan.

Status: Implemented and on-going.

Implementation: Dolphin Ecology Project, Sanctuary staff, The Nature Conservancy,

(5) Reef and Coastal Cleanups. Reef and coastal cleanups are supported by a network of environmental and civic organizations, government agencies, industries, and individuals who volunteer to remove debris and collect information on the amount and types of debris. The information serves to educate the public on marine debris issues and encourage behavior that will reduce debris along beaches, coastal areas, reef tracts, and in the open ocean.

Status: Implemented and on-going.
Implementation: A partnership among volunteers, Sanctuary managers and Sombrero Reef Sweep, Barley Bay Festival, Clean Florida Keys, The Ocean Conservancy, Reef Relief, Friends and Volunteers of Refuges, The Nature Conservancy.

(6) Marine Ecosystem Event Response and Assessment (MEERA). The MEERA Project seeks to provide early detection and assessment of biological events occurring in the Sanctuary and surrounding waters. The goal is to help the scientific community better understand the nature and causes of events, such as coral bleaching and disease outbreaks, fish kills, harmful algal blooms, "red tides," and other events that adversely affect marine organisms. Understanding the events will help scientists and managers determine if the events are natural or linked to human activities. The project relies on observations made by people who are frequently on the water, such as captains, recreational boaters, environmental professionals, and law enforcement personnel. This activity is also included in the Research and Monitoring Action Plan.

Status: Implemented and on-going.
Implementation: Mote Marine Lab's Tropical Research Center

(7) Sea Turtle Activities. Sea turtles are protected under the U.S. Endangered Species Act and Florida law. Volunteers protect and preserve sea turtles and their habitats. Volunteers monitor known and potential nesting beaches in the Keys. They mark and record the location of nests and document nest success. Volunteers staff a sea-turtle stranding network. Injured turtles are ministered to and returned to the marine environment.

Status: Implemented and on-going.
Implementation: Save-A-Turtle, The Turtle Hospital, see also the Research & Monitoring Action Plan.

(8) Save the Manatee Club. Manatees are endemic throughout South Florida waters. Save the Manatee Club has volunteers in the Keys and is active locally for education and monitoring. Volunteers regularly assist in removing monofilament line, a particular danger for the species.

Status: Implemented and on-going.
Implementation: Save the Manatee Club, Dolphin Research Center, Monroe County,

(9) Marine Animal Rescue Activities. Volunteers throughout the Florida Keys regularly offer ready assistance to distressed marine mammals. Each stranding is unique, and the specific course of action depends upon individual circumstances. Volunteers assist marine mammal stranding to reduce the animal's pain and suffering, provide appropriate first aid, minimize possible threats of marine

mammals to human health and safety, derive maximum scientific and educational benefits from both live and dead stranded marine mammals, and collect consistent, high-quality data to facilitate marine mammal conservation.

Status: Implemented and on-going.
Implementation: National Marine Fisheries Service's Marine Mammal Health and Stranding Response Program and permitted partners.

(10) Wild Bird Rehabilitation. Several wildlife rescue organizations in the Keys respond to injured birds, including sea gulls, pelicans, egrets, herons, osprey, and eagles. Volunteers rescue and rehabilitate birds at major rehabilitation centers in Tavernier, Marathon and Key West.

Status: Implemented and on-going.
Implementation: Florida Keys Wild Bird Rehabilitation Center, Marathon Wild Bird Center, and Wildlife Rescue of the Florida Keys.

(11) Reef Ecosystem Condition (RECON). RECON trains volunteer divers to collect information about the reef environment, the health of stony corals, the presence of key reef organisms and obvious human-induced impacts. The goals of RECON are to broaden the scope of available information about the bottom-dwelling organisms on coral reefs, to alert local researchers and managers of changing reef conditions, such as coral bleaching and nuisance algal blooms, and to increase public understanding of the threats to coral reef ecosystems. This activity is also included in the Sanctuary Science Action Plan.

Status: Implemented and on-going.
Implementation: The Ocean Conservancy, EPA

STRATEGY V.3 SUPPORTING VOLUNTEER ACTIVITIES

Strategy Summary
The Volunteer Program requires staff and administrative support for the program to function efficiently. Thus, Sanctuary project managers strive to recruit, place, orient, train, evaluate, and recognize volunteers who work on a project. Just as each project requires specific training and orientation, each volunteer requires unique evaluation and recognition. Volunteers are asked to report to the project manager the number of hours worked on each project.

