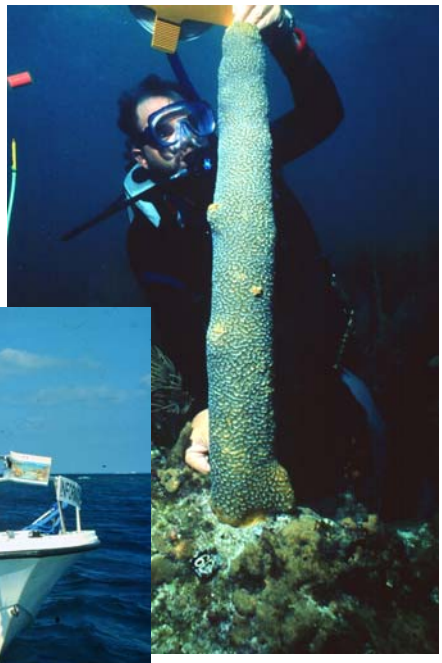
Florida Keys
National Marine Sanctuary
Draft Revised Management Plan



February 2005

U.S. Department of Commerce

National Oceanic and
Atmospheric Administration

National Ocean Service

National Marine Sanctuary Program

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

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Note to Reader

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

ABOUT THIS DOCUMENT

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

Sanctuary Characteristics

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

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

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

Management Plan Organization

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

Accomplishments and Highlights

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

Table of Contents

List of Figures

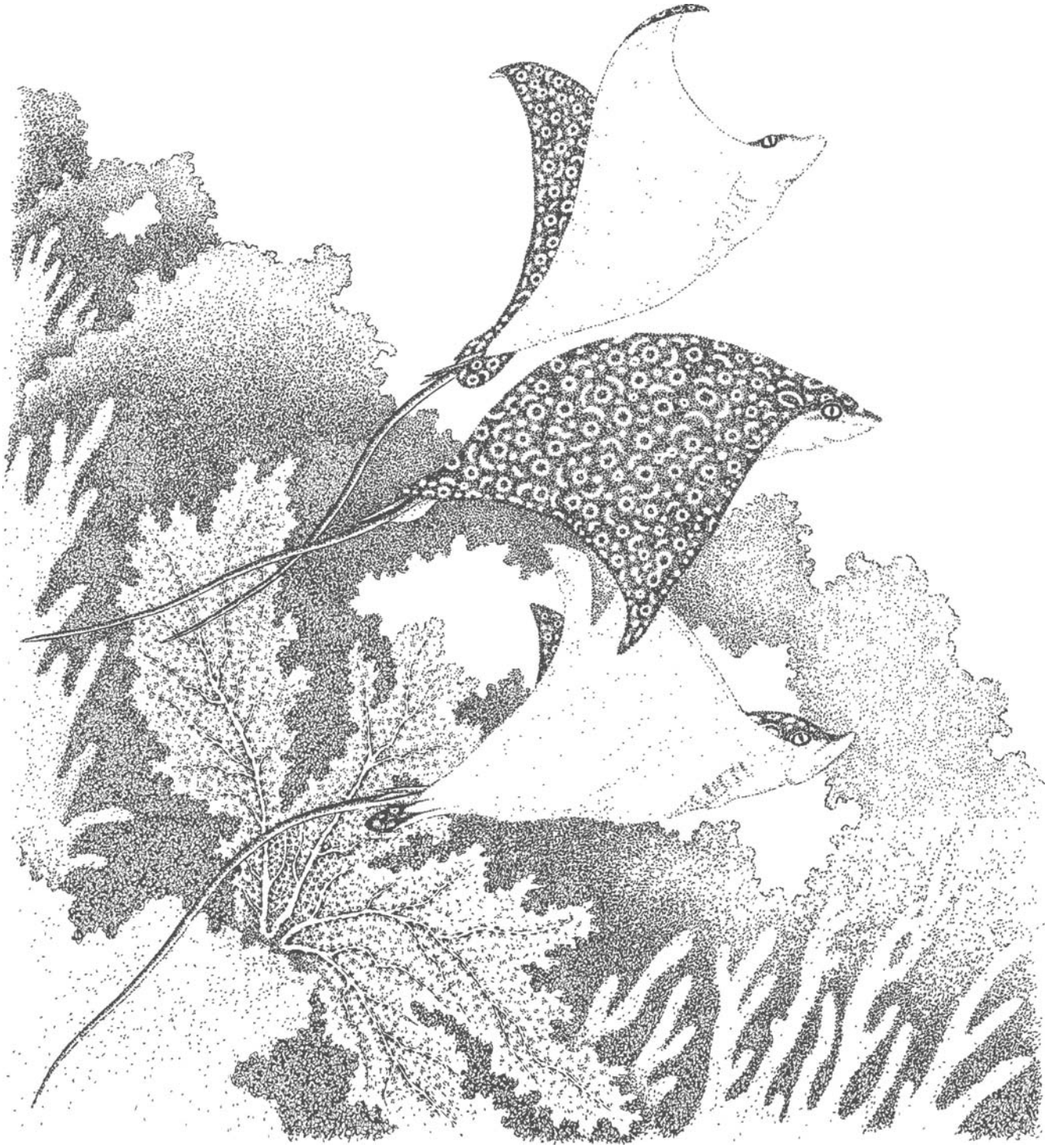
List of Tables

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

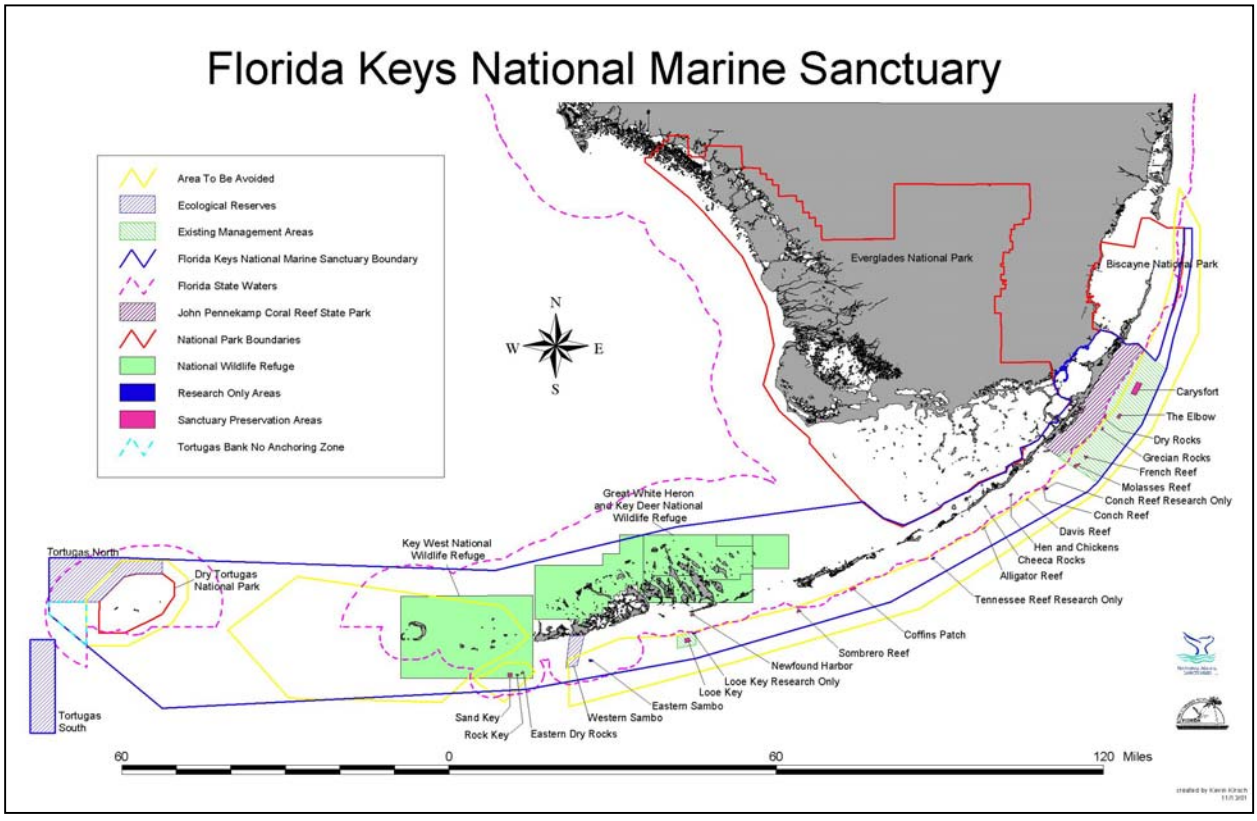
National Park and up its eastern boundary along the reef tract at a depth of approximately 60 feet until its northeastern-most point.

