

# Florida Keys National Marine Sanctuary Revised Management Plan



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Atmospheric Administration

National Ocean Service

National Marine Sanctuary Program

This document is the revised management plan for the Florida Keys National Marine Sanctuary. It replaces the management plan that was implemented in 1996 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) 809-4700 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 [floridakeys.noaa.gov](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 1996 *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 in 1996; 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 recreation and livelihoods for approximately 80,000 residents.

The Sanctuary is 2,900 square nautical miles of coastal waters, including the 2001 addition of the Tortugas Ecological Reserve. The Sanctuary overlaps four national wildlife refuges, six state parks, three state aquatic preserves and has incorporated two of the earliest national marine sanctuaries to be designated, Key Largo and Looe Key National Marine Sanctuaries. Three national parks have separate jurisdictions, and share a boundary with the Sanctuary. The region also 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 vessel groundings, pollution, and overfishing. Threats to the Sanctuary also include indirect human impacts, which are harder to identify but are 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.

## *Management Plan Organization*

Within this document, the tools that the Sanctuary uses to achieve its goals are presented in 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 1996 *Management Plan* generally retain their designations in this document. As in the 1996 plan, two or more action plans may share a strategy where their goals and aims converge. The 1996 plan can be accessed on the Sanctuary's Web site [floridakeys.noaa.gov](http://floridakeys.noaa.gov)

### *Accomplishments and Highlights*

The Sanctuary's programs and projects have made significant progress since the original management plan was implemented 1996. An overview of these accomplishments is provided in the Introduction. In addition, each action plan contains bulleted lists of accomplishments since the 1996 management plan was adopted.

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# Acronyms

ACHP	Advisory Council on Historic Preservation
AGRRA	Atlantic and Gulf Rapid Reef Assessment Program
ASA	Abandoned Shipwreck Act
ATBA	Areas to Be Avoided
AWT	Advanced Wastewater Treatment
CAD	Computer Automated Dispatch
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CFR	Code of Federal Regulations
CRCP	Coral Reef Conservation Program
DARP	Damage Assessment and Restoration Program
DEP	Florida Department of Environmental Protection
DTNP	Dry Tortugas National Park
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F.S.	Florida Statutes
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Florida Department of Community Affairs
FDHR	Florida Division of Historical Resources
FDOT	Florida Department of Transportation
FKNMS	Florida Keys National Marine Sanctuary
FKNMSPA	Florida Keys National Marine Sanctuary Protection Act
FPS	Florida Park Service
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
FY	Federal Fiscal Year
GIS	Geographic Information System
GMD	Growth Management Division (Monroe County)
GMFMC	Gulf of Mexico Fishery Management Council
GPS	Global Positioning System
HAZMAT	Hazardous Materials
ICS	Incident Command Structure
ICW	Intra-coastal Waterway
IMO	International Maritime Organization
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

MRD	Marine Resources Division (Monroe County)
NCCOS	National Centers for Coastal Ocean Science
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuary Act
NMSF	National Marine Sanctuary Foundation
NMSP	National Marine Sanctuary Program
NOAA	National Oceanic and Atmospheric Administration
NOAA/OLE	NOAA Office of Law Enforcement
NOS	National Ocean Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRDA	Natural Resource Damage Assessment Claims
NURC	National Undersea Research Center
OFW	Outstanding Florida Waters
OSDS	On-Site Disposal System
OSTDS	On-Site Sewage Treatment and Disposal System
PREP	National Prepared for Response Exercise Program
PSSA	Particularly Sensitive Sea Area
RECON	Reef Ecosystem Condition Program
REEF	Reef Environmental Education Foundation
RNA	Research Natural Area
RSMAS	University of Miami/Rosenstiel School of Marine and Atmospheric Science
SAFMC	South Atlantic Fishery Management Council
SAP	Science Advisory Panel
SAV	Submerged Aquatic Vegetation
SCR	Submerged Cultural Resources
SEFSC	Southeast Fisheries Science Center
SFWMD	South Florida Water Management District
SHIELDS	Sanctuary Hazardous Incident Emergency Logistics Database System
SPA	Sanctuary Preservation Area
SWIM	Surface Water Improvement and Management Act
SWM	Stormwater Management
TAC	Technical Advisory Committee
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
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAMS	Waterway Assessment and Marking System

WMA Wildlife Management Area  
WQPP Water Quality Protection Program  
WQSC Water Quality Steering Committee



# 1.0 INTRODUCTION

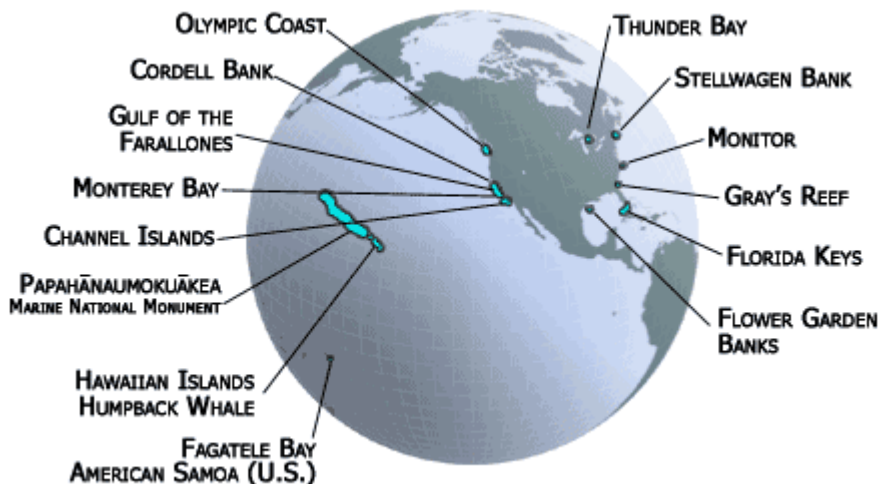
## 1.1 The National Marine Sanctuary Program (NMSP)

The National Marine Sanctuary Program (NMSP) is a network of 14 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 sanctuary system 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 sanctuary system contains 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 almost 138,000 square miles of Pacific Ocean including the Northwest Hawaiian Islands - the largest marine protected area in the world. Together, these sites protect nearly 150,000 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 each site's resource protection mandates. Research, education, outreach, and enforcement activities are major components in each site'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 Sanctuary System



**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 and an endorsement of the NMSP's management successes at Key Largo and Looe Key National Marine Sanctuaries.

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 the late 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 H.W. 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 by establishing an Area To Be Avoided (ATBA). 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 the primary objective of sanctuary resource protection. The Sanctuary was created and exists under federal law, and became effective in state waters with the consent of the State of Florida. It 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 (DEP) as the state partner for Sanctuary management. The Florida Fish and Wildlife Conservation Commission (FWC), created in 1999, enforces Sanctuary regulations in partnership with Sanctuary managers and the NOAA Office of Law Enforcement. Throughout this document when the term FKNMS managers is used in reference to a responsible or responsive entity it refers to the NOAA and State of Florida co-trustees and their designated representatives from the NMSP, DEP and FWC working cooperatively to implement the strategies outlined in this plan.

NOAA, DEP and FWC are large and diverse organizations. In some cases we have identified specific organizations we work closely with within the broader agencies but are generally separate from the direct organizational chain of the staff working at the Sanctuary. For instance, FWC also houses the Fish and Wildlife Research Institute (FWRI), which conducts and coordinates scientific research and monitoring. In addition, the Sanctuary works cooperatively with multiple state and federal agencies, numerous universities and non-governmental organizations. The relationship with some, like the US Environmental Protection Agency (EPA), is based in the legislation creating the Florida Keys National Marine Sanctuary. Other relationships have evolved through cooperative agreements and information arrangements based upon shared boundaries, shared mission and goals, and/or shared interests.

National marine sanctuaries are typically designated by the Secretary of Commerce through an administrative process established by the National Marine Sanctuary Act (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 to be managed as a national marine sanctuary under the NMSA. President George H. W. Bush signed the FKNMSPA into law on November 16, 1990.

The FKNMSPA and NMSA require the preparation of a comprehensive management plan and implementing regulations to protect Sanctuary resources. This *Revised Management Plan* responds to the requirements of the FKNMSPA and NMSA. The implementing regulations, effective as of 1 July

1997, are found at 15CFR922 and in Appendix C. The designation document<sup>1</sup> for the FKNMS is found in Appendix D.

### ***Sanctuary Boundaries***

The Sanctuary's enabling legislation designated 2,800-square-nautical miles of coastal waters surrounding the Florida Keys as the Florida Keys National Marine Sanctuary. The Sanctuary's boundary was amended in 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 which rises to a depth of only 90 feet of water.