Because volunteers are capable of assisting Sanctuary managers in diverse ways, this strategy helps identify future volunteer programs. As management needs change over time, the volunteer program continues to identify future projects to recruit volunteers to accomplish objectives. Sanctuary staff determines where and how volunteers can assist in fulfilling management objectives. The staff continues to form partnerships with other organizations to use volunteers in a variety of projects. Areas that may be evaluated in the near future include volunteers for artificial reef monitoring and Sanctuary-wide ecological monitoring.

Activities

(1) Recruiting and Placement. Volunteers are recruited based on particular skills, experience, aptitude and especially their interest. Recruitment sources include community groups, churches, neighborhood associations, other volunteer groups, governmental agencies, universities, and local schools. Once recruited, volunteers are paired with a program matching their desire, expertise, and experience.

> *Status:* Implemented and on-going.
> *Implementation:* Sanctuary staff

(2) Orientation and Training. Orientation is necessary so that volunteers become part of the Sanctuary program. Orientation allows new volunteers to feel welcomed and appreciated, and provides information that assists them in performing their work effectively. Training is specific to the volunteers and the project.

> *Status:* Implemented and on-going. Orientation occurs two to three times a year in the Upper, Middle, and Lower Keys. Specific project training packages for volunteers and skills building training for project managers will be developed.
> *Implementation:* Sanctuary staff

(3) Volunteer Safety. Volunteer safety is a priority for every project manager. Each project has its own set of safety measures that the project manager must be aware of. Project managers and staff strive to recognize work place hazards and to improve working conditions to the greatest extent possible.

> *Status:* Development of safety manuals for volunteer activities will be a priority in the next five years.
> *Implementation:* Sanctuary staff

(4) Recognition. Recognition begins with placing the volunteer in a fulfilling position. Thereafter, formal and informal recognition and awards include an annual party, notes, cards, plaques, uniforms, and similar appropriate items associated with the service.

Status: Implemented and on-going.
Implementation: Sanctuary staff

(5) Evaluation. The benefits of evaluation include identifying a project's strengths and weaknesses; anticipating project issues and dealing with them in advance; improving morale and involvement of volunteers and staff; discovering which staff or projects have the highest volunteer turnover; and uncovering new opportunities.

Status: Implemented and on-going.
Implementation: Sanctuary staff.

(6) Communications. Program managers, via a wide range of mechanisms including letters, telephone calls, and e-mail, communicate with volunteers. Volunteers are regularly highlighted through news articles, television specials and series, such as "Waterways," radio interviews and magazine articles that enhance recognition, funding, and recruiting. In addition e-mail and Internet sites are used to communicate goals and achievements. The Sanctuary maintains an information database about volunteer interests and skills, project activity, service hours, and other relevant data.

Status: Implemented and on-going.
Implementation: Sanctuary staff

(7) Funding. Funding for the Sanctuary's volunteer projects is complex and achieved through a variety of partnerships and a range of sources.

Status: The Sanctuary regularly assists in developing funding sources for volunteer projects that provide Sanctuary management information.
Implementation: Sanctuary staff

(*8) Internships.* Sanctuary project managers regularly develop internships. The managers provide project descriptions, supervision, training, scheduling, and support activities for the intern.

Status: Implemented and on-going.
Implementation: Sanctuary staff

(9) Volunteer Program Development. Opportunities to use volunteers at the Sanctuary in both long and short term situations will be developed on an as-needed basis.

Status: Implemented and on-going.
Implementation: Sanctuary staff

PREVIOUS STRATEGIES

This review of the FKNMS Management Plan identified some Action Strategies that no longer warranted the priority attention they originally received in 1997. These strategies have not been removed from the plan rather they have been incorporated into the new strategies under broader headings. Many of the previous strategies listed in the original plan were tied to activities in other action plans that did not occur and others were not feasible due to liability. It was found that to have the majority of the Plan simply list specific ways that volunteers can be utilized was not very useful due to changing needs. In the revised Plan, the mechanisms to identify volunteer opportunities and needs are identified rather than the activities themselves.

3.3 ENFORCEMENT & RESOURCE PROTECTION

This management division bundles all of the essential legal tools that are available to Sanctuary Managers to protect the natural and historical resources of the Sanctuary. These action plans include: the Regulatory Action Plan; Enforcement Action Plan; Damage Assessment and Restoration Action Plan; and the Maritime Heritage Resources Action Plan. Each of these action plans serves a direct role in protecting and conserving Sanctuary resources, whether they are natural or historic resources. Effective management requires a comprehensive set of regulations and an enforcement program to implement those regulations. The most successful marine protected areas are committed to enforcement of their regulations. The Sanctuary regulations and the interpretive approach to enforcing those regulations are described in this section.