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.

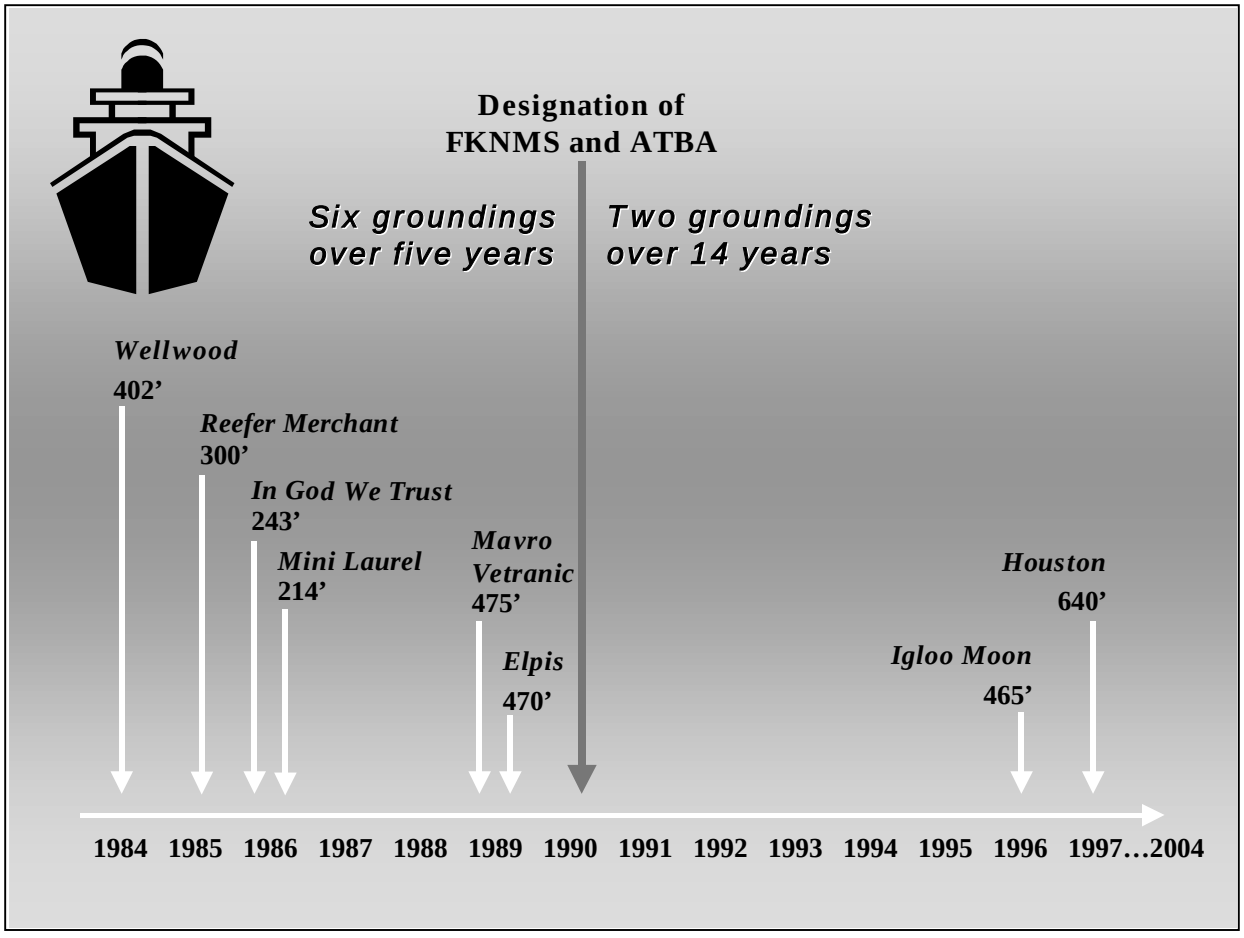
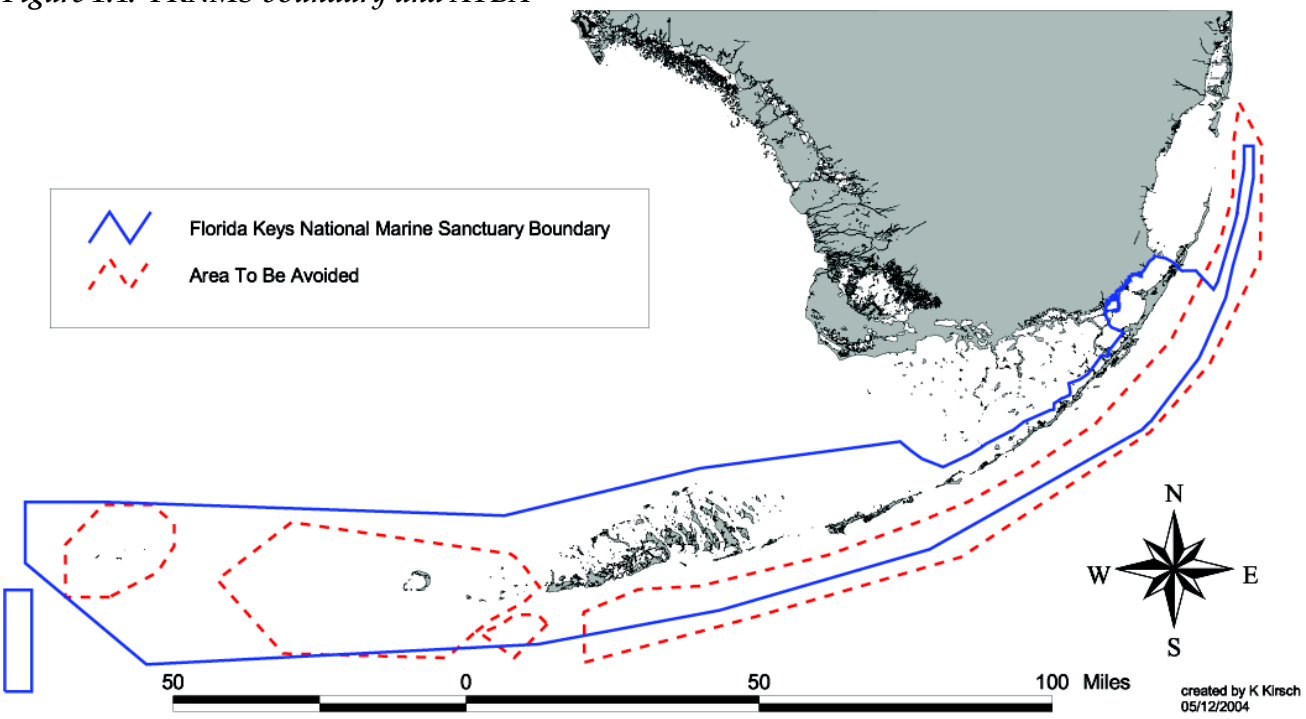


Figure 1.4. FKNMS boundary and ATBA



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.