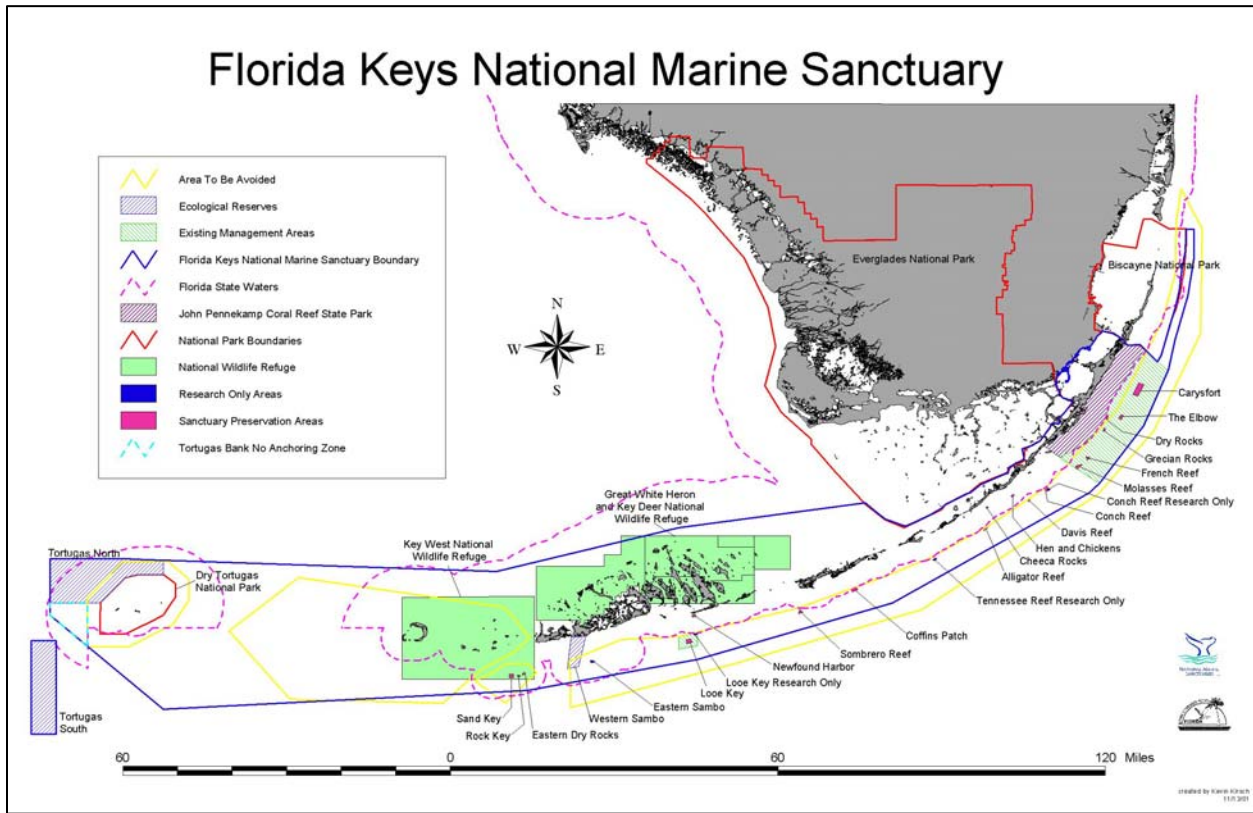
The Sanctuary boundary overlaps two previously existing national marine sanctuaries (Key Largo and Looe Key); four U.S. Fish and Wildlife Service (USFWS) refuges; six state parks, including John Pennekamp Coral Reef State Park; three state aquatic preserves; and other jurisdictions. Everglades National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

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<sup>1</sup> The NMSA defines the term designation (also known as the designation document) of a sanctuary as the geographic area of the sanctuary, the characteristics of the area that give it conservation, recreational, ecological, historical, research, educational, or esthetic value, and the types of activities that will be subject to regulation to protect those characteristics.

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 (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 1996 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 to prevent anchor damage to coral and seagrass, surveying maritime heritage resources, and protecting water quality. In addition to action plans, the 1996 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 1996 management plan was published in three volumes: Volume I is the Sanctuary management plan itself (which this document updates); Volume II characterizes the natural and social environmental setting of the Sanctuary and 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 1996 management plan are available on the Sanctuary Web site ([floridakeys.noaa.gov](http://floridakeys.noaa.gov)) and from the Sanctuary's Key West 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 1996 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 FKNMS Sanctuary Advisory Council and the general public in every step of the process.

In the late spring and summer of 2001, FKNMS staff, working closely with the Sanctuary Advisory Council, held scoping meetings and re-convened action plan working groups that had been created during development of the 1996 plan. The scoping meetings were held in Marathon, Key Largo, and

Key West, and gave the public the opportunity to meet with Sanctuary Advisory Council 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 1996 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. Sanctuary Advisory Council 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 Sanctuary Advisory Council membership and Action Plan Working Group membership lists are included in Appendix E.

Between 2001 - 2004, numerous drafts of each action plan and strategy were prepared and reviewed by the FKNMS Management Team, Action Plan Leads and National Marine Sanctuary Program Headquarters staff. In February 2005 the *Draft Revised Management Plan* was published and distributed for public review and comment. A notice was placed in the Federal Register. A series of three public meetings were held in the Florida Keys including a meeting in each of Key Largo, Marathon and Key West. This formal comment period extended from February 15, 2005 to April 15, 2005. Responses were received from approximately 20 commenters. Between May 2005 and February 2006 the comments were reviewed, consolidated into a single document and distributed for review and response to the FKNMS Management Team and Action Plan Leads. The responses to the comments were incorporated into the *Draft Revised Management Plan*, as appropriate. Between August 2006 and May 2007 FKNMS staff and staff in the NMSP and the FL Department of Environmental Protection headquarters units worked together to review, refine and ensure the *Draft Revised Management Plan* reflected the most recent and up-to-date information and management practices and policies.

### ***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 subsequent 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 the authorities, the appropriate program, and/or the resources required. The intent of identifying these responsibilities is not to create unfunded mandates for other agencies, but rather to integrate management actions so as to maximize protection of Sanctuary resources.

In this process, the sanctuary management plan becomes a framework in which the role of all partners is clarified. The sanctuary assumes the role of facilitator and integrator of a far larger body of activities and outcomes than are within the scope of its immediate authorities, programs, and resources. 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 in 1990 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 implementation of the ATBA. The United Nations International Maritime Organization (IMO) 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, the PSSA and the Sanctuary boundary.

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

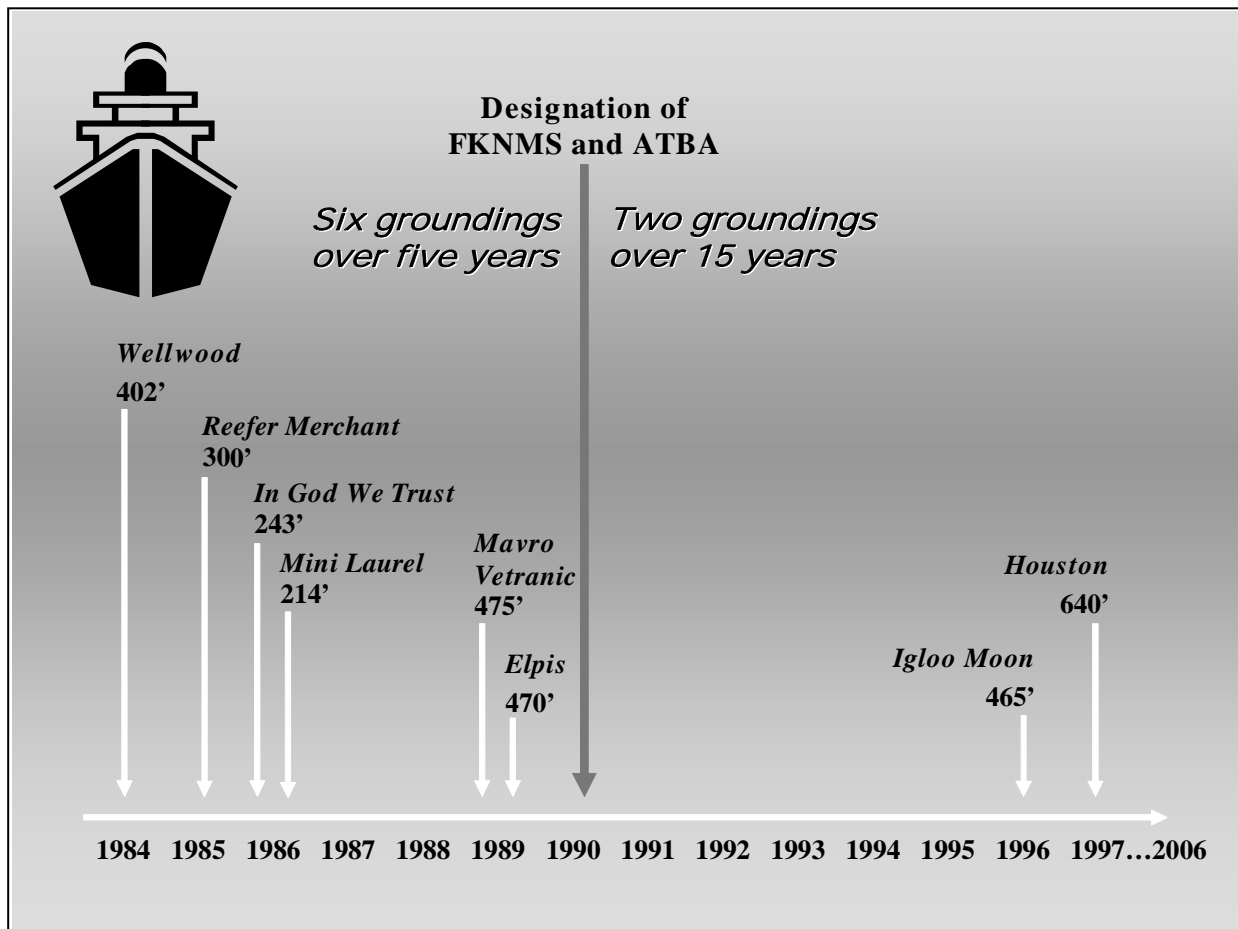
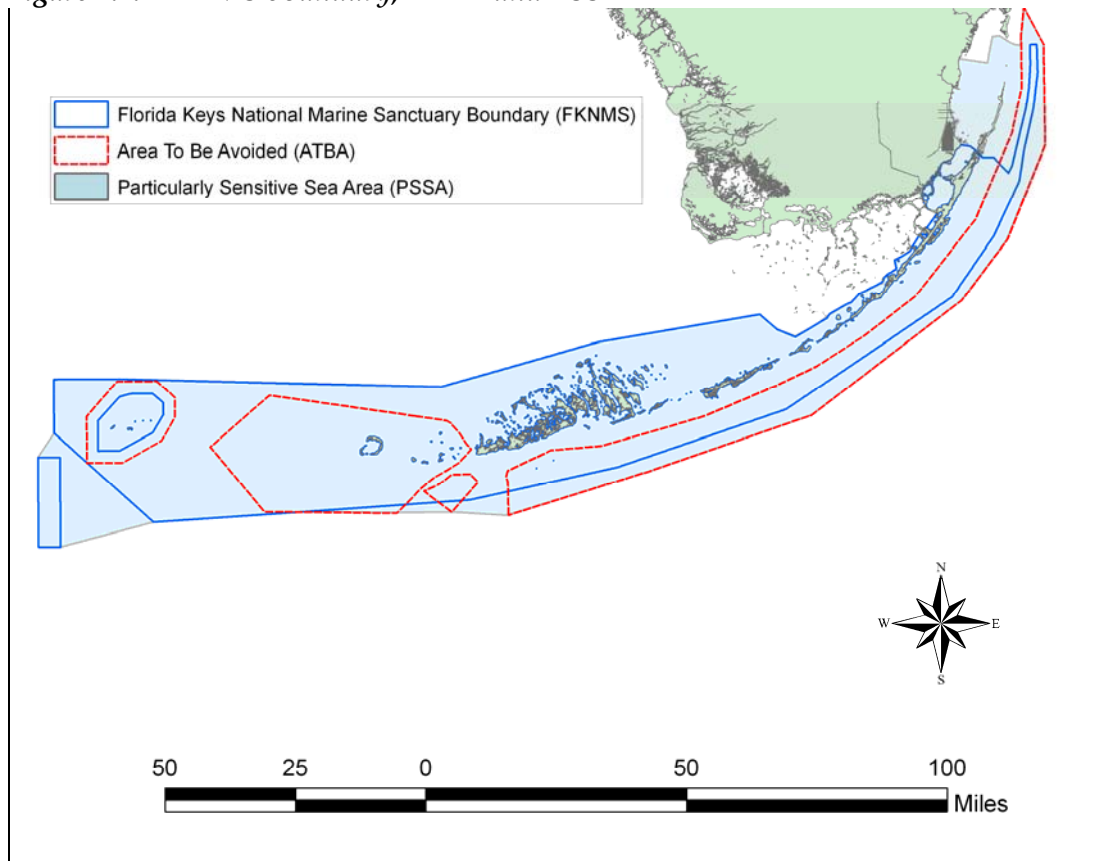