Vessel groundings and damage to submerged Sanctuary resources are a major management issue in the Sanctuary. Over 600 vessel groundings occur every year in the Sanctuary and this prohibited activity has resulted in the need for a separate action plan to describe the Sanctuary's approach to damage assessments and restoration.

Historical resources are also protected within the Sanctuary and the action plan that describes the Sanctuary's approach to protecting these resources is described in this management division. A rich and colorful history of exploration and discovery of submerged historical resources in the Florida Keys has necessitated the development of an action plan that integrates the State of Florida and NOAA's trustee responsibilities for these resources.

3.3.4 Maritime Heritage Resources Action Plan

Introduction

The Maritime Heritage Resources Action Plan includes a close partnership of the State, NOAA and the Advisory Council on Historic Preservation that resulted in a 1998 programmatic agreement for historical resources management. After five years of implementation, all parties recently renewed this Agreement for an additional five years (see Appendix F.) 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 Maritime Heritage Resources Action Plan represents excellent progress in balancing resource protection, investigation and interpretation as the federal and state standards formalized in the Programmatic Agreement have been uniformly implemented and enforced across a broad spectrum of interests.

Maritime Heritage Resources (MHR) are defined as underwater items and sites that have historical, cultural, archaeological, or paleontological significance, including sites, structures, districts, and objects associated with or representative of earlier peoples, cultures, human activities and events. In this plan, the terms "historical resources," "cultural resources," and "maritime heritage resources" are used interchangeably and may include artificial reefs, shipwrecks that are part of both U.S. and world history, as well as the remains of prehistoric cultures.

Maritime heritage resources in the Sanctuary encompass a broad historical range. Because of the Keys' strategic location on early European shipping routes, the area's shipwrecks reflect the history of the entire period of discovery and colonization. This richness of historical resources brings a corresponding responsibility to protect and preserve resources of national and international interest. Accordingly, the resources are managed for public benefit and enjoyment, while the historical and cultural heritage is preserved for the future.

Long-term protection requires a precautionary approach to historical resource management, particularly when information or artifacts may be destroyed or lost through direct and indirect activities. The Federal Archaeological Program or equivalent standards of conservation, cataloguing, display, curation, and publication must be assured before permitting their excavation. Such projects are expensive and labor-intensive, sometimes requiring specialists in the fields of archaeology, conservation, museum work, historic shipwreck research, and recovery. NOAA and the State will continue to explore all public and private partnerships for management and consider private-sector implementation, when appropriate.

NOAA's policy is to protect sanctuary resources, including maritime heritage resources. NOAA also manages the Sanctuary and its resources to facilitate multiple uses that are compatible with resource protection. Compatible uses include research, education, recreation, fishing and other uses.

Maritime heritage resources are managed in close partnership among NOAA, the State of Florida, and the Advisory Council on Historic Preservation (ACHP). During development of the 1997 management plan, this was an area of considerable controversy and conflict. Since then, there has been much progress in achieving a balanced level of resource protection, investigation, and interpretation.

A Programmatic Agreement for historical resource management among NOAA, the State and ACHP provide further detail about how historic resources within the Sanctuary are managed. See Appendix F of this document for more details.

Goals and Objectives

The Sanctuary has a trustee responsibility for current users and future generations. Because these non-renewable resources may ultimately deteriorate due to natural processes, decisions are made with a precautionary approach after careful and deliberate analyses of the potential consequences of long-term preservation. With this in mind, the goals of this Action Plan are to:

- Gather sufficient information about cultural resources to allow informed decisions.
- Interpret the history and culture of the area for the public.
- Allow private-sector participation, research, documentation, recovery, and curation.
- Develop a community-based stewardship.

To achieve these goals, the following objectives have been identified:

- Inventory the Sanctuary's maritime heritage resources.
- Create a database consistent with resource protection and business confidentiality.
- Interpret the resources for the public through on-site and land-based exhibits and materials such as brochures, web pages and videos.
- Develop public partnerships for research, interpretation, and management.
- Foster and enhance a stewardship ethic.

Implementation

NOAA and the Florida Division of Historical Resources (FDHR) are primarily responsible for implementing the MHR Management Plan. NOAA and the State jointly manage Sanctuary resources, while FDHR retains title to abandoned shipwrecks on State-owned submerged lands. If excavation is involved, permission may also be required from FDHR (e.g., consent to use state lands) and the U.S. Army Corps of Engineers (ACOE) (e.g., dredge and fill permit), depending on the location of a given site.