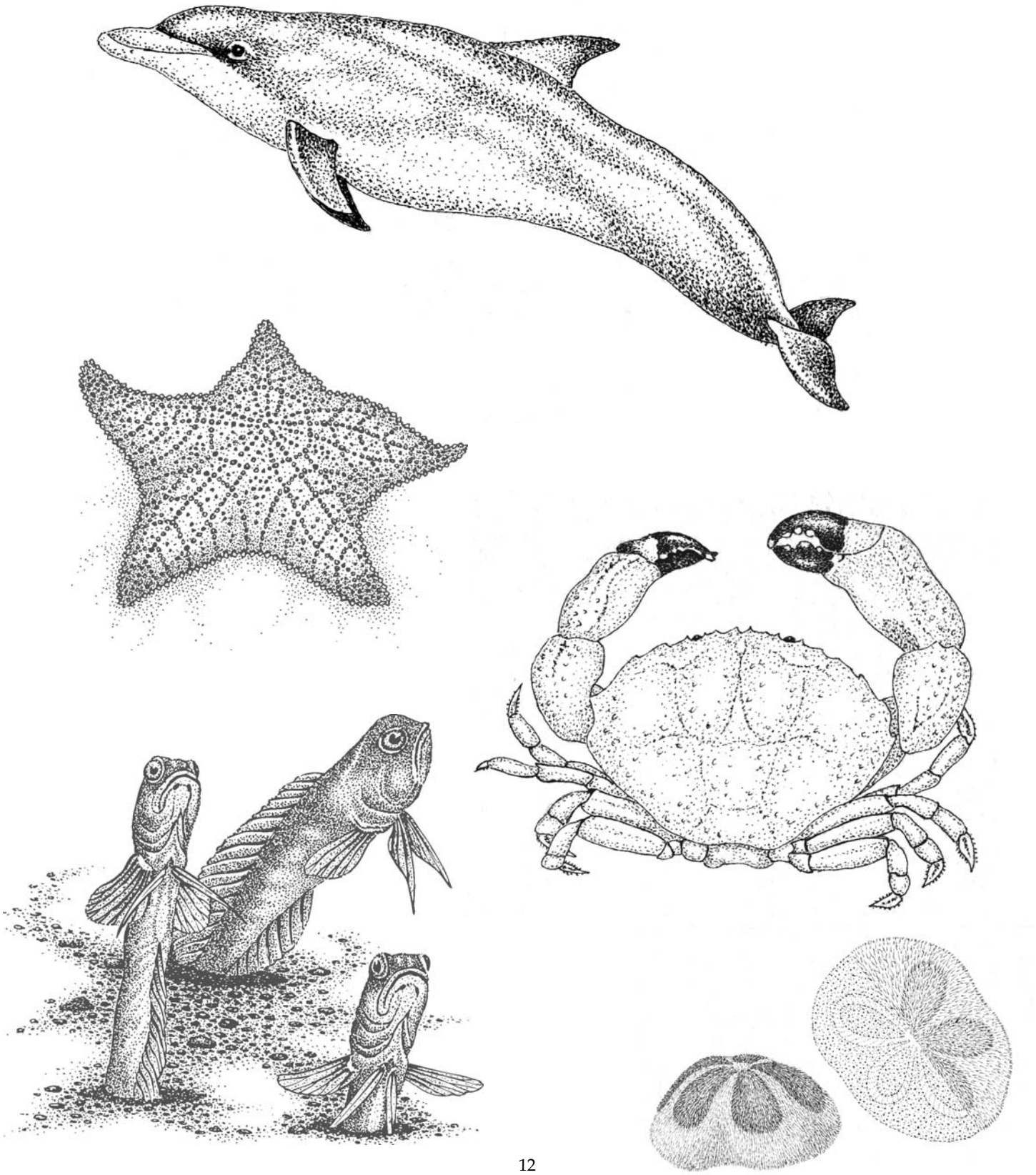
9. Damage Assessment and Restoration. The Damage Assessment and Restoration Action Plan is new to this document but is based on accumulated data and lessons learned since 1982. The cross-disciplinary strategies will prove useful in reducing the number of vessel groundings in Sanctuary waters as well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

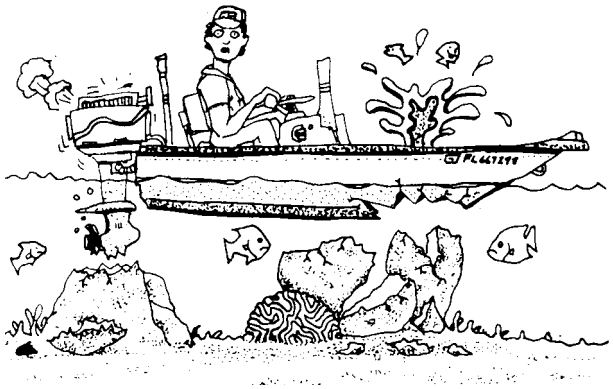
Most pressures stem from the 5 million annual visitors and 80,000 year-round residents. Their high levels of use in the Sanctuary have significant direct and indirect effects on the ecosystem. Sanctuary visitors primarily seek water-related recreation, including fishing, diving, snorkeling, and boating.

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.

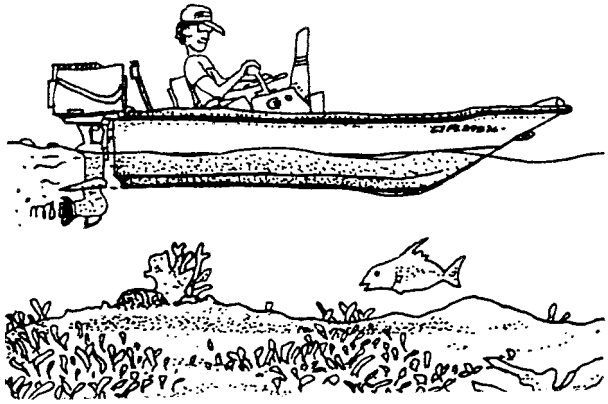
In Florida Bay, reduced freshwater flow has increased plankton blooms, sponge and seagrass die-offs, and fish kills. Since Florida Bay and nearshore waters provide important nursery and juvenile habitat for a variety of reef species, the declines in these areas affect the overall health and structure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

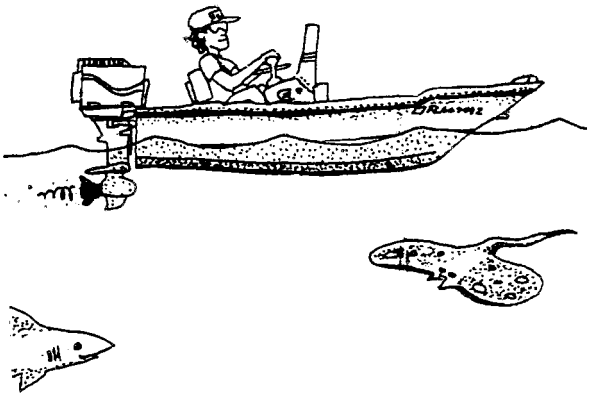
3.0 ACTION PLANS



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	●	●	●

3.4 RESOURCE THREAT REDUCTION

Resource protection and conservation can be achieved with non-regulatory tools such as those action plans bundled in this management division. Those action plans include: the Marine Zoning Action Plan; the Mooring Buoy Action Plan; the Waterway Management Action Plan; and the Water Quality Action Plan. Each of these action plans contains tools that allow managers to directly protect and conserve Sanctuary resources through the implementation of various management strategies. These action plans when implemented provide very targeted means of protecting resources whether it is by establishing marine zones to conserve Sanctuary resources or by providing mooring buoys to eliminate anchor damage to corals in high-use areas. The effective marking of channels and waterways to aid in the prevention of vessel groundings is yet another non-regulatory approach to protecting Sanctuary resources.

Water quality degradation is the primary issue that is affecting the health and vitality of Sanctuary resources. This management division includes the Water Quality Action Plan that is designed to identify the sources of water quality decline and to outline the various corrective management actions that need to be implemented to improve water quality.

3.4.1 Marine Zoning Action Plan

Introduction
In its enabling legislation, Congress instructed NOAA to consider temporal and geographical zoning to ensure protection of Sanctuary resources. During the development of the 1997 *Management Plan*, NOAA and its partners determined that marine zoning would be critical to achieving the Sanctuary's primary goal of resource protection, especially in light of the multiple-use mandates.

The FKNMS established the nation's first comprehensive network of marine zones in 1997 after years of planning, design, and public input. The marine zoning plan for the Sanctuary includes five types with varying levels of protection called Sanctuary Preservation Areas (SPAs), Ecological Reserves, Special-use Areas, Wildlife Management Areas (WMAs), and Existing Management Areas.

In its 2001 evaluation of the this Action Plan, the SAC found that the five strategies in the 1997 Zoning Action Plan had been implemented according to the 1997 *Final Management Plan*. This represents a highly effective component of Sanctuary management. The Advisory Council also found that marine zoning is one of the most immediately successful tools used by the Sanctuary for conservation and protection of threatened natural marine resources. The Sanctuary's zones have met with favorable response from the community, and many areas are effecting positive biological change inside their boundaries after just a few years of protection.