Figure 1.4. FKNMS boundary, ATBA and PSSA



**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 implementation of the Comprehensive Everglades Restoration Plan (CERP). 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 along the coastal waters of South Florida including Florida Bay following rain events. One of the goals of the CERP is to restore the water quality, quantity, timing and distribution to the South Florida ecosystem.

**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 demonstrate the success of the marine zoning program.

**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 180,000 volunteer hours, an estimated \$2.9 million value, were donated to the Sanctuary between 1996 and 2006. 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.

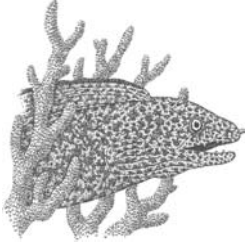
**8. Enforcement and Regulations.** Both the city of Key West and the State of Florida have declared Florida Keys waters under their jurisdictions as "no-discharge" zones. Additional accomplishments in implementing the Enforcement and Regulatory Action Plans are largely a tribute to the cooperative efforts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

**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 programmatic agreement for resource management that was originally signed in 1998 and then renewed in 2004 (see Appendix F for more information and a Web site link for the full document). Additionally, 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 180+-episode television series, *Waterways*.



## 3.4 RESOURCE THREAT REDUCTION

Resource protection and conservation can be achieved with a variety of management 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, balancing user conflicts or by providing mooring buoys to eliminate anchor damage to corals in high-use areas. The marking of channels and waterways to aid in the prevention of vessel groundings is an effective non-regulatory approach to protecting Sanctuary resources while boundary buoys help Sanctuary users comply with the regulations.

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 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 1996 *Management Plan*, FKNMS 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 of zones 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 this Action Plan, the Sanctuary Advisory Council found that the five strategies in the Zoning Action Plan had been implemented according to the 1996 *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 effect positive biological change inside their boundaries after just a short period 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 proposed areas will be reviewed and evaluated 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. FKNMS manages the remaining seven WMAs.

#### *Existing Management Areas*

Existing Management Areas (EMAs) are resource management areas that were established prior to the 1996 Sanctuary management plan. Sanctuary regulations supplement the existing authorities to facilitate comprehensive protection of resources. EMAs are managed in partnership with FKNMS as seamlessly as possible. There are 21 Existing Management Areas in the Sanctuary. Fifteen are administered by the Florida Department of Environmental Protection, four by the U.S. Fish and Wildlife Service, and two by FKNMS (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 activities compatible with resource protection. 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 Sanctuary Preservation Areas, Ecological Reserves, 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 USFWS. 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 WMAs in USFWS 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 [floridakeys.noaa.gov/research\\_monitoring/map.html](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 1996 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 Supplemental 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 marine 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 SPAs, four Special-use Areas, and the Western Sambo Ecological Reserve.
- Deployed boundary markers for the WMAs 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.
- Compiled zone monitoring results that have shown positive trends in the number and size of recreationally and commercially important species.
- Gained the support of the Flats-fishing community for the WMAs.
- Gained noticeable public support for the no-take areas, as evidenced in public testimony at the FKNMS Sanctuary Advisory Council meetings and other forums.

### *Strategies*

There are five management strategies in this Marine Zoning Action Plan.

- 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 <sup>+</sup>	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 <sup>1,2</sup>
Z.2: Ecological Reserves	100	120	100	80	80	480 <sup>1,2</sup>
Z.3: Special-use Areas	100	120	100	80	80	480 <sup>1,2</sup>
Z.4: Wildlife Management Areas	100	120	100	80	80	480 <sup>1,2</sup>
Z.5: Existing Management Areas	-	-	-	-	-	-
<b>Total Estimated Annual Cost</b>	<i>400</i>	<i>480</i>	<i>400</i>	<i>320</i>	<i>320</i>	<b>1,920</b>
+ Cost estimates are for "programmatic" funds, which exclude base budget funding requirements (existing salaries, overhead, etc.).						
<sup>1</sup> 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.						
<sup>2</sup> 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 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 SPAs 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 FKNMS 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 SPAs. The taking of ballyhoo by “hair-hooking” is allowed on a trial basis by permit in select SPAs. Non-consumptive activities are allowed in all of these zones. The full regulations for SPAs are in Appendix C.

There are currently 18 SPAs, 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 [floridakeys.noaa.gov/research\\_monitoring/map.html](http://floridakeys.noaa.gov/research_monitoring/map.html).

**Activities (8)**

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

Status: Buoys have been placed at the corner of each SPA

Implementation: Buoys continue to be maintained by FKNMS under the Waterway Management Action Plan

**(2) Establish and Implement Management Responsibilities.** FKNMS continues to oversee all aspects of zone management for SPAs. 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.

Enforcement in SPAs has been minimal to date, which may compromise their ecological integrity and reduce their effectiveness in separating use conflicts. Although patrolling the no-take areas has been given the highest priority for Sanctuary officers, other calls sometimes distract them from the no-take areas. 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 SPAs is critical to reducing conflicts and protecting the shallow, heavily used reefs as intended by this designation.

Status: All 18 existing SPAs have been fully implemented.

Implementation: FKNMS will continue to manage all SPAs.

**(3) Assess Existing Zone Boundaries and Adjust as Needed.** The placement of SPAs 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 SPAs, including the Conch Reef Sanctuary Preservation Area and adjacent Conch Reef Special-use/Research-only Area, will be fully assessed pending the availability of sufficient funding.

Implementation: FKNMS 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 SPA 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.** SPAs have specific regulations that allow and disallow certain activities within the zones. Unlike Ecological Reserves, which prohibit all consumptive activities without exception, SPAs 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. A pilot project to allow ballyhoo to be taken in 3 Upper Keys SPAs has been implemented.

These three exceptions to no-take regulations need to be periodically 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 SPAs, 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 SPAs will be fully assessed pending the availability of sufficient funding.

Implementation: FKNMS is the agency responsible for this activity and will prioritize regulatory assessments and associated changes.