FDHR, through its Bureau of Archaeological Research, has developed a range of management tools that can be usefully applied within the Sanctuary. FDHR's role, although sometimes regulatory, typically involves inventory, assessment, research, education, public interpretation, and grant assistance for historic preservation projects.

NOAA's primary role is to protect the historic resources through permitting and enforcement, provide overall policy direction, and coordinate research by institutions and individuals. In this capacity, NOAA will ensure that research is well-designed and consistent with Sanctuary policies. NOAA will also work with the State to inventory resources consistent with appropriate acts and guidelines.

Geographic Focus
Although MHRs may be located anywhere in the Sanctuary, areas of known concentration and high probability occur especially in shallow water with proximity to shipping routes, on and near reefs, in the Straits of Florida, in other historically used channels, and near historical sources of freshwater. Management will focus on selected shipwreck sites, with the particular characteristics of a site determining the types of management tools to be applied. High-probability areas will be delineated after analysis of a comprehensive resource inventory.

Costs
The estimated cost of implementing this action plan includes Sanctuary staff salaries; equipment and supplies; services; and other requirements necessary for implementation. Because each activity must be addressed independently, costs were calculated in a similar manner and cannot be totaled down the column. Costs are divided into total capital cost, and annual operations and maintenance cost.

Personnel
While full implementation of the revised management plan would require a fully developed archaeological staff, it is strongly recommended that an underwater archaeologist be hired to implement the high priority activities under the plan. The archaeologist position will probably be at the GS-11/13 level (approximately $50,000 – 70,000 annually). The secondary support staff would most likely be at the GS-7/9 level (approximately $30,000 to $45,000 annually). Volunteers have proved to be very effective in assisting with cultural resource management. The Sanctuary will continue to seek out and use volunteers.

Equipment
The Sanctuary currently owns and operates a variety of vessels that could be used by archaeological staff to conduct fieldwork. Contracting or cooperating with other organizations for field support equipment may be feasible. Thus, the equipment costs described below reflect a fully developed field unit in order to achieve full implementation and should not be considered limiting in any decision to hire a program archaeologist.

Sufficient equipment will be required so sites can be reached and investigated in a reasonable response time. Such equipment would include a boat, trailer, standard safety and diving gear, position finding and survey capabilities, shallow-excavation equipment, and equipment for underwater recording and recovery. Equipment cost, based on the use of surplus or seized vessels and medium quality diving and surveying equipment, is approximately $100,000. Additional boats of approximately 20 feet in length may be required for oversight of private recovery operations. If government surplus vessels are used, it is estimated that an additional $30,000 may be required for refurbishment and outfitting, with an additional $10,000 for survey, diving, and documentation equipment.

Computers, cameras, drafting tools, storage, and office equipment, could cost as much as $100,000, depending on the level of technological sophistication. However, the bulk of this expense is a one-time outlay. An estimated annual operating budget, including salaries, ranges from $70,000 for an archaeologist to $200,000 for a fully developed field unit.

Contingency Planning for a Changing Budget
If funding is below the level needed for full implementation, cuts could be made in staffing and equipment purchases. Staffing the marine archaeologist position is, however, critical for effective implementation and will be given the highest funding priority under this plan. Contracting for archaeological services or equipment can be explored to conduct interim activities. Other staff members could potentially fill part-time positions within the private-recovery supervision program after training in archaeological methods. An observer may be required on private-recovery vessels at all times to ensure compliance with regulations and permit conditions. A core staff technician could be shared with the biology or damage assessment staff, as both positions include underwater mapping and documentation skills.

The Issue Of Commercial Salvage
One of the issues this Action Plan addresses is commercial salvage. The actions being implemented to address this issue are the result of a long public process, including scoping meetings, workshops, and consideration of numerous and diverse comments from the public and the SAC.

In consultation with the State, which owns abandoned shipwrecks in 65 percent of the Sanctuary, and consistent with the Abandoned Shipwreck Act, commercial salvage of abandoned shipwrecks has been determined not to be a compatible use in areas where there is coral, seagrass or other significant natural resources. However, in areas relatively devoid of significant natural resources, commercial salvage will be permitted for objects of low to moderate historical significance, provided that the recording and reporting of recovery operations, as well as the curation of representative samples of artifacts are consistent with the Programmatic Agreement for MHR Management, as well as Federal Archaeological Program or equivalent standards. The federal program was developed by the National Park Service by Presidential Order, and includes a collection of historical and archaeological resource-protection laws to which federal managers are required to adhere. The National Historic Preservation Act (NHPA) requires federal agencies to develop programs to inventory and evaluate historic resources. NHPA Section 106 requires review of each recovery permit by the State Historic Preservation Office and the Advisory Council on Historic Preservation. Permits within the scope of and which adhere to all provisions of the Programmatic Agreement need not go through an additional NHPA 106 review process.