Public comments during scoping as well as comments received by Sanctuary Managers since the implementation of the Marine Zoning Action Plan in 1997 have resulted in the consideration of additional WMAs and SPAs in the FKNMS. These areas will be proposed through a separate regulatory process (also see Strategy R.2, Regulatory Action Plan, Activity 17).

Types of Zones In The Sanctuary
There are five types of zones in the Sanctuary: Sanctuary Preservation Areas, Ecological Reserves, Special-use (Research-only) Areas, Wildlife Management Areas, and Existing Management Areas.

Sanctuary Preservation Areas
SPAs protect shallow, heavily used reefs where conflicts occur among user groups and where concentrated visitor activity leads to resource degradation. These zones encompass discrete, biologically important areas and are designed to reduce user conflicts and sustain critical marine species and habitats. Regulations for SPAs are designed to limit consumptive activities while continuing to allow activities that do not threaten resource protection. There are eighteen SPAs totaling approximately 6.5 square nautical miles. The largest area is Carysfort/South Carysfort, and the smallest areas are Dry Rocks and Cheeca Rocks.

Ecological Reserves
Ecological Reserves seek to protect biodiversity by setting aside areas with minimal human disturbance. Ecological Reserves encompass large, contiguous, diverse habitats, in order to protect and enhance natural spawning, nursery, and permanent-residence areas for the replenishment and genetic protection of fish and other marine life. Allowing certain areas to evolve in or return to a natural state preserves the diverse range of resources and habitats throughout the Sanctuary. Ecological Reserves protect the food and home of commercially and recreationally important species, as well as the hundreds of marine organisms not protected by fishery management regulations.

Regulations for Ecological Reserves are designed to meet the objectives of these zones by limiting consumptive activities while continuing to allow activities that do not threaten resource protection. Ecological Reserves therefore restrict all consumptive activities and allow non-consumptive activities only where such activities are compatible with resource protection. There are currently two Ecological Reserves in the Sanctuary, the Western Sambo Ecological Reserve and the Tortugas Ecological Reserve, totaling approximately 160 square nautical miles (548 square kilometers).

Special-use (Research-only) Areas
Special-use (Research-only) Areas are set aside for research and education, or for the recovery or restoration of injured or degraded resources. Special-use Areas may also be established to facilitate access to or use of Sanctuary resources, or to prevent user conflicts. The areas may confine or restrict activities such as personal watercraft operation and live-aboard mooring. Access is restricted to permitted entry only. The four permanent Special-use Areas in the Sanctuary are designated for Research-only and are located at Conch Reef and Tennessee Reef in the Upper and Middle Keys, and Looe Key Patch Reef and Eastern Sambo in the Lower Keys.

Wildlife Management Areas
Wildlife Management Areas (WMAs) seek to minimize disturbance to especially sensitive or endangered wildlife and their habitats. These zones typically include bird nesting, resting, or feeding areas, turtle-nesting beaches, and other sensitive habitats. Regulations are designed to protect these species or the habitat while providing for public use. Access restrictions may include no-access buffers, no-motor zones, idle-speed only/no-wake zones, and closed zones. Some restrictions may apply to time periods, others to areas. There are currently 27 WMAs in the Sanctuary. Twenty WMAs are co-managed with the U.S. Fish and Wildlife Service as part of their plan for managing backcountry portions of the Key West, Key Deer, Great White Heron, and Crocodile Lake National Wildlife Refuges. NOAA manages the remaining seven WMAs.

Existing Management Areas
Existing Management Areas are resource management areas that were established prior to the 1997 Sanctuary management plan. Sanctuary regulations supplement the existing authorities to facilitate comprehensive protection of resources. There are 21 Existing Management Areas in the Sanctuary. Fifteen are administered by the Florida Department of Environmental Protection, four by the US Fish and Wildlife Service, and two by NOAA (Key Largo and Looe Key National Marine Sanctuaries).

Goals and Objectives
Marine zoning's purpose is to protect and preserve sensitive components of the ecosystem while facilitating compatible activities. Marine zoning ensures that areas of high ecological importance evolve naturally, with minimal human influence. Marine zoning also promotes sustainable uses, protects diverse habitats, and preserves important natural resources and ecosystem functions. The objectives for marine zoning are to:

- Reduce stresses from human activities by establishing areas that restrict access to sensitive wildlife populations and habitats.
- Protect biological diversity and the quality of resources by protecting large, contiguous and diverse habitats that provide natural spawning, nursery, and permanent residence areas for the replenishment and genetic protection of marine life and protect and preserve all habitats and species.

- Minimize conflicting uses.
- Protect resources and separate conflicting uses by establishing a number of non-consumptive zones in areas that are experiencing conflict between consumptive and non-consumptive uses and in areas experiencing significant declines.
- Eliminate injury to critical or sensitive habitats.
- Disperse concentrated collection of marine organisms.
- Prevent heavy concentrations of uses that degrade Sanctuary resources.
- Provide undisturbed monitoring sites for research.
- Provide control sites to help determine the effects of human activities.

Implementation

NOAA remains the primary agency responsible for Ecological Reserves, Sanctuary Preservation Areas, and Special-use Areas in the Sanctuary. NOAA is also responsible for seven Wildlife Management Areas and shares responsibility and jurisdiction over 20 Wildlife Management Areas with the FWS. The 21 Existing Management Areas within the Sanctuary are administered by a variety of Federal and state agencies, including NOAA. Any additional management areas proposed by Federal, state, or county governments or local municipalities would be administered under the jurisdiction of those authorities.

The Sanctuary has the lead responsibility for implementing zoning strategies outlined in this action plan. NOAA staff continues to be directly responsible for maintaining zone boundary markings. Continued, full implementation of the Marine Zoning Action Plan often requires participation of various agencies and organizations, volunteer support, and private vendors for specific activities. NOAA remains the primary funding source for strategies in this action plan, except for marking the Wildlife Management Areas in FWS jurisdictions.

Marine Zoning Maps

This Marine Zoning Action Plan describes specific activities related to establishing, marking, implementing, and evaluating marine zones. Maps showing the marine zones can be found at http://floridakeys.noaa.gov/research_monitoring/map.html.

Relationship to Other Action Plans

Several other Action Plans are either directly or indirectly connected to marine zoning activities in the Sanctuary, such as:

- The Enforcement Action Plan describes enforcement strategies.
- The Waterway Marking/Management Action Plan describes marking and maintenance of boundary buoys or signs.
- The Mooring Buoy Action Plan describes buoy placement in many of the zones.
- The Education and Outreach Action Plan describes education and outreach programs aimed at interpreting the zones.
- The Research and Monitoring Action Plan and Science Management and Administration Action Plan describe monitoring of the zones, dissemination of monitoring results, and the degree to which the zones meet their goals and objectives.

Accomplishments
There have been multiple zoning accomplishments during implementation of the 1997 management plan, including:

- Designated the Tortugas Ecological Reserve in the westernmost portion of the Sanctuary. The process began by establishing a diverse, 25-member Tortugas 2000 Working Group and culminated with the release of the *Final Supplemental Environmental Impact Statement / Final Management Plan* for *the Tortugas Ecological Reserve* in November 2000.
- Gathered extensive input and public participation in the Tortugas Ecological Reserve process that highlighted the importance of this zoning issue to the local and national community. The area received all agency approvals necessary and was fully implemented on July 1, 2001.
- Implemented a Zone Monitoring Program to examine the effects of the fully protected zones on marine resources.
- Established a temporary and then permanent rule to protect living corals and significant habitats of Tortugas Bank from anchor damage by freighters.
- Deployed 118 boundary markers (highly visible 30-inch yellow buoys) for the 18 Sanctuary Preservation Areas, four Special-use Areas, and the Western Sambo Ecological Reserve.
- Deployed boundary markers for the Wildlife Management Areas and adjacent no-motor zones.
- Developed a simple, no-cost permit system to allow the netting of bait fish in certain zones.
- Prioritized Sanctuary enforcement in "no take" areas, resulting in a high level of compliance.
- Instituted education and outreach efforts, such as Team OCEAN and participation in public events and presentations, resulting in a better-informed public and greater compliance.