**(5) Identify and Evaluate Areas/Regions for Potential Need for Additional Marine Zoning, and Establish and Implement Zones if Appropriate.** Existing SPAs 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 evaluation of need for additional areas and identification of additional areas/regions suitable for the placement of SPAs will be addressed during the regulatory process to commence following the publication of this plan.

Implementation: FKNMS is the agency responsible for this activity and will prioritize identification and evaluation. The consideration of need and potential for establishment of new SPAs will occur through a process separate from this management plan review.

**(6) Monitor, Evaluate, and Report on Effectiveness of Zones.** Monitoring is necessary in order for FKNMS to assess the effectiveness of Sanctuary Preservation Areas in ameliorating resource degradation and reducing user conflicts. Monitoring in all SPAs is on-going. The 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 SPAs, and is further described in the Research and Monitoring Action Plan.

Implementation: FKNMS is the agency responsible for this activity and will continue to monitor the SPAs 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 SPAs has been undertaken on a limited basis through socio-economic studies. Additional studies will be conducted as resources permit.

Implementation: FKNMS is the agency responsible for this activity.

**(8) Revise GIS and NOAA/NOS Charts.** FKNMS 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 that will be implemented over the course of this management plan.

Implementation: NOAA is responsible for this activity.



*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 Sanctuary Advisory Council 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.

There are currently two Ecological Reserves in the Sanctuary: the Western Sambo Ecological Reserve (9 nm<sup>2</sup>) and Tortugas Ecological Reserve (151 nm<sup>2</sup>). Maps and coordinates can be found at [floridakeys.noaa.gov/research\\_monitoring/map.html](http://floridakeys.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 [floridakeys.noaa.gov](http://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.
<ul style="list-style-type: none"> <li>• Spawning areas</li> <li>• Full life cycles</li> </ul>	<ul style="list-style-type: none"> <li>• Try to choose an area that would include significant fish spawning aggregation sites.</li> <li>• Try to choose an area that would encompass all the habitats required to support the full life cycle of commercially and recreationally important fish.</li> </ul>
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. FKNMS 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:* FKNMS is the agency responsible for this activity.

**(2) Establish and Implement Management Responsibilities.** FKNMS 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. The use of the mooring buoys in Tortugas North is set-up on a rotational basis.

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 and are managed on an on-going basis.

*Implementation:* FKNMS 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 Tortugas Ecological Reserve are based on the most current information available in 2000 and may need to be reassessed during the period of this management plan. Boundaries of the Western Sambo Ecological Reserve will be fully assessed pending the availability of sufficient funding.

*Implementation:* FKNMS 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 but will be pending availability of sufficient fund. 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:* FKNMS is the agency responsible for this activity and will prioritize regulatory assessments and associated changes as resources permit.

**(5) Identify and Evaluate Areas/Regions for Potential Need 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 the potential for new reserves will be evaluated.

*Status:* The identification of additional areas/regions suitable for Ecological Reserve placement has not been undertaken.

*Implementation:* FKNMS is the agency responsible for this activity and will prioritize identification and evaluation as resources permit. If needed, the establishment of new Ecological Reserves would occur through a process separate from this management plan review.

**(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 four 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:* FKNMS 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, FKNMS recognizes that patterns of use, marine life species populations and habitats are likely to change over time. Therefore, FKNMS 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 but will be as sufficient funds are available.

Implementation: FKNMS is the agency responsible for this activity and will prioritize use evaluations and associated management changes as resources permit.

**(8) Revise GIS and NOAA/NOS Chart Revision.** FKNMS 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 responsible for this activity.

### **STRATEGY Z.3            SPECIAL-USE AREAS**

#### ***Strategy Summary***

Special-use Areas are set aside 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 [floridakeys.noaa.gov/research\\_monitoring/map.html](http://floridakeys.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. FKNMS 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 FKNMS under the Waterway Management Action Plan.

**(2) Establish and Implement Management Responsibilities.** FKNMS 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. 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. FKNMS 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: FKNMS 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: FKNMS 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: FKNMS 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 Sanctuary Advisory Council 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:* FKNMS is the agency responsible for this activity and will prioritize this assessment and evaluation as 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:* FKNMS is the agency responsible for this activity. This activity will be undertaken after Activity 5 is completed and as resources permit. The establishment of new Special-use Areas will occur through a process separate from this management plan review.

**(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. FKNMS 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:* FKNMS 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:* FKNMS continues to be the agency responsible for this activity.

**(9) Revise GIS and NOAA/NOS Chart.** FKNMS 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. FKNMS 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. FKNMS continues to mark and manage the remaining seven WMAs.

Since 1996, several new municipalities have been incorporated in the Florida Keys. Some of the new municipalities have jurisdiction over nearshore waters. FKNMS 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. FKNMS 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: FKNMS 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: FKNMS is the agency responsible for this activity and will prioritize these boundary assessments as 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: FKNMS is the agency responsible for this activity and will prioritize regulatory assessments and associated changes as resources permit.

**(4) Identify and Evaluate Areas for Potential Need for Additional Marine Zoning, and Establish and Implement Zones if 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 that demonstrate the need for additional zones become available to Sanctuary managers, areas or regions in the Sanctuary for new WMAs will be identified, evaluated and implemented through a regulatory process.

Status: The identification of additional areas/regions suitable for the placement of Wildlife Management Areas has not been undertaken.

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

**(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. FKNMS 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: FKNMS is the agency responsible for this activity and will prioritize use evaluations and associated management changes as resources permit.

**(7) Revise GIS and NOAA/NOS Charts.** FKNMS 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 incorporates 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 Pennkamp 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; the last four of these in a close management partnership with FKNMS. Four remaining areas are managed by USFWS (Crocodile Lake National Wildlife Refuge, Great White Heron National Wildlife Refuge, Key West National Wildlife Refuge, and National Key Deer Refuge), and two by FKNMS (Key Largo NMS and Looe Key NMS). Since 1996, 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) *Revise GIS and NOAA/NOS Charts.*** FKNMS 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.

## 3.4.2 Mooring Buoy Action Plan

### *Introduction*

Sanctuary Biologist John Halas first implemented the mooring buoy system used in the Key Largo National Marine Sanctuary in 1981. This simple yet effective tool for reducing anchor damage to coral reefs and seagrass beds was later implemented in Looe Key National Marine Sanctuary (1984) and eventually in other areas. Sanctuary staff worked with Reef Relief, a grassroots conservation group in Key West, and other groups to install mooring buoys at popular dive sites along the reef tract. Today, Florida Keys National Marine Sanctuary staff travels worldwide, assisting groups with mooring buoy installations that protect natural resources from anchor damage. While mooring buoys are excellent management tools, other management programs must accompany a mooring buoy program, including education, outreach, research and monitoring.

Concerns have been raised that mooring buoys may negatively impact marine resources by attracting boaters, divers, and fishermen to the areas. This plan establishes a methodology for identifying areas appropriate for mooring buoys and managing boating activities near coral reefs so that negative impacts are minimized. By allowing or directing access at selected locations, a Mooring Buoy Program can limit resource-use conflicts and damage to the resources.

The Mooring Buoy Action Plan seeks to minimize anchoring impacts to sensitive marine habitats, specifically coral reef formations, to provide reasonable access to Sanctuary resources, consistent resource protection, and to manage or restrict activities that have a detrimental impact on resources. To accomplish these goals, the Mooring Buoy Action Plan seeks to:

- Assess the characteristics of boater and diver use in coral reef areas.
- Maintain a database of boater and diver use and existing mooring buoy locations.
- Develop criteria for determining the location of additional mooring buoys to meet demand.
- Assess the impact of boater and diver use in coral reef areas.
- Develop a standard marking system for mooring buoys.
- Determine the impact of large vessels on mooring buoys and determine optimum vessel size for a variety of buoys.
- Implement vessel-size restrictions on the use of mooring buoys.

### *Organization of the Mooring Buoy Program*

Developing a comprehensive mooring buoy plan has been a high priority since the beginning of the initial management plan and continues as an on-going strategy for protecting coral reef resources.

### *Responsible Institutions*

FKNMS is to be the lead agency responsible for implementing the activities within this action plan. However, the mooring buoy program works in partnership with local government agencies, FWC, FWRI, USACE, USCG, NPS, and Monroe County; non-government organizations, including The Nature Conservancy, Mote Marine Laboratory, and The Ocean Conservancy also play an important role in this plan.

### *Prioritization of Implementation*

The implementation of a mooring buoy system has been shown to be an effective management tool worldwide, especially in coral reef ecosystems. It is a simple, relatively non-controversial, and extremely visible action that will protect delicate reef structures. Accordingly, the Mooring Buoy Action Plan is among the highest priority for management action.

### *Staff*

A minimum of nine full-time personnel are needed to maintain the mooring buoys. Currently there are eight full-time staff assigned to the Mooring Buoy Program.

### *Equipment*

FKNMS staff, using Sanctuary vessels, maintain the mooring buoys. The Tortugas Ecological Reserve has substantially increased logistical and manpower needs. Because of the additional mooring buoy sites, a third vessel and crew are needed. Each vessel should be at least 25 to 50 feet long, and equipped with standard navigational equipment. At least one vessel should have a built-in hydraulic winch for servicing the large boundary buoys. FKNMS currently owns two complete sets of hydraulic installation equipment. One additional backup system may be required in the future.