The Abandoned Shipwreck Act requires that a state's management practices protect shipwrecks, natural resources, and habitat areas, and guarantee recreational access to shipwreck sites. The act's guidelines prohibiting commercial salvage in marine sanctuaries are followed in zoned areas and in areas where there is coral, seagrass or other significant natural resources. Commercial salvage is permitted only for objects of low to moderate historical significance in areas relatively devoid of significant natural resources. There will be no commercial salvage of MHRs of high historical significance. The act provides for private-sector recovery conducted in an archaeologically and environmentally sound manner. Thus, management also preserves selected shipwrecks in the Sanctuary for research and recreation. Other shipwreck sites may contain artifacts more appropriate for recovery and preservation in museums with public access.

Finally, the plan provides for the distribution of certain recovered resources to private parties. Private profit is available through public display, as well as from the sale of gold, silver, jewels, and other redundant, and/or duplicative, objects of little or no historical significance after proper

archaeological recording, analysis and reporting. The Programmatic Agreement provides further details on the criteria and process for decisions regarding recovery and preservation *in situ*.

Accomplishments
There have been a number of accomplishments in the management of maritime heritage resources since implementation of the 1997 management plan, including:

- A Programmatic Agreement for Historical Resource Management in the Sanctuary among NOAA, ACHP, and the State of Florida was executed in June of 1998, establishing guidelines for permits.
- Establishment of a standardized permitting system with resulting issuance of 23 Survey/Inventory, 6 Research/Recovery, and 34 associated amendments and/or renewals.
- 28 permit reports have been submitted and accepted as complete by NOAA and the State covering 16 different MHR investigations. Significant new information on the location, type, age and condition of historic resources has resulted.
- Permit information has been incorporated into a GIS database to facilitate management decision-making.
- The Sanctuary established a Shipwreck Trail for public access to and education about cultural resources in the Sanctuary; nine sites are included in this program.
- Sanctuary staff have educated the general public, diving community, and the marine archeology community through development of a series of presentations and materials on the Shipwreck Trail program.
- Establishment of a Maritime Heritage Resources Inventory Team staffed by volunteers to document and inventory shipwreck sites within its boundaries. This team has performed a vast amount of underwater and archival research, which has resulted in documenting 550 sites in the five-volume set, *Underwater Resources of the Florida Keys National Marine Sanctuary Northeast Region*.
- 174 Heritage assets have been professionally conserved, incorporated into a heritage asset database and display at the FKNMS Upper Region Office. Several of these artifacts were deemed to be threatened triggering management recovery actions.
- A research plan was implemented to document and interpret a previously unknown wreck in 230 ft. of water that was brought to the Sanctuary's attention by the recreational diving community. Results indicate the shipwreck to be of historical significance commensurate with listing in the National Register of Historic Places.
- The USCG Duane artificial reef was listed in the National Register of Historic Places on May 16, 2002. Indiana University Underwater Science and Educational Resources Program prepared the nomination. Direction, coordination, funding and logistical support for this and other field school efforts were provided by FKNMS during the period.

Strategies
There are five non-regulatory management strategies in this Maritime Heritage Resources Action Plan.

- MHR.1 MHR Permitting
- MHR.2 Establishing an MHR Inventory
- MHR.3 MHR Research and Education
- MHR.4 Ensuring Permit Compliance

- MHR.5 Ensuring Interagency Coordination

Each of these strategies is detailed below. Table 3.9 provides estimated costs for implementation of these strategies over the next five years.

Table 3.9 Estimated Costs of the Maritime Heritage Resources Action Plan

Maritime Heritage Resources Action Plan Strategies	Estimated Annual Cost (in thousands)*					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
MHR.1: MHR Permitting	250	170	120	90	120	*750*
MHR.2: Establishing an MHR Inventory	70	95	20	-	15	*200*
MHR.3: MHR Research and Education	5	165	50	-	-	*220*
MHR.4: Ensuring Permit Compliance through Enforcement	10	-	-	10	-	*20*
MHR.5: Ensuring Interagency Coordination	10	10	-	-	-	*20*
Total Estimated Annual Cost	*345*	*440*	*190*	*100*	*135*	*1,210*

* Contributions from outside funding sources also anticipated.