Strategies
There are five management strategies in this Marine Zoning Action Plan. Each of these strategies is detailed below.

- Z.1 Sanctuary Preservation Areas
- Z.2 Ecological Reserves
- Z.3 Special-use Areas
- Z.4 Wildlife Management Areas
- Z.5 Existing Management Areas

Each of these strategies is detailed below. Table 3.10 provides estimated costs for implementation of these strategies over the next five years.

Table 3.10 Estimated Costs of the Marine Zoning Action Plan

Marine Zoning Action Plan Strategies*	Estimated Annual Cost (in thousands)					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
Z.1: Sanctuary Preservation Areas	100	120	100	80	80	*480* [1,2]
Z.2: Ecological Reserves	100	120	100	80	80	*480* [1,2]
Z.3: Special-use Areas	100	120	100	80	80	*480* [1,2]
Z.4: Wildlife Management Areas	100	120	100	80	80	*480* [1,2]
Z.5: Existing Management Areas	-	-	-	-	-	-
Total Estimated Annual Cost	*400*	*480*	*400*	*320*	*320*	1,920

* Cost estimates are for "programmatic" funds, which exclude base budget funding requirements (existing salaries, overhead, etc.).

[1] Estimated 5 Year Cost listed here does not include funding for placement and maintenance of buoys and markers along zone boundaries. Refer to Waterway Management Action Plan for these figures.

[2] Estimated 5 Year Cost listed here does not include funding for monitoring, evaluating, and reporting on zone effectiveness. Refer to Research and Monitoring Action Plan for these figures.

STRATEGY Z.1 SANCTUARY PRESERVATION AREAS

Strategy Summary
Sanctuary Preservation Areas have been established to protect shallow, heavily used reefs where conflicts occur among user groups, and where concentrated visitor activity leads to resource degradation. The zones encompass discrete, biologically important areas and are designed to reduce user conflicts in high-use areas and sustain critical marine species and habitats.

Regulations for Sanctuary Preservation Areas seek to limit consumptive activities while continuing to allow activities that do not threaten resource protection. Therefore consumptive activities are restricted with two exceptions. The first exception is that NOAA currently allows catch-and-release fishing by trolling in four preservation areas: Conch Reef, Alligator Reef, Sombrero Key, and Sand Key. The second exception is that the taking of ballyhoo (bait fish) by cast and lampara nets is currently allowed by permit in all Sanctuary Preservation Areas. Non-consumptive activities are allowed in all of these zones. The full regulations for Sanctuary Preservation Areas are in Appendix C.

There are currently 18 Sanctuary Preservation Areas, totaling approximately 6.5 square nautical miles. The largest is Carysfort/South Carysfort, and the smallest are Dry Rocks and Cheeca Rocks. Maps and coordinates can be found at http://floridakeys.nos.noaa.gov/research_monitoring/map.html.

Activities (8)

(1) Maintain Buoys Along Zone Boundaries. Boundary buoys have been placed at the corner of each Sanctuary Preservation Area. Buoys carry stickers to clarify no-take regulations. For all Sanctuary Preservation Areas, buoy positions may be altered to clearly distinguish zone boundaries. NOAA continues to provide regular buoy maintenance under the Waterway Management Action Plan.

> *Status:* Buoys have been placed at the corner of each Sanctuary Preservation Area.
> *Implementation:* Buoys continue to be maintained by NOAA under the Waterway Management Action Plan.

(2) Establish and Implement Management Responsibilities. The Sanctuary continues to oversee all aspects of zone management for Sanctuary Preservation Areas. Eighteen areas have been fully implemented. Mooring buoys are installed and maintained to facilitate non-consumptive use and reduce anchor damage, as described in the Mooring Buoy Action Plan. Research and monitoring aimed at determining the efficacy of these areas in preserving species populations and habitats are described in the Research and Monitoring Action Plan. Regulations for all Sanctuary Preservation Areas are listed in Appendix C.

Enforcement in Sanctuary Preservation Areas has been minimal to date, which may compromise their ecological integrity and reduce their effectiveness in separating use conflicts. A strategy to address enforcement by increasing officers is contained in the Enforcement Action Plan.

NOAA also recognizes that public compliance with zone regulations is greatly enhanced through education and outreach. To this end, strategies that address public education and outreach are of high priority and further explained in the Education and Outreach Action Plan. Despite excellent

educational products and programs, interpreting the boundaries of the marine zones continues to be a priority. These issues are discussed in Activities below. Addressing these issues and altering Sanctuary Preservation Areas is critical to reducing conflicts and protecting the shallow, heavily used reefs as intended by this designation.

> *Status:* All 18 Sanctuary Preservation Areas have been fully implemented.
> *Implementation:* NOAA will continue to manage all Sanctuary Preservation Areas.

(3) Assess Existing Zone Boundaries and Adjust as Needed. The placement of Sanctuary Preservation Areas requires periodic evaluation and adjustment as new scientific data, socioeconomic and use information, user group knowledge, and other information become available. Some boundaries may be altered to remove strain from degraded habitats, protect unique features, or facilitate certain uses.

Boundary changes may also be appropriate in areas where use conflicts occur or enforcement is problematic. The configuration and regulations of some zones needs to be evaluated and altered to improve enforcement and protection.

> *Status:* Boundaries of the Sanctuary Preservation Areas, including the Conch Reef Sanctuary Preservation Area and adjacent Conch Reef Special-use/Research-Only Area, have yet to be assessed.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake a boundary assessment of the Sanctuary Preservation Areas when resources permit. At that time the Conch Reef Sanctuary Preservation Area and Conch Reef Special-use/Research-Only Area will be given priority.

(4) Evaluate Allowable Activities in Existing Zones and Make Regulatory Changes as Needed. Sanctuary Preservation Areas have specific regulations that allow and disallow certain activities within the zones. Unlike Ecological Reserves, which prohibit all consumptive activities without exception, Sanctuary Preservation Areas restrict consumptive uses but do permit limited taking of marine life by specific methods in specific zones. Catch-and-release fishing by trolling is allowed in four areas: Conch Reef, Alligator Reef, Sombrero Key, and Sand Key. Taking ballyhoo (bait fish) by cast net or lampara net (commercial gear for this species) is currently allowed by permit in existing zones.

These two exceptions to no-take regulations need to be re-evaluated in order to improve enforcement and education of these areas. People gather information on allowable activities from sources such as brochures, boat-ramp signs, and word-of-mouth, but also by observing the actions of others. The yellow boundary buoys of Sanctuary Preservation Areas, Ecological Reserves, and Special-use Areas indicate when one enters a protected zone. Allowable and prohibited activities for each area, and individual restrictions for each zone require periodic evaluation and may need to be changed.

> *Status:* The activities currently allowed within the Sanctuary Preservation Areas have yet to be evaluated.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake regulatory assessments and associated changes when resources permit.

(5) Identify and Evaluate Areas/Regions for Additional Marine Zoning, and Establish and Implement Zones if Appropriate. Existing Sanctuary Preservation Areas were established based on the status of important habitat, the ability of an area to sustain the habitat, the level of use, and the degree of conflict between consumptive and non-consumptive users. The size and location of the areas were then guided by examining user patterns, aerial photography, and ground-truthing. As new information on resource damage or decline, conflicts, or critical habitats becomes available, additional areas for new Sanctuary Preservation Areas will be evaluated.

> *Status:* The identification of additional areas/regions suitable for the placement of Sanctuary Preservation Areas has not been undertaken to date.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake identification and evaluation when resources permit.

(6) Monitor, Evaluate, and Report on Effectiveness of Zones. Monitoring is necessary in order for NOAA to assess the effectiveness of Sanctuary Preservation Areas in ameliorating resource degradation and reducing user conflicts. Monitoring in all Sanctuary Preservation Areas has been on-going for over three years. These results and how they are reported are described in the Research and Monitoring Action Plan and Science Management and Administration Action Plan. In order to make informed decisions about continuing catch-and-release fishing by trolling and bait fishing, the ecological effect of these activities will be assessed and is described in the Research and Monitoring Action Plan.

> *Status:* Scientific monitoring is currently underway in all Sanctuary Preservation Areas, and is further described in the Research and Monitoring Action Plan.
> *Implementation:* NOAA is the agency responsible for this activity and will continue to monitor the Sanctuary Preservation Areas in conjunction with other programs or agencies.