### *Contingency Planning for a Changing Budget*

To the extent possible, FKNMS will encourage other volunteers and private and nonprofit organizations to assist the Mooring Buoy program. FKNMS will also consider alternative funding sources, including an "Adopt-a-Buoy," volunteers, and other innovative funding mechanisms.

If an adequate budget is not available and alternative funding sources are not feasible, mooring buoy maintenance costs can be reduced by cutting the number of buoys in the system. However, the use of mooring buoys is one of the most basic and cost effective mechanisms for reducing physical impacts in sensitive areas, and reducing the number of buoys will only be considered after all other cost-saving actions have been explored.

### *Accomplishments*

There have been several accomplishments relative to FKNMS mooring buoys since implementation of the 1996 management plan, including:

- Sanctuary staff has completely refitted all mooring buoy systems in the Sanctuary.
- Two 39-foot mooring buoy vessels (*R/V Rachel Carson* and *R/V Agassiz*) have been acquired and equipped.
- New mooring buoy staff has been hired and trained.
- Two smaller mooring buoy maintenance vessels have been acquired and made operational.
- Sanctuary staff have developed a mooring buoy installation and maintenance manual.
- The Sanctuary has increased the number of mooring buoys within its boundaries from 175 to over 500 by taking responsibility for mooring buoys previously installed by other organizations in Key West, Marathon, and Islamorada.
- The four outer boundary buoys for the Looe Key Existing Management Area continue to be maintained.
- Sanctuary staff installed 118 yellow boundary buoys (30-inch diameter) for marine zones.
- Sanctuary staff installed 120 WMA boundary buoys.
- Sanctuary staff installed mooring buoys on the *Thunderbolt* (Marathon), *Cayman Salvager* (Key West), *Spiegel Grove* (Upper Keys) and *Adolphus Busch* (Lower Keys) shipwrecks.

- Sanctuary staff installed mooring buoys and information buoys along Shipwreck Trail.
- Sanctuary staff installed five new mooring buoys in the Lower Keys and 36 new mooring buoys in the Tortugas Ecological Reserve.
- Sanctuary staff has implemented a monitoring program at mooring buoys in the Tortugas Ecological Reserve.
- A 1993-1994 survey assessed public and private boat access throughout the Sanctuary and sought to develop a low-impact access plan and direct new public access to low-impact areas. The plan's purpose is to modify as appropriate, any access affecting sensitive areas throughout the Sanctuary. This strategy is described in detail in the Waterway Management Action Plan and included in the Volunteer Action Plan.

**Goals and Objectives**

The goals of the Mooring Buoy Action Plan are to:

- Minimize anchoring impacts to sensitive marine habitats (specifically coral reef formations)
- Provide reasonable access to Sanctuary resources
- Provide consistent resource protection
- Manage or restrict activities that have a detrimental impact on resources.

To achieve these goals, the Sanctuary seeks to achieve the following objective:

- To limit resource-use conflicts and damage to Sanctuary resources by allowing or directing access at selected locations.

**Strategies**

There is one management strategy in this Mooring Buoy Action Plan.

- B.15 Mooring Buoy Management

This strategy is detailed below. Table 3.12 provides estimated costs for implementation of this strategy over the next five years.

**Table 3.12 Estimated Costs of the Mooring Buoy Action Plan.**

Mooring Buoy Action Plan Strategy	Estimated Annual Cost (in thousands)*					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
B.15: Mooring Buoy Management	316	332	348	366	384	1,746
<b>Total Estimated Annual Cost</b>	316	332	348	366	384	<b>1,746</b>

\* Contributions from outside funding sources also anticipated.

**Strategy Summary**

The purpose of this strategy is to continue a comprehensive mooring buoy maintenance program. Within this program, FKNMS mooring buoy teams perform several functions, such as siting and installing mooring buoys as needed; inspecting mooring systems regularly and replacing components as necessary; and installing heavy-duty anchor systems in areas frequented by larger vessels. As part of this action plan, Sanctuary managers will establish vessel size limits and the teams will continue to evaluate developing technology and implement environmentally sound, cost effective, and efficient installations.

**Activities (10)**

**(1) Maintain Existing Mooring Buoys.** The existing system of mooring buoys must be maintained. Mooring buoy teams use volunteers when available to supplement the mooring buoy maintenance program.

*Status:* There are currently over 500 mooring buoys within the Sanctuary that are maintained through a combination of government agencies and private organizations; managing these existing buoys is an on-going activity.

*Implementation:* FKNMS, in cooperation with existing agencies and non-governmental organizations (NGOs) that maintain mooring buoys, is the lead agency. FKNMS also assists, both financially and through logistical support, other organizations that install and maintain mooring buoys. Volunteers are used to assist in some aspects of the maintenance of mooring buoys to the maximum extent feasible.

**(2) Assess Current Mooring Buoy Technology.** The various types of mooring buoy designs available for use will be continually reviewed, based on substrate type, boat size, water depth and sea state. Methods of limiting resource damage through mooring buoy installation will be assessed, as will vessel impacts on mooring buoys.

*Status:* On-going. Many components of this activity have been through an on-going analysis of mooring buoy systems in the Sanctuary and research on visitor impacts to patch reefs. Vessel impacts on mooring buoys remain to be addressed.

*Implementation:* FKNMS will be the lead agency responsible for implementing the assessment of vessel impacts. FKNMS will work with the Sanctuary Advisory Council, other sanctuaries and marine protected areas, and nongovernmental organizations that have experience with mooring buoy systems used by larger vessels.

**(3) Review Visitor-use and Boating Data.** Boating activity and visitor-use data collected by various surveys are used for mooring buoy planning. This includes targeting data on diving activity around major coral reef systems and considering the impact of special events, such as holidays and lobster season, on boating patterns. On-the-water surveys are correlated with available aerial data to determine peak usage and turnover rates in high-use areas. To enable recommendations for mooring buoy additions or deletions, visitation data will be compared with existing mooring buoy locations.

Status: On-going. A report entitled “An Evaluation of Mooring Buoys in the Florida Keys National Marine Sanctuary Based on Boating Patterns” has been produced, which addresses some of the items identified in this activity.

Implementation: FKNMS is the lead agency. Using available sources to update visitor use data, FKNMS works with the Sanctuary Advisory Council and the working group established in Activity 4 to review the information. Team OCEAN volunteers help gather visitor data.

**(4) Develop Siting Criteria.** Sanctuary staff will continue to develop criteria for future mooring buoy sites within the Sanctuary. Workshops will be conducted as needed, with representatives of the Sanctuary Advisory Council, affected agencies, NGOs and other interested parties to identify criteria for allocating existing buoys and placing new ones. A working group has been established to advise and facilitate the development of the mooring buoy action plan.

Status: On-going.

Implementation: FKNMS is the lead agency responsible for implementing this activity by organizing the working group and facilitating workshops.

**(5) Recommend New Sites for Mooring Buoys.** Areas where new mooring buoys should be installed are identified based on local knowledge, local dive industry input, visitor-use data, resource management concerns, level of demand and other relevant information. Priority areas for installation are determined.

Status: On-going.

Implementation: FKNMS is the lead agency responsible for implementing this activity. The working group established in Activity 4 will make recommendations.

**(6) Conduct Site Assessments of Proposed Locations.** Areas identified for the installation of new mooring buoys are surveyed to determine: 1) the health of the habitat in relation to visitor use, 2) types of use and use patterns (e.g., size of vessels, glass-bottom boat use, unusual features, etc.), and 3) the number, location, and concentration of specific mooring buoys on the reef.

Status: On-going.

Implementation: FKNMS is the lead agency. DEP biologists and the Sanctuary Advisory Council are consulted for the resource survey.

**(7) Determine Costs of Implementation and Maintenance.** After establishing the number of mooring buoys suitable for each primary area, installation and maintenance costs will be determined. Maintenance costs will be based on past costs at the Key Largo and Looe Key National Marine Sanctuaries and relevant NGOs (e.g., Reef Relief, etc.). The ability to fund adequate maintenance activities will be a primary factor in determining the priority areas where new mooring buoys will be installed.

Status: On-going.

Implementation: FKNMS will be the lead agency responsible for implementing this activity. Other agencies and NGOs with mooring buoy experience (e.g., the DEP, Reef Relief, etc.) will be consulted to determine installation and maintenance costs.



**(8) Install Additional Mooring Buoys.** Based on the recommendations developed in Activities 5 and 6, new mooring buoys will be installed at the locations identified.

Status: On-going.

Implementation: FKNMS is the lead agency.

**(9) Implement Vessel Size Limits in High-Use and Sensitive Areas.** The Mooring Buoy Working Group recommends that staff use education and outreach rather than regulations for this activity. The Working Group recommends determining vessel size using a combination of length and tonnage. Mooring buoys in the Sanctuary are designed for vessels less than 60 feet. Vessels using mooring buoys in the Sanctuary have increased in size over the past five years, requiring stronger and heavier duty mooring systems. Based on vessel-impact information, staff observations, and load tests, it has been determined that vessels using mooring buoys located between Key Largo and the Marquesas Keys should not exceed 60 feet in length. Vessel-size limits in the Tortugas Ecological Reserve are 100 feet in length or a combined length of 100 feet.