STRATEGY MHR.1 MHR PERMITTING

Strategy summary
A permit system facilitates access and multiple uses compatible with resource protection. Non-intrusive access is not prohibited and does not require a permit. Resource removal without a permit is prohibited. Such permits are based on the regulations for all permits, as well as factors and criteria in the regulations for MHR permits, which are detailed in the Programmatic Agreement. A site's historical/cultural value and significance, recreational value, environmental impact of the activity, professional qualifications of the applicants, proposed methods of research, recovery, conservation, and public benefit are considered. Applications that provide for conservation in museums or similar places of public access for research, education, or public viewing have priority over applications in which the objects are dispersed. When the applicant plans to disperse objects in the private market, disposition of artifacts will be considered on a case by case basis. Where the applicant has arranged for private conservation, long term public display, guaranteed public access, and public interpretation of artifacts and data, the disposition of objects may be adjusted accordingly. Proposals where the entire collection is conserved in private museums but available for research and public access are encouraged. No permits will be issued for excavation in areas where coral, seagrass, or other significant natural habitats would be adversely impacted.

The Sanctuary requires permits for activities prohibited by Sanctuary regulations or which otherwise may adversely affect Sanctuary resources. Such permits may be granted only in accordance with existing laws and policies. NOAA encourages uses that do not adversely affect resources (including archaeological information) or interfere with other Sanctuary uses.

A survey and inventory permit is not required for remote-sensing activities, but a survey and inventory report is required before considering the issuance of a research and recovery permit. Those who conduct remote sensing without a permit are encouraged to report results to the Sanctuary.

A factor considered in evaluating a research-and-recovery permit is whether the applicant has demonstrated professional and scientific abilities in the survey-inventory phase. An archaeological research-and-recovery permit is required to remove historical resources. The historic resources must be maintained in a museum or similar institution where public access for research, education and viewing enjoyment is provided.

A de-accession-and-transfer permit is required to privatize the public resources recovered under a research-and-recovery permit. The de-accession-and-transfer permit is subject to the requirements for Special-use permits. Removal of historic resources requires a substantial justification of public interest, consistent with the purposes and policies of the Sanctuary described in the Programmatic Agreement and the Abandoned Shipwreck Act guidelines.

The Sanctuary Program, Florida Division of Historic Resources (FDHR), and legal staff have worked together to develop a framework for MHR management of submerged lands within the Sanctuary consistent with the NMSA, the Abandoned Shipwreck Act (ASA) guidelines, and State law. This framework is formalized in the Programmatic Agreement among NOAA, the Advisory Council on Historic Preservation, and the State of Florida for Historical Resource Management in the FKNMS.

The regulations, MHR Programmatic Agreement and permit guidelines have been completed. Subsequent guidelines and other activities discussed below are under consideration. This activity will have a high level of action and be on-going.

Activities (3)

(1) Create An MHR Field Unit. A field unit would be established to conduct field research and coordinate permitted research activities. NOAA recognizes the need to develop field expertise relating to archaeological investigations in the Sanctuary and will seek the funding to hire an underwater archaeologist and provide necessary support staff and equipment.

> *Status:* This activity will have a high level of action in the first year after adoption of this revised plan. Depending on funding, it may require longer to complete. Contracting archaeological services in the field will be considered as an interim measure in addition to the continued use of volunteers to carry out field activities.
> *Implementation:* NOAA will be the lead agency; FDHR will assist.

(2) Monitor MHR Site Degradation. Conduct long-term monitoring of selected sites based on significance and recreational value to determine if environmental conditions and human use affect site integrity to provide information for permit decision-making

> *Status:* Implemented and on-going.
> *Implementation:* NOAA will be the lead agency; FDHR will assist.

(3) Evaluate Excavation and Mitigation Techniques. Evaluate emergent technologies that lead to less disturbance and more efficient recovery. These technologies include but are not limited to turbidity screens, sediment removal equipment, and seagrass restoration or relocation protocols.

> *Status:* Implemented and on-going.
> *Implementation:* NOAA will be the lead agency. FDEP and FDHR will assist.

STRATEGY MHR.2 ESTABLISHING AN MHR INVENTORY

Strategy Summary
The purpose of this strategy is to create a bibliography and computerized database in a standard format and, where appropriate, make it publicly accessible over the Internet. It also seeks to identify and survey site locations and characteristics including name, age, integrity, historical and cultural significance, sensitivity, and recreational value. The inventory is a long-term management goal and will be a continuous project for the Sanctuary.