(7) Evaluate Uses of Existing and New Zones and, if Appropriate, Manage Impacts as Needed. NOAA recognizes that patterns of resource use, levels of impact, and user satisfaction are likely to change over time. Changes and fluctuations in marine life species populations and habitats will also be observed. As needed, existing and new impacts will be assessed, evaluated, and managed.

> *Status:* An evaluation of use and other patterns in the Sanctuary Preservation Areas has not been undertaken to date.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake use evaluations and associated management changes when resources permit.

(8) GIS and NOAA/NOS Chart Revisions. NOAA will use GIS to accurately site and establish legal boundaries for zones and ensure these are provided to the NOAA/NOS Charting Division to be placed on all relevant navigational charts.

> *Status:* This is a new activity.
> *Implementation:* NOAA is responsible for this activity.

STRATEGY Z.2 ECOLOGICAL RESERVES

Strategy Summary

Ecological Reserves have been established to protect biodiversity by setting aside areas with minimal human disturbance. They encompass large, contiguous and diverse habitats, in order to protect and enhance natural spawning, nursery, and residence areas for the replenishment and genetic protection of fish and other marine life. Allowing certain areas to evolve in or return to a natural state preserves the full range of diversity of resources and habitats found throughout the Sanctuary. Ecological Reserves protect the food and home of commercially and recreationally important species, as well as the hundreds of marine organisms not protected by fishery management regulations.

The SAC developed a list of criteria for Ecological Reserves and the Tortugas 2000 Working Group established criteria for the creation and establishment of the Tortugas Ecological Reserve (Table 3.11). Regulations for Ecological Reserves are designed to meet their objectives by limiting consumptive activities while continuing to allow activities that do not threaten resource protection. Thus, Ecological Reserves restrict all consumptive activities and allow non-consumptive activities in some zones where such activities appear compatible with protection.

There are currently two Ecological Reserves in the Sanctuary: the Western Sambo Ecological Reserve (9 nm^2) and Tortugas Ecological Reserve (151 nm^2). Maps and coordinates can be found at http://floridakeys.nos.noaa.gov/research_monitoring/map.html.

An Ecological Reserve had been proposed in the Dry Tortugas region during the 1995 Draft Management Plan process. However, extensive public comment received at that time indicated that the proposed boundaries would pose serious, adverse economic impacts on users of the area. In response to those comments, NOAA withdrew the proposal but committed to determining boundaries and final regulations for a reserve in the Tortugas within two years. NOAA then undertook an extensive process in coordination with the National Park Service to design and establish the Tortugas Ecological Reserve. At the core of this process, called "Tortugas 2000," was a diverse stakeholder and agency working group that reviewed scientific and socioeconomic data and gathered input from users, environmental organizations, and the public to build a consensus recommendation on the boundaries and regulations. The Tortugas 2000 process, resulting working group recommendation, alternatives for the reserve, NOAA's final boundary and regulatory action, and a comprehensive socioeconomic analysis are published in the *Final Supplemental Environmental Impact Statement/Supplemental Management Plan for the Tortugas Ecological Reserve*. This document has not been reproduced as part of this action plan, but is considered an integral component of it. It can be downloaded from the Sanctuary's web site at http://www.floridakeys.noaa.gov.

Table 3.11 Criteria for the Creation and Establishment of the Tortugas Ecological Reserve

Criteria	Objective
Biodiversity and habitat	Try to choose an area that would contain the greatest level of biological diversity and widest range of contiguous habitats representative of the Florida Keys marine ecosystem.
Fisheries sustainability	Try to choose an area that would provide the greatest benefit in protecting and enhancing commercially and recreationally important fish species, especially those that are rare, threatened, or depleted.
• Spawning areas	• Try to choose an area that would include significant fish spawning aggregation sites.
• Full life cycles	• Try to choose an area that would encompass all the habitats required to support the full life cycle of commercially and recreationally important fish.
Sufficient size	Try to choose a boundary that would encompass an area that is large enough to meet the criteria listed above and to achieve the potential benefits and goals of an ecological reserve.
Allowable activities	Try to allow only those activities in the Ecological Reserve that would be compatible with achieving its goals.
Socio-economic impacts	Try to choose an area and craft recommendations that would serve to minimize adverse socio-economic impacts in the short- and long-term on established users of resources in the area.
Reference area/monitoring	Try to choose an area that would serve as a reference or control area to facilitate the monitoring of anthropogenic impacts and to evaluate the consequences of establishing the Ecological Reserve.
Enforcement/compliance	Try to choose a boundary and craft regulations that would facilitate enforcement and encourage compliance.
Water quality	Try to choose an area that is known to have suitable water quality.

Activities (8)

(1) Place and Maintain Buoys Along Zone Boundaries. Boundary buoys have been placed along the Western Sambo Ecological Reserve. The buoys carry stickers to clarify no-take regulations. Boundary buoys will not be placed along the Tortugas Ecological Reserve. Deepwater and open-ocean conditions make the placement of buoys in this area difficult to impossible. GPS and marked navigational charts are more practical methods of depicting these areas to the public.

For all Ecological Reserves, boundary buoys may be added, removed, or shifted in exact location to clearly distinguish boundaries. NOAA continues to provide regular maintenance of boundary buoys

under the Waterway Management Action Plan. If additional Ecological Reserves are established, NOAA would place and maintain buoys and signs as appropriate.

> *Status:* Buoys will continue to be added, removed, or shifted in exact location to clearly distinguish zone boundaries.
> *Implementation:* NOAA is the agency responsible for this activity.

(2) Establish and Implement Management Responsibilities. The Sanctuary continues to oversee all aspects of zone management for the Ecological Reserves. The Western Sambo Ecological Reserve has been fully implemented. The Mooring Buoy and Research and Monitoring Action Plans describe specific activities in Western Sambo. The Tortugas Ecological Reserve has also been fully implemented. A permitting system for access to Tortugas North has been implemented and is described in the *Final Supplemental Environmental Impact Statement/Supplemental Management Plan for the Tortugas Ecological Reserve*. Mooring buoys have been installed at some locations in Tortugas North and are described in the Mooring Buoy Action Plan.

Regulations for both reserves are listed in Appendix C. A strategy to address enforcement needs by increasing officers is in the Enforcement Action Plan. Public compliance with zone regulations is greatly enhanced through education and outreach. Strategies for public education and outreach are in the Education and Outreach Action Plan. Research and monitoring efforts aimed at determining the efficacy of these zones are described in the Research and Monitoring Action Plan.

> *Status:* Both Ecological Reserves have been fully implemented.
> *Implementation:* NOAA will continue to be the responsible agency for managing the Ecological Reserves.

(3) *Assess Existing Zone Boundaries and Adjust as Needed.* The placement of existing Ecological Reserves requires periodic evaluation and adjustment as new scientific data, socioeconomic information, user group knowledge, and other information becomeS available. Boundaries of some reserves may be altered to capture important habitats or ecological features. For example, if new scientific data identifies a previously unknown benthic formation unique to the Sanctuary but falling just outside a zone, the boundary may be altered to protect the feature.

> *Status:* Boundaries of the Western Sambo Ecological Reserve have yet to be assessed. Boundaries of the Tortugas Ecological Reserve were based on the most current information available in 2000 and do not require assessment at this time.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake a boundary assessment of the Western Sambo Ecological Reserve when resources permit.

(4) Evaluate Allowable Activities in Existing Zones and Make Regulatory Changes as Needed. Ecological Reserves have specific regulations that allow and disallow certain activities. Activities for each reserve require periodic evaluation and may be changed to address issues of concern. For example, if public input indicates resources are damaged by a particular activity, the possibility of changing regulations to reduce the conflict will be evaluated.

> *Status:* The activities currently allowed within the Western Sambo Ecological Reserve have yet to be evaluated. Allowable activities for the Tortugas Ecological Reserve were based on extensive scientific data and public input in 2000 and do not require evaluation at this time.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake regulatory assessments and associated changes when resources permit.

(5) Identify and Evaluate Areas/Regions for Additional Marine Zoning, and Establish and Implement Zones if Appropriate. The two Ecological Reserves were established based on a thorough review of scientific data on ocean current patterns, known fish spawning aggregations, unique coral formations, and other biological resource information available at the time that each reserve was considered. Extensive socioeconomic information was also used to assess potential impacts on user groups. If new scientific data, socioeconomic information, local user group knowledge, and other information become available, additional areas or regions for new reserves will be evaluated.