FKNMS staff will install large boat mooring sites on selected reef areas located throughout the Sanctuary. These designated sites will be designed for vessels larger than 60 feet in length up to 100 feet. A program to educate the public on size and weather condition limits should be implemented under the education action plan in coordination with the installation of these mooring buoys. Aesthetic and recreational crowding factors will be considered as well. After a period of review and analysis, the size limits may be proposed for incorporation into the Federal Regulations established for the Sanctuary if data supports such a move once gathered.

Status: On-going.

Implementation: FKNMS will be the lead agency responsible for implementing this activity.

**(10) Evaluate Effectiveness and Influences of Mooring Buoy Placement and Make Necessary Changes.** Volunteer monitoring and in-house staff monitor mooring buoy sites and compare the sites to similar nearby areas without mooring buoys. A monitoring program will be established in the Tortugas Ecological Reserve to compare mooring sites prior to and after the installation of mooring buoys, and in areas without mooring buoys that have little or no diving or boating. Mooring buoys will be removed from areas found to be detrimentally impacted by the presence of mooring buoys.

Status: On-going.

Implementation: FKNMS will be the lead agency responsible for implementing this activity. DEP/FWC will provide support.

### 3.4.3 Waterway Management Action Plan

#### *Introduction*

This action plan describes strategies that implement and maintain a comprehensive and effective waterway marking and management system for boaters within the FKNMS. Formerly known as the Reef/Channel Marking Action Plan, this plan was re-named to reflect the broader strategies and activities. In addition to markers, this plan incorporates several surveys and databases that aid in waterway management. Aids to Navigation (channel markers and informational markers) and regulatory markers (i.e. vessel exclusion, no motor, and preservation zones) are in place in many areas of the Sanctuary. Channel, shoal, and reef markings have reduced the damage to shallow-water resources; however, significant resource damage continues to occur in sensitive areas. Meanwhile, boating activities have increased dramatically since the plan was first developed necessitating the enhancement of waterway markings and management. This plan promotes standardized signage consistent with the International “Rules of the Road” and state standards. This comprehensive marking plan emphasizes long-term resource protection and protects shallow-water resources such as seagrass banks, patch reefs and the bank reef crest.

Marking reefs, banks, and major passages to and from Florida Bay, the Gulf of Mexico, and the Atlantic Ocean improves navigation and minimizes the damage to shallow-water resources throughout the Sanctuary. At the same time, an effective waterway management system promotes boater safety by identifying and marking hazards to navigation. Properly delineated regulatory zones (as addressed in the Marine Zoning Action Plan) together with effective waterway management alert boaters of Special-use areas and promote compliance with sanctuary regulations, while well-marked zones also greatly enhance enforcement of sanctuary regulations.

Several inventories and databases are maintained to assess current levels of boating activity and evaluate trends in shallow-water resource damage. These inventories include several studies of propeller scar data, the location of all existing markers (permitted and un-permitted), the location and function of marine facilities, depth of entrance and exit channels from subdivisions throughout the Keys, and a vessel grounding database. In addition to the inventories, changes in boating activity are monitored as new marking systems are placed in sensitive areas. These inventories and databases, further described below, are maintained as tools for planners and resource managers to evaluate the effectiveness of waterway management. Full utilization of these tools will also lead to design improvements.

Through Damage Assessment and Restoration Program activities, the FKNMS has conducted removal of grounded and sunken vessels and marine debris. FKNMS also works closely with Monroe County derelict vessel program that currently removes roughly 100 derelict vessels per year. Such debris threatens boater safety and has the potential to directly injure benthic resources and/or jeopardize water quality. Although state grant funds dedicated for this purpose have declined in recent years, the county has directed Boating Improvement Funds to overcome this shortfall. Continued funding to remove derelict vessels and marine debris through alternative funding sources is critical for effective waterway management.

This action plan is inherently linked to and complimented by several other action plans. The Boat Access Strategy (strategy B.1) is included as a component of the Mooring Buoy Action Plan, however,

the implementation scheme (description of activities and associated information) for the strategy is only included in this action plan. Waterway management/marking activities (strategy B.4) such as the vessel grounding database, prop-scar surveys, and derelict vessel removal are linked to the Damage Assessment and Restoration Action Plan. The planning and installation of regulatory markers are directly linked to the Regulatory and the Marine Zoning Action Plans. The regulations associated with the waterway marking/management strategy are included in the Regulatory Action Plan.

### ***Goals and Objectives***

The Sanctuary contains broad, shallow-water areas and significant reef tracts that require marking to improve navigation, increase boater safety, and therefore provide adequate resource protection.

Goals with respect to waterway marking-management include:

- Minimize resource damage from boating activities.
- Protect shallow-water resources.
- Provide reasonable and appropriate access while minimizing resource damage.
- Educating the public about safe and responsible boating practices.

To achieve these goals, the following objectives must be accomplished:

- Periodically assess the characteristics of boat use within the Sanctuary.
- Continually assess the extent and intensity of damage that occurs due to boating.
- Gain consensus on uniform aids to navigation, marking criteria, and regulatory marking systems.
- Promote and enhance a standardized waterway marking system consistent with international and state standards.
- Develop waterway marking criteria that protect resources, ensure reasonable boating access, and allow for easy transit.
- Continue installing new markers and maintaining existing ones.
- Evaluate the effectiveness of the waterway marking system and regulatory zones.
- Educate the public about the waterway marking system.

### ***Implementation***

#### *Responsible Institutions*

The Monroe County Growth Management Division (GMD) has primary responsibility for implementing this action plan in State of Florida waters. USCG has primary responsibility for marking federal navigation channels, including the Intra-coastal Waterway, and shipping lanes. The Sanctuary is responsible for marking its regulatory zones. The Sanctuary also coordinates the Waterway Management/Marking Working Group and promotes cooperation among the different agencies. The success of the Action Plan depends on the cooperation of federal, state, county, local agencies and the municipalities.

#### *Personnel*

About ten staff members from the Monroe County GMD and the assisting institutions were involved in the original implementation of the Waterway Management Action Plan. Two FWRI staff constructed the original GIS data layers. Three Monroe County GMD staff, including the county's Marine Planner, continue to be involved in developing this plan, submitting permit applications,

developing installation and maintenance contracts, and directing the removal of derelict vessels and marine debris. FKNMS staff is involved in the coordination of the Waterway Management Action Plan Working Group that includes Monroe County GMD, USCG, USFWS, and other trustees. The FKNMS mooring buoy team installs and maintains numerous regulatory markers addressed under this plan. FKNMS staff review permitting of markers and have recently been involved in the coordination of installing the 300-foot residential shoreline idle speed/no wake zones.

#### *Contingency Planning for a Changing Budget*

In December 2002, the County adopted a new ordinance that levies additional funds through the state vessel registration fee; about \$580,000 is available annually from Monroe County Boating Improvement Funds. State grants for the removal of derelict vessels were not renewed in recent years, so the county has used approximately \$150,000 of the Boating Improvement Funds to cover these activities in Monroe County. Many aids to navigation are funded, owned and maintained by the USCG, although recent changes in mission have limited resources available for waterway marking. The Sanctuary may purchase and install markers from vessel grounding settlements, but has not yet done so on a large-scale basis. The current level of funding will allow the program activities to be completed; additional funding simply shortens the time frame required.

#### *Accomplishments*

- Implemented a Channel Marking Master Plan, prepared by Monroe County GMD and adopted by the Board of County Commissioners. The county portion of the plan is essentially complete, with over one hundred new markers installed, eight new channels marked and maintained, and three additional banks marked.
- Worked with owners of container vessel *M/V Houston*, USCG, and the Key West Propeller Club to install eight RACON beacons (also known as radar transponder beacons) on navigational aids along the reef tract from Loggerhead Key, in the Dry Tortugas National Park, to Fowey Rocks at the north end of Biscayne National Park. The beacons transmit a signal that is displayed on the radar screens of passing ships, warning them of the location of the coral reef tract. The Sanctuary used its authority to negotiate with the ship owners for funds to purchase 10 of these highly effective beacons. The remaining two beacons are being held as replacements for the existing beacons.
- Installed new danger markers in the Sambos Complex to protect SPA reefs.
- Identified navigation problems in channels around Key West and the Middle Keys. As a result, an area north of Moser Channel through Red Bay Banks area has been remarked.
- Inventoried approximately 600 aids to navigation; included in a GIS database.
- Completed a boat-access survey of all marinas, boat ramps and docking facilities; data has been entered into a marine facilities GIS database.
- Surveyed entrance depths to all residential canals; available as GIS data layer.
- Provided updated waterway information to the *Upper Keys Boating Guide*, the locally produced *Teall's Guides*, and NOAA charts.
- Standardized, relocated, added, and when necessary, removed markers.
- Conducting on-going investigation of the root causes of prop scars in grass flats. Lignumvitae Key State Park seagrass banks have been assessed via aerial and ground surveys for vessel grounding trend analysis. A statewide survey of prop scars has been published and a four-point action plan recommended channel marking, zoning, education, and enforcement.
- Streamlined permit process and marked residential subdivision shorelines as requested to delineate the 300 foot Sanctuary idle-speed-only/no-wake zone.

- Removed a dangerous obstruction at Marker 48 and determined that the pile at 9-foot stake is no longer a threat to navigation.
- Improved marking of shoal areas using 'Danger Reef' buoys at various reefs throughout the Sanctuary such as Newfound Harbor SPA, Looe Key back reef, Bicentennial Head.

**Strategies**

Waterway Management/Marking is comprised of two strategies, which are detailed below.