NOAA, FDHR and several nonprofit organizations have completed some survey and inventory activities. Together, they have compiled and organized data on the location, identity, and significance of certain historical shipwrecks. The Cultural and Historic Resources section of the Description of the Affected Environment chapter (Volume II of 1997 Final Management Plan) contains additional information on many of the known significant cultural resources within the Sanctuary. The *Maritime Heritage Inventory* volumes are available from the Sanctuary. Currently, staff is working to develop prioritized plans for known sites that cover management, research, interpretation, and access strategies (this is with reference to the scope of work being developed to assess current knowledge and develop site specific management plans).

Activities (6)

(1) Use MHR Information Developed in Permits, Authorizations or Certifications. Part of the permit process generally includes assessment of the natural and cultural resources in the area. The plan also provides for public and private surveys and inventories the resources. NOAA does not release information protected by its policy on business confidentiality.

> *Status:* On-going.
> *Implementation:* NOAA will be the lead agency in consultation with the FDHR.

(2) Survey and Collect Anecdotal Information. Community knowledge will be cultivated through surveys of fishermen, recreational divers, recreational dive facilities, salvors and others with local knowledge. A program of professional and amateur public participation will be developed. This information, when verified, will be incorporated into the resource inventory for periodic updating to the master inventory.

> *Status:* Implemented and on-going.
> *Implementation:* NOAA will be the lead agency with assistance from FDEP and FDHR.

(3) Use Volunteer Assistance in Cultural Resources Inventory. The Sanctuary's volunteer coordinator, using volunteers, will continue to assist staff in collecting information, locating unrecorded sites, recording and documenting sites, assessing site significance, and developing sites for improved public access, interpretation, and protection.

> *Status:* Implemented and on-going.
> *Implementation:* FKNMS volunteer coordinator; FDHR will assist.

(4) Conduct Public Participation Projects Inventory. Research and educational institutions (using students and volunteers) will conduct maritime heritage resources inventory projects, involving the public in the inventory phase of the investigations.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency responsible for implementing this activity; FDHR will assist.

(5) Develop a Site Database. A central database of shipwreck information will be maintained by the Sanctuary, in cooperation with the Florida Site File at the FDHR. Projects will be designed that are appropriate for grant funding by the department, Coastal Zone Management Program, and other sources. The data collected for non-sensitive sites may also be incorporated with other geological, biological, and census data into a geographic information system in order to analyze relationships among the resources and facilitate management.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency; FDEP, and FDHR will assist.

(6) Create a Public Awareness Program. Develop educational tools such as brochures, posters, videos, and an Internet site to inform the public about volunteer opportunities and training. Distribute protocols for the public when a MHR is located within the Sanctuary in coordination with the Education and Outreach Action strategies.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency; FDHR will assist.

STRATEGY MHR.3 MHR RESEARCH AND EDUCATION

Strategy Summary
NOAA and the state of Florida have been addressing research and education considerations throughout the initial management plan period. Contractors have performed a significant amount of research through the development of the Shipwreck Trail. The Sanctuary has supported marine archaeological field schools, made presentations at professional meetings, and held public workshops on the program. This strategy includes seven activities.

Activities (7)

(1) Train Volunteers. A volunteer training program for general public involvement in research, documentation, and management will be continued. Emphasis is to be placed on increasing effectiveness through curriculum development and enhancement.

> *Status:* Implemented and on-going.
> *Implementation:* The Sanctuary's volunteer coordinator is responsible for implementing cooperation with a staff or contract archaeologist and the Shipwreck Trail's education coordinator. The FDHR will assist.

(2) Manage Public Participation Projects. A series of projects to involve the public in the long-term management of maritime heritage resources and promote stewardship through public involvement will be continued. Currently, the Maritime Heritage Resources Inventory volunteer program is most active in the Upper Region and will require greater emphasis in the Lower and Middle Keys.

> *Status:* On-going.
> *Implementation:* NOAA is the lead agency; FDHR will assist.

(3) Coordinate with University Field Schools. The Sanctuary will facilitate archaeological research by providing scientific, logistical, and other support, including materials available on the Internet.

> *Status:* On-going.
> *Implementation:* NOAA and the FDHR will be the lead agencies; FDEP will assist.

(4) Expand The Shipwreck Trail. The Shipwreck Trail, developed to provide an on-water and on-land interpretive exhibit for the public, will be evaluated to improve effectiveness. The Shipwreck Trail education coordinator will work with the dive community, schools and the public to expand the activities. The appropriateness of adding new trail sites with historical or recreational significance will be examined. The possibility of monitoring existing sites using volunteers to gain information about impacts will also be evaluated. The Sanctuary Education Action plan has incorporated maritime heritage resource education activities.