> *Status:* The identification of additional areas/regions suitable for Ecological Reserve placement has not been undertaken.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake identification and evaluation when resources permit.

(6) Monitor, Evaluate, and Report on Effectiveness of Zones. Monitoring is necessary to assess the effectiveness of Ecological Reserves in preserving biodiversity and protecting habitats. Monitoring in the Western Sambo Ecological Reserve has been on-going for more than three years. Coordination of existing research and monitoring and the implementation of new monitoring programs has occurred in the Tortugas Ecological Reserve. These activities are described in the Research and Monitoring Action Plan and the *Final Supplemental Environmental Impact Statement/Supplemental Management Plan for the Tortugas Ecological Reserve*.

> *Status:* Scientific monitoring is currently underway in both Ecological Reserves, and is further described in the Research and Monitoring Action Plan.
> *Implementation:* NOAA is the agency responsible for this activity and will continue to monitor the Ecological Reserves in conjunction with other programs and agencies.

(7) Evaluate Uses of Existing and New Zones, and if Appropriate, Manage Impacts as Needed. Ecological Reserves seek to protect biodiversity and preserve the full range of habitats, allowing areas to evolve in or return to a natural state. Ecological Reserves, therefore, have the highest level of protection; only non-consumptive activities compatible with resource protection are permitted. However, NOAA recognizes that patterns of use, marine life species populations and habitats are likely to change over time. Therefore, NOAA is committed to evaluating and managing existing and new impacts to ensure proper function and performance of Ecological Reserves.

Status: An evaluation of use or other patterns in the Ecological Reserves has not been undertaken to date.
Implementation: NOAA is the agency responsible for this activity and will undertake use evaluations and associated management changes when resources permit.

(8) GIS and NOAA/NOS Chart Revisions. NOAA will use Geographic Information Systems to accurately site and establish legal boundaries for zones and assure these are provided to the NOAA/NOS Charting Division to be placed on all relevant navigational charts.

Status: This is a new activity.
Implementation: NOAA is responsible for this activity.

STRATEGY Z.3 SPECIAL-USE AREAS

Strategy Summary
Special-use Areas are set aside areas for scientific research and education or the recovery or restoration of injured or degraded resources. The areas may also be established to facilitate access to or use of resources, and to prevent user conflicts. Special-use Areas may also be designated to minimize adverse environmental effects of high-impact activities. Because Special-use Areas seek to facilitate special management programs such as habitat recovery, restoration, and research, or to minimize impacts on sensitive habitats, access is restricted to permitted entry only. The regulations are in Appendix C.

There are currently four permanent Special-use Areas, all designated for scientific research and monitoring (Research-Only Areas). The Special-use/Research-Only Areas are Conch Reef and Tennessee Reef in the Upper and Middle Keys, and Looe Key Patch Reef and Eastern Sambo in the Lower Keys. Maps and coordinates can be found at http://floridakeys.nos.noaa.gov/research_monitoring/map.html.

To date, Special-use Areas represent an under-utilized tool that offers the flexibility in design to achieve many conservation goals. Ideally, applying a combination of Sanctuary regulations to any given issue may be the most comprehensive approach to long-term resource protection. For example, the No-anchor Area of the Tortugas Bank for vessels more than 50 meters long was implemented in 1998. Although this zone was established under regulations not directly associated with Special-use Areas, closure to high-impact activities is an appropriate application of the designation. Another example is the temporary closure of discrete areas to aid large-scale coral reef restoration efforts.

Activities (9)

(1) Place and Maintain Buoys Along Zone Boundaries. Boundary buoys have been placed at the corner of each Special-use Area. The buoys are marked "Research-only" and buoy stickers to clarify no-entry regulations for these zones are being considered. For all Special-use Areas, buoy positions may be altered to clearly distinguish zone boundaries. NOAA will continue regular maintenance of boundary buoys under the Waterway Management Action Plan.

> *Status:* Buoys have been placed at the corner of each Special-use Area.
> *Implementation:* Buoys continue to be maintained by NOAA under the Waterway Management Action Plan.

(2) Establish and Implement Management Responsibilities. The Sanctuary continues to oversee all aspects of zone management for Special-use Areas. Research and monitoring efforts aimed at determining the efficacy are described in the Research and Monitoring Action Plan. Further monitoring inside and outside of Special-use/Research-Only Areas is required to ascertain the effects of non-consumptive activities on resources. Regulations are listed in Appendix C. Although not directly a provision of Sanctuary regulations associated with Special-use Areas, the ease of enacting temporary, emergency closures should be improved and their duration lengthened to allow fast, adequate response to immediate resource impacts.

Enforcement in these areas needs to be increased. A strategy to address pressing enforcement needs for these zones by increasing officers is contained in the Enforcement Action Plan. NOAA recognizes that public compliance with zone regulations is greatly enhanced through education. Currently the boundary buoys of Special-use/Research-Only Areas read "Research-only;" however, new stickers to clarify no-entry regulations are being considered. Additional strategies that address public education and outreach are explained in the Education and Outreach Action Plan.

> *Status:* All four Special-use/Research-Only Areas have been fully implemented.
> *Implementation:* NOAA will continue to manage all Special-use Areas.

(3) Assess Existing Zone Boundaries and Expand/Adjust as Needed. The placement of existing Special-use/Research-Only Areas requires periodic evaluation and adjustment as new scientific research, compliance information, and other data become available. Boundaries of some areas may need adjustment to protect unique biological features or remove strain from degraded habitats. Boundary changes may also be appropriate in areas where use conflicts occur or enforcement is problematic. The configuration and regulations of some zones needs to be evaluated and altered to improve enforcement and protection.

> *Status:* Boundaries of the Special-use Areas, including the Conch Reef Special-use/Research-Only Area and adjacent Conch Reef Sanctuary Preservation Area, have yet to be assessed.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake a boundary assessment of the Special-use Areas when resources permit. At that time the Conch Reef Special-use/Research-Only Area and Conch Reef Sanctuary Preservation Area will be given priority.

(4) Evaluate Allowable Activities in Existing Zones and Make Regulatory Changes as Needed. The Special-use/Research-Only Areas have stringent regulations that restrict access to only permitted entry to facilitate research and monitoring. Allowable activities for each area require periodic evaluation. Also, changes in designation from Research-Only to another Special-use Area type may be appropriate where a zone is not being used as intended.

> *Status:* The activities currently allowed within the Special-use Areas have not been evaluated to date.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake regulatory assessments and associated changes when resources permit.

(5) Determine High Impact Activities or User Conflicts. In order to determine where implementation of Special-use Areas might be appropriate and the type of designation required, it is necessary to assess and evaluate activities that have a high impact on resources and identify conflicting activities. The Sanctuary will accomplish this by compiling and reviewing data on use patterns and high impact areas. Additional data will be gathered to address particular concerns or issues. Input from the SAC and the public about critical issues and areas of concern are essential to this activity.

Status: The assessment and evaluation of high impact activities and user conflicts has not been undertaken to date.
Implementation: NOAA is the agency responsible for this activity and will undertake assessment and evaluation when resources permit.

(6) Determine and Establish Appropriate Zones for High-Impact or User-Conflict Activities. Special-use Areas support research and monitoring and may also be designated to recover injured or degraded resources, facilitate access or use, prevent conflicts, and confine or restrict activities. Based on the issues identified and information developed in Activity 5, and after public review, additional Special-use Areas may be developed for high impact or user conflict activities.

Status: The establishment of appropriate zones to address high impact or user conflict activities has not been undertaken.
Implementation: NOAA is the agency responsible for this activity. This activity will be undertaken after Activity 5 is completed and when resources permit.

(7) Monitor, Evaluate, and Report on Effectiveness of Zones. In order to assess the effectiveness of Special-use Areas, zone monitoring focuses on detecting changes due to the cessation of consumptive activities. Zone monitoring is on-going in all Special-use Areas and the dissemination of results is described in the Science Management and Administration Action Plan. Zone monitoring is also required in order to ascertain the effects of non-consumptive activities on resources. NOAA is responsible for this activity; however, partnerships, contracts, and agreements with academic, other-agency, or non-governmental programs are required for full implementation.