- Strategy B.1 Boat Access
- Strategy B.4 Waterway Management/Marking

Each of these strategies is detailed below. Table 3.13 provides estimated costs for implementation of these strategies over the next five years.

**Table 3.13 Estimated Costs of the Waterway Management Action Plan.**

Waterway Management Action Plan Strategies	Estimated Annual Cost (in thousands)*					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
B.1: Boat Access	-	-	-	50	-	50
B.4: Waterway Management/Marking+	335	352	370	390	408	1855
<b>Total Estimated Annual Cost</b>	335	353	370	440	408	<b>1,905</b>
* Contributions from outside funding sources also anticipated.						
+ Expenditures by the U.S. Coast Guard are not included in these estimates						

## STRATEGY B.1 BOAT ACCESS

### Strategy Summary

The purpose of this strategy is to conduct surveys to assess public and private boat access throughout the Sanctuary. By knowing these entry and exit sites, the team can ensure channel markings to and from these areas are adequate.

### Activities (4)

**(1) Periodically Update Marine Facilities Survey.** A field survey of each boat access site in the Keys is periodically updated. Information includes the location, type of facility, services provided, intensity of use, and type of use.

Status: Implemented and on-going.

Implementation: Monroe County Division of Marine Resources (now the Growth Management Division) completed the initial surveys in 1993<sup>3</sup> under contract with FWRI as part of the Channel Marking Project; a second survey was conducted in 1999<sup>4</sup>. All data was turned over to FWRI for generation of GIS data layers. The inventory is updated by Monroe County GMD as marine facilities change or new ones come into existence. A comprehensive field survey will be conducted periodically.

**(2) Survey Needs for Shallow-water Access.** A survey<sup>5</sup> was designed and completed that assessed the water depths at subdivision entrance points, and of shallow-water access impediments between the Atlantic Ocean, Florida Bay, and the Gulf of Mexico and subdivision entrances. The information collected is used to prioritize placement of corrective or additional markings.

Status: Implemented and on-going.

Implementation: Monroe County (DMR) (now GMD) completed the initial surveys under contract with FWRI as part of the Channel Marking Project. The Florida Department of Community Affairs (FDCA) provides information on subdivisions and needs for shallow-water access. FKNMS provided boat support for some of the surveys.

**(3) Input Survey Data into a GIS.** Input all data developed through the on-site surveys into a GIS database to enable use of inventories for waterway management planning and by resource managers.

Status: Implemented and on-going.

Implementation: Monroe County DMR (now GMD) completed this activity for both databases under contract with FWRI. All data has been turned over to FWRI and is updated as data changes.

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<sup>3</sup> Marine Facility Survey conducted in 1993 by County DMR (now GMD) as part of Channel Marking Master Plan process. Also called the *Marinas* data layer.

<sup>4</sup> Fletcher survey. Data gathered, data entry on-going.

<sup>5</sup> Survey of all subdivisions to determine which have four-foot access to bay and/or ocean. Conducted by DMR (now GMD) for Channel Marking Master Plan. Also referred to as *Subdivisions* GIS data layer.

**(4) Make Survey Results Available to Resource Managers and the Public.** Initiate a process to make the information developed in the marine facilities survey and shallow water access survey available to resource managers in map, graphic, and written formats. As part of FWRI's obligation to maintain data created as a result of activities carried out in the Sanctuary, this information will become more readily available over time.

Status: Implemented and on-going.

Implementation: Data is currently available through FWRI. Some of the data has been used for an *Upper Keys Boater's Guide*. (See Strategy W.28 in the Water Quality Action Plan.); additional data will be used by Monroe County GMD and FWRI for the Middle Keys and Lower Keys boater's guide.

#### **STRATEGY B.4 WATERWAY MANAGEMENT/MARKING**

##### **Strategy Summary**

The purpose of this strategy is to continue to promote and enhance a coherent waterway management and marking system throughout the Sanctuary to minimize resource damage from boating activities, promote safe navigation, and increase boater safety.

##### **Activities (10)**

**(1) Improve Coordination of the Agencies Involved in Waterway Management.** Re-vitalize the Waterway Management Action Plan working group to renew active discussions of priorities in waterway marking and management.

Status: On-going.

Implementation: Working group was very active for several years after implementation of the Action Plan. Activity has tapered off in recent years; Sanctuary will coordinate the regular meeting and revitalization of this group.

**(2) Survey Damage from Propeller Scarring and Vessel Groundings.** Assemble aerial photography, visual observations, and databases of reported vessel grounding data to obtain a complete picture of damage to shallow water resources caused by prop-scars, keel grooves, blowholes, and vessel groundings. A database was assembled from published reports<sup>6</sup>. A statewide prop-scar survey was completed, compiled and published by FWRI in 1995<sup>7</sup>. NOAA, FWRI, DEP and Monroe County have conducted additional aerial and on-water surveys. In addition, FWRI and the Sanctuary created the vessel grounding database<sup>8</sup> from FWC grounding citations. "Hot spots" of resource damage can be

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<sup>6</sup> Kruer, C.R. 1994. Mapping Assessment of Vessel Damage to Shallow Seagrasses in the Florida Keys. A report to the Florida Dept. of Natural Resources and the Univ. of South Florida / F.I.O. 9p.

<sup>7</sup> Sargent, F., T.J. Leary, D.W. Crewz, and C.R. Kruer 1995. Scarring of Florida's seagrasses: assessment and management options. FWRI technical report TR-1. 46p. Using low-level aerial surveys and photography, researchers characterized levels of light, moderate, and severe scarring. These areas were converted into a GIS data layer by FWRI.

<sup>8</sup> Includes all seagrass and coral grounding cases that generated a FWCC citation; database maintained by FKNMS Damage Assessment and Restoration program.

illustrated by plotting the data. This data is then used to design/improve waterway marking schemes through partnering with USCG and Monroe County.

Status: Implemented and on-going.

Implementation: Propeller scar surveys have been compiled, and Monroe County, FKNMS and DEP continue aerial and ground surveys of boating impacts. FWRI and FKNMS created the vessel grounding database and sanctuary staff update grounding data as they are reported. FWRI is the lead agency for propeller scarring surveys. FKNMS maintains the vessel grounding database.

**(3) *Inventory and Geo-reference Aids to Navigation and Regulatory Markers.*** A channel marker inventory<sup>9</sup> has been designed to identify, characterize and geo-reference all known markers; information has been incorporated into a GIS data layer. Positions for aids to navigation maintained by local, state, and federal agencies are integrated into the database. Used in conjunction with the vessel-grounding database, an assessment can be made of where new markers may be needed and existing markers repositioned. Each agency has a separate inventory of regulatory markers they maintain; an effort to compile all regulatory markers will be made.

Status: Implemented and on-going. The inventory will take two years to update.

Implementation: Monroe County GMD has this inventory as a GIS layer and verified all marker locations. Monroe County, NOAA, and USCG update the database to reflect changes in positions for aids to navigation.

**(4) *Enhance Channel Marking Aids to Navigation.*** This activity will enhance existing channel marking efforts. Based on much of the data collected and assessed as part of this plan, Monroe County implemented the Channel Marking Master Plan<sup>10</sup>, a comprehensive plan for all channels and markers in the county. The plan will be linked to channel marking schemes maintained by other local, state, and federal agencies. The GMD will continue to identify areas of concern and implement further enhancements as needed.

Status: This is an on-going activity. The county is funded for this activity through the Florida Boating Improvement Funds and other grants.

Implementation: Monroe County has essentially completed its portion of the Channel Marking Master Plan. This effort has greatly enhanced the channel marking within the county by installing over 100 new markers, maintaining eight new channels, and marking additional banks. Additional enhancements will be considered by GMD. Coordination of channel marking activities will be achieved through the Action Plan Working Group members participating in meetings of the local Marine and Port Advisory Committees, the Sanctuary Advisory Council, and providing technical input to USCG.

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<sup>9</sup> Channel marker inventory compiled from USCG Light List and County data as part of the Channel Marking Master Plan. Existing channel makers were checked for exact location by Monroe County DMR (now GMD). Data layer is referred to as the *ATONS* layer. In addition, an *Unpermitted Markers* data layer was compiled by Monroe County DMR (now GMD) during field surveys.

<sup>10</sup> Channel Marking Master Plan for the Florida Keys, January 1998. Richard Jones, Channel Marking Planner. Submitted in fulfillment of DEP Agreement No. SWPP96-06 by the Monroe County Department of Marine Resources.



**(5) Assess Effectiveness of Channel Marking Master Plan.** In addition to installing new channel markers, several studies have been designed to assess the effectiveness of newly marked channels. Assessment consists of three primary techniques: 1) using aerial photography to assess changes in benthic communities in discrete areas following modifications to a waterway marking scheme; 2) analysis of grounding information; and 3) numbers of complaints and/or other evidence that problems have been solved. Aerial overflights have been completed for several areas<sup>11</sup> throughout the keys at various times and using a variety of methods. A coherent monitoring study was started by (now GMD) in 1997 by gathering aerial photography for five study areas: Broad Creek, Tavernier Creek, Vaca Cut, Whale Harbor Channel, and Niles Channel. The channel markings for all of the study areas, with the exception of Niles Channel, were improved between 1997 and 2000. Follow-up aerial surveys of the same areas are planned. The effectiveness of the new markings will be evaluated by changes in the shallow resources (mainly seagrasses) in these areas.