> *Status:* On-going.
> *Implementation:* NOAA will lead the education staff. NOAA and the FDHR will assist lead determinations about monitoring protocols and expansion proposals.

(5) Develop an Interpretive Exhibit. An interpretive exhibit of the archaeological sites and their historic context will be developed in conjunction with the development of the Dr. Nancy Foster Florida Keys Environmental Center in Key West to provide the public with information about maritime heritage resources in the Sanctuary. Long-term plans will include provisions for increasing public access to information.

Status: On-going.
Implementation: The FDHR and NOAA will be the lead agencies.

(6) Develop a Scientific Research Study Program. The Sanctuary Program will encourage and coordinate scientific studies by recognized research groups and institutions. A plan outlining the MHR research priorities will be developed and incorporated into the overall scientific research study program.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency; FDEP, FDHR, and a state Historic Preservation Officer will assist. Opportunities to collaborate with the National Park Service will be explored.

STRATEGY MHR.4 ENSURING PERMIT COMPLIANCE THROUGH ENFORCEMENT

Strategy Summary

The purpose of this strategy is to ensure compliance with statutes, rules, Sanctuary regulations, and permits through intensive on-site patrols by authorized law enforcement officers. Currently, NOAA, the State, and other agencies are cross-deputized with Sanctuary law enforcement authority. Sanctuary and other pertinent regulations and laws are enforced jointly with an emphasis on public education as a tool for compliance. Officers will receive training to facilitate interpretive enforcement.

Activity

(1) Develop an MHR educational program for law-enforcement personnel. This program will be part of a standardized training program for cross-deputized enforcement agencies and is included in the cross-deputization strategy of the Enforcement Action Plan.

Status: Implemented and on-going.
Implementation: NOAA, FWCC, and FDHR.

STRATEGY MHR.5 ENSURING INTERAGENCY COORDINATION

Strategy Summary
The purpose of this strategy is to facilitate comprehensive coordination among federal, state, and local agencies involved in the management of maritime heritage resources to explore collaborative projects and sharing of information. Currently, NOAA and the FDHR collaborate under the Programmatic Agreement. The terms of the Programmatic Agreement and the final Management Plan specify the responsibilities and roles of various parties to ensure the timely and effective coordination of activities.

Activities (6)

(1) Develop a Flow Chart. Include all agencies that participate in managing maritime heritage resources, indicating roles, responsibilities and time lines. Describe procedures for shipwrecks of possible sovereign interest, and notify permit holders changes in procedures and policies.

Status: New activity; 18 months to complete.
Implementation: NOAA will be the lead agency; FDHR will assist.

(2) Develop Cooperative Projects and Programs. NOAA will seek to develop cooperative projects, share information, and combine resources with other agencies involved in historical research. NPS, which conducts similar programs in other parks, has significant expertise and experience in this area and shares significant common borders with the Sanctuary. Enhanced interagency coordination can directly benefit the development of the Sanctuary's MHR Research and Study Program.

Status: On-going.
Implementation: NOAA will be the lead agency with assistance from DEP and FDHR.

(3) Use Volunteer Assistance in Cultural Resources Inventory. The Sanctuary's volunteer coordinator, using volunteers, will continue to assist staff in collecting information, locating unrecorded sites, recording and documenting sites, assessing site significance, and developing sites for improved public access, interpretation, and protection.

Status: Implemented and on-going.
Implementation: FKNMS volunteer coordinator; FDHR will assist.

(4) Conduct Public Participation Projects Inventory. Research and educational institutions (using students and volunteers) will conduct maritime heritage resources inventory projects, involving the public in the inventory phase of the investigations.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency responsible for implementing this activity; FDHR will assist.

(5) Develop a Site Database. A central database of shipwreck information will be maintained by the Sanctuary, in cooperation with the Florida Site File at the FDHR. Projects will be designed that are appropriate for grant funding by the department, Coastal Zone Management Program, and other sources. The data collected for non-sensitive sites may also be incorporated with other geological, biological, and census data into a geographic information system in order to analyze relationships among the resources and facilitate management.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency; DEP, and FDHR will assist.

(6) Create a Public Awareness Program. Develop educational tools such as brochures, posters, videos, and an Internet site to inform the public about volunteer opportunities and training. Distribute protocols for public when an MHR is located within the Sanctuary in coordination with the Education and Outreach Action strategies.

Status: Implemented and on-going.
Implementation: NOAA will be the lead agency; FDHR will assist.