Status: Scientific monitoring is currently underway in all Special-use Areas and is further described in the Research and Monitoring Action Plan.
Implementation: NOAA is the agency responsible for this activity and will continue to monitor the Special-use Areas in conjunction with other programs or agencies.

(8) Determine Permitting Process. A process for issuing permits that allows scientists access to Special –Use/Research-Only Areas has been fully implemented (See Strategy R.1 in the Regulatory Action Plan). If additional Special-use Areas are designated for purposes other than research, monitoring, and education, an appropriate permitting process will be determined and implemented.

Status: A permitting process has been fully implemented.
Implementation: NOAA continues to be the agency responsible for this activity.

(9) GIS and NOAA/NOS Chart Revisions. NOAA will use GIS to accurately site and establish legal boundaries for zones and ensure these are provided to the NOAA/NOS Charting Division to be placed on all relevant navigational charts.

Status: This is a new activity.
Implementation: NOAA is responsible for this activity.

STRATEGY Z.4 WILDLIFE MANAGEMENT AREAS

Strategy Summary
Wildlife Management Areas typically include bird nesting, resting, or feeding areas, turtle nesting beaches, and other sensitive habitats including shallow flats that are important feeding areas for fish. Regulations governing access seek to protect endangered or threatened species or habitats, while providing opportunities for public use. Access restrictions include no-access buffer zones, no-motor zones, idle-speed only/no-wake zones, and closed zones. Some restrictions specify time periods when use is prohibited.

There are currently 27 WMAs in the Sanctuary. The Sanctuary and USFWS jointly manage 20 of the areas as part of their plan for managing backcountry portions of the Key West, Key Deer, Great White Heron, and Crocodile Lake National Wildlife Refuges. The USFWS administers these 20 areas, including marking the areas with buoys and signs as appropriate. These areas are part of this plan as an integrated ecosystem management approach to resource protection. NOAA continues to mark and manage the remaining seven WMAs.

Since 1997, several new municipalities have been incorporated in the Florida Keys. Some of the new municipalities have jurisdiction over nearshore waters. The Sanctuary acknowledges these municipalities and their authority to establish managed areas in the nearshore waters of the Sanctuary. If additional WMAs are established, NOAA or the responsible agency or government will ensure that the zones are implemented and managed as appropriate.

Activities (7)

(1) Continue to Place and Maintain Buoys and Signs Along Zone Boundaries. Boundary buoys and/or signs have been and will continue to be placed along the boundaries of each WMA. NOAA continues to work with the USFWS to place and maintain buoys or markers at the Crocodile Lakes WMA.

> *Status:* Buoys and signs continue to be added, removed, or shifted in exact location to clearly distinguish zone boundaries and clarify channels of access routes.
> *Implementation:* NOAA is the agency responsible for this activity.

(2) Assess Existing Zone Boundaries and Adjust as Needed. The placement of existing WMAs requires periodic evaluation and adjustment as new scientific data, socioeconomic information, local user group knowledge, and other information become available. Boundaries of some areas may need to be shifted, expanded, or reduced to protect key species or populations, capture important habitats or ecological features, facilitate public uses, or address user conflicts. For example, if new scientific data identifies a regular breeding area for a particular species just outside the boundary of a zone, the boundary may be shifted or expanded to offer protection to that important biological feature.

> *Status:* Boundaries of the WMAs have been marked, but they need to be assessed and adjusted as necessary.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake boundary assessments when resources permit.

(3) Evaluate Allowable Activities in Existing Zones and Make Regulatory Changes as Needed. Each of the existing WMAs has specific regulations that allow and disallow certain activities. Allowable activities for each area require periodic evaluation and may need to be changed to address issues of concern. For example, if public input indicates conflicts with wildlife in an area that has allowed idle-speed-only/no-wake access, the possibility of changing the zone to no-motorized access will be evaluated.

> *Status:* The activities currently allowed within the WMAs have yet to be evaluated.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake regulatory assessments and associated changes when resources permit.

(4) Identify and Evaluate Areas for Additional Marine Zoning, and Establish and Implement Where Appropriate. The 27 existing WMAs in the Sanctuary were established based on information on the locations of sensitive wildlife populations and habitats available at the time of the Draft Management Plan process in 1995. As new scientific data, socioeconomic information, local user group knowledge, and other information become available to Sanctuary managers, areas or regions in the Sanctuary for new areas will be identified, evaluated and implemented through a regulatory process.

> *Status:* The establishment of new WMAs will occur through a process separate from this management plan review.
> *Implementation:* NOAA is the agency responsible for this activity.

(5) Monitor, Evaluate, and Report on Effectiveness of Zones. In order for NOAA to assess the effectiveness of WMAs in protecting sensitive wildlife populations and habitats, specific monitoring will occur. NOAA is responsible for this activity; however, partnerships, contracts, and agreements with other academic, agency, or non-governmental programs will likely be required for full implementation (see also Strategy Z.6, Research & Monitoring Action Plan).

> *Status:* Scientific monitoring is currently not performed within the WMAs.
> *Implementation:* This activity will be undertaken in conjunction with the support of other programs or agencies when resources permit.

(6) Evaluate Uses of Existing and New Zones and, if Appropriate, Manage Impacts as Needed. NOAA recognizes that marine vessels, equipment, technology, and patterns of use change over time. Changes and fluctuations in marine populations and habitats will be observed and as needed, existing and new impacts will be assessed, evaluated, and managed.

> *Status:* An evaluation of use patterns in the WMAs has not been undertaken to date.
> *Implementation:* NOAA is the agency responsible for this activity and will undertake use evaluations and associated management changes when resources permit.

(7) GIS and NOAA/NOS Chart Revisions. NOAA will use GIS to accurately site and establish legal boundaries for zones and assure these are provided to the NOAA/NOS Charting Division to be placed on all relevant navigational charts.

> *Status:* This is a new activity.
> *Implementation:* NOAA is the agency responsible for this activity.

STRATEGY Z.5 EXISTING MANAGEMENT AREAS

Strategy Summary

This zone type simply identifies areas managed by other agencies where restrictions already exist or officially incorporate the regulations of two previously designated sanctuaries (Key Largo and Looe Key NMS). These zones delineate existing jurisdictions of state parks, aquatic preserves, sanctuaries, and other restricted areas. The purpose is to recognize established management areas, complement existing programs, and ensure cooperation and coordination among agencies. Because some Existing Management Areas are managed by other agencies, regulations already exist under those authorities. Sanctuary regulations supplement these authorities. If management of existing areas within the Sanctuary requires additional regulations or restrictions, the measures would be developed and implemented in coordination with the agency. Regulations for some existing areas, including those for Key Largo and Looe Key NMS, are contained in Appendix C.

A total of 21 Existing Management Areas occur in the Sanctuary. Fifteen of these areas are administered by DEP, and include: Bahia Honda State Park, Curry Hammock, Fort Zachary Taylor State Historic Site, Indian Key State Historic Site, John Pennekamp Coral Reef State Park, Key Largo Hammocks State Botanical Site, Lignumvitae Key State Botanical Site (includes Shell Key State Preserve), Long Key State Recreation Area, San Pedro State Underwater Archaeological Site, Windley Key State Geological Site, Biscayne Bay and Card Sound Aquatic Preserve, Coupon Bight Aquatic Preserve, and Lignumvitae/Indian Key Aquatic Preserve. Four remaining areas are managed by FWS (Crocodile Lake National Wildlife Refuge, Great White Heron National Wildlife Refuge, Key West National Wildlife Refuge, and National Key Deer Refuge), and two by NOAA (Key Largo National Marine Sanctuary and Looe Key National Marine Sanctuary). Since 1997, several new municipalities have been incorporated in the Florida Keys. Some municipalities have jurisdiction over nearshore waters. Additional managed areas established under these new authorities would be considered Existing Management Areas.

Activity

(1) GIS and NOAA/NOS Chart Revisions. NOAA will use GIS to accurately site and establish legal boundaries for zones and ensure these are provided to the NOAA/NOS Charting Division to be placed on all relevant navigational charts.

> *Status:* This is a new activity.
> *Implementation: NOAA is responsible for this activity.*