*Status:* Implemented and on-going.

*Implementation:* Monroe County is conducting pre- and post-project assessments of newly marked channels. Aerial overflights have been conducted in five areas. The vessel grounding database will also be used to assess the effectiveness of the plan.

**(6) Enhance Reef Marking Aids to Navigation.** Protection of the reef tract has been accomplished through several important marking improvements; however, significant and long lasting damage still occurs on the reef crest. Further enhancements are needed. The Sanctuary staff will assist USCG in planning improvements and make recommendations based on trends in boating activity and resource damage. Continued coordination and enhancement of reef marking activities will be achieved through the Action Plan Working Group.

*Status:* Implemented and on-going.

*Implementation:* RACON beacons have been installed and, along with the ATBA restrictions, have virtually eliminated large vessel groundings on the reef. At the request of FKNMS, reef markings were improved at Sambos complex by USCG. Further enhancements will be proposed through the Action Plan Working Group. The Sanctuary has lead responsibility to staff the working group and facilitate information exchange among agencies and citizen groups.

**(7) Conduct Waterway Assessment and Marking System (WAMS) Survey.** The USCG has the primary responsibility for installing and maintaining markers in federally maintained channels, Hawk Channel, the old Intra-Coastal Waterway (ICW), on the bank reef crest, and shoal areas outside state waters. USCG has committed to conducting a WAMS study in the area to evaluate the effectiveness of federally maintained markers and management schemes. The Sanctuary staff will assist with the study however possible, and provide technical support such as output from the vessel grounding database.

*Status:* On-going.

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<sup>11</sup> Areas that have aerial photographs gathered before 1996 include: the north end of Big Coppitt Key, Lower Sugarloaf Sound, Kemp Channel south of U.S. 1, the north end of Ramrod Key, and the Lignumvitae Aquatic Preserve area. Two of these areas, Lower Sugarloaf Sound and Lignumvitae, received channel markings.

Implementation: USCG has made several improvements in channel markings and reef crest markings. A formal WAMS process is in the planning stages. The County's Channel Marking Master Plan has several recommendations for improvements of federally maintained markers. Data from the survey will be used to plan future improvements to the marking system.

**(8) Enhance Use of Regulatory Markers and Information Signs.** In addition to working with other agencies to mark channels, shoals and reefs with day boards, beacons and lights, the Sanctuary helps manage waterways through regulatory and zoning activities. The Sanctuary maintains more than 100 wildlife management buoys (including some for other agencies), approximately one hundred preservation area and ecological reserve boundary buoys, and numerous danger markers near coral heads. Regulatory markers inform boaters of regulations for idle-speed/no-wake zones, vessel exclusion zones, and other zoning designations. In addition, several agencies install information signs at entry points to waterways throughout the Florida Keys.

Status: Implemented and on-going.

Implementation: The FKNMS has the lead responsibility. FKNMS staff install and maintain several hundred regulatory markers and numerous informational markers. The installation of regulatory markers is linked to the Marine Zoning and Regulatory Action Plans.

**(9) Remove Derelict Vessels, Marine Debris and other Waterway Obstructions.** Another important activity for managing the waterways of the Florida Keys is the removal of abandoned vessels and marine debris that impede navigation, threaten public safety or harm the environment. Monroe County currently removes about 100 derelict vessels per year through an efficient removal program. USCG removes objects deemed to be hazards to navigation or significant threats of marine pollution. FKNMS works closely with both agencies to report and coordinate the removal of waterway obstructions. In some instances, particularly for problem projects where no agency has lead responsibility, FKNMS has located funds and contracted the removal of sunken vessels that were deemed to be a threat to sanctuary resources. This activity is related to the removal of grounded vessels under Damage Assessment and Restoration, Regulatory and Marine Zoning action plans.

Status: On-going.

Implementation: Monroe County has an efficient derelict vessel removal program. USCG is responsible for removing hazards to navigation. FKNMS staff coordinate removal of debris and when needed reduce threat to sanctuary resources. In 2006/2007 Monroe County removed over 400 derelict vessels and over 45,000 derelict traps following the impacts and dislocations of the 2004 and 2005 hurricane seasons. This large scale removal effort was partially supported through hurricane recovery funds from the Federal Emergency Management Agency.

**(10) Develop Guidelines for 100-Yard Idle-speed/No-wake Shoreline Markers.** Guidelines will be developed for collecting information from homeowners and homeowner associations based on reporting requirements set forth by agencies involved in issuing permits to install regulatory markers in submerged lands. Permitting agencies include USACE, DEP and the USCG. FKNMS staff provides residential shoreline No-wake/Idle-speed permit information and requirements to homeowners and homeowner associations upon request. FKNMS staff works with the public to seek

the necessary approvals or exemptions from jurisdictional agencies. Generally, those desiring permits provide: approximate latitude and longitude coordinates for the area to be marked and the names, addresses and telephone numbers for adjacent homeowners. Permit requests are evaluated by need, resource impacts, and locations before being submitted for permit approval.

FKNMS staff completes, files and pursues approvals from the agencies responsible for managing submerged lands, regulatory markers and regulations within the Sanctuary. FKNMS staff seeks approvals/exemptions from jurisdictional agencies and works with agencies to complete permit application and obtain approvals. It is the responsibility of the homeowners and homeowner associations to initiate communications with contractors for buoy installation and maintenance.

Status: On-going.

Implementation: Currently, there are four permitted sites and 17 existing regulatory markers. The FKNMS Upper Region resource manager and administrative staff are responsible for implementation of the activity.

## 3.4.4 Water Quality Action Plan

### *Introduction*

#### *Overview*

Declining water quality continues to be a major concern for the Sanctuary. The Water Quality Protection Plan, mandated by Congress and developed jointly by EPA, NOAA, the State of Florida, and Monroe County, has been an evolving and effective model for identifying water-quality problems and solutions. The model has also been productive in providing the extensive monitoring and research needed to implement science-based management. However, the model has been of less help in resolving some local concerns regarding implementation.

Each activity in the Water Quality Action Plan is derived from the management strategies described in the 1996 final management plan. The strategies address sources of pollution, priority corrective actions and compliance schedules. The strategies seek to restore and maintain a balanced, indigenous population of corals, shellfish, fish and wildlife, and recreation in and on the water. The strategies include a water-quality monitoring program and opportunities for public participation in all aspects of development and implementation. This action plan is an abbreviated version of Strategies and Activities described in the *Water Quality Protection Program Document*. The Water Quality Protection Program's *Progress Report on Implementation* (March 1997) was revised and updated in May 1998, January 1999, and June 2001. The details of research and monitoring strategies related to water quality are published in the FKNMS's *Comprehensive Science Plan*.

#### *Relationship to Other Action Plans*

Many water quality strategies appear in other action plans because of the need to establish separate components for common goals. For example, in addition to addressing water quality, a strategy may have research, education, or volunteer components. If a strategy appears in more than one action plan, this is noted.

#### *Goals and Objectives*

The goal of the Water Quality Action Plan is to work with federal, state and local governments to better understand water quality problems and actively implement solutions to reverse trends and restore "healthy" water quality.

The objectives of this action plan are to work with relevant agencies and the public to increase understanding of water quality issues and address the issues through research, monitoring and the development and implementation of wastewater and stormwater master plans, as well as development of wastewater treatment facilities.

#### *Implementation*

Strategies are typically implemented by a combination of federal, state, and local effort. The U.S. EPA and the DEP lead the implementation of most strategies in this plan. Other entities, including Monroe County, the South Florida Water Management District, the Florida Department of Health, and the U.S. Coast Guard, have also led major efforts.

#### *Costs*

Based upon 1997 estimates in the *Water Quality Protection Program Document*, the cost to implement all strategies was initially estimated to be between \$290 million and \$510 million. Two expensive strategies, stormwater system retrofitting (\$200 million) and wastewater infrastructure (\$57 million to \$257 million) accounted for most of that. Excluding stormwater and wastewater strategies, the cost was estimated between \$34 million and \$55 million.

Since those estimates were made, Monroe County has updated its *Sanitary Wastewater Master Plan* and *Stormwater Master Plan*. The estimates in those documents for complete implementation of recommendations are, in the *Wastewater Master Plan*, \$520 million, and in the *Stormwater Master Plan*, \$500 million. Costs of the remaining activities have not been re-estimated, but can be assumed to be somewhat higher than original estimates. Funding comes from a combination of public (federal, state and local) and private sources. Eighteen government institutions have been identified as potential participants. Table 3.14 lists estimated costs to implement each strategy and its component activities.

#### *Contingency Planning for Changing Budgets*

The Water Quality Action Plan includes a wide variety of strategies and activities that will be implemented by various agencies and funded through various mechanisms. A separate study of potential funding sources was conducted by the EPA, and is included in the Water Quality Protection Program Phase II Report. The EPA and DEP, with guidance from the Technical Advisory Committee (established under strategy W.32, found in the Science Management and Administration Action Plan), will be responsible for reprioritizing strategies and activities depending on the available funds.

#### *Accomplishments*

Since the final management plan went into effect in 1997, the Sanctuary and its partners in water quality protection have accomplished many of its initial goals. Highlights of the accomplishments include:

- Developed the first Water Quality Protection Program for a National Marine Sanctuary, including a comprehensive Action Plan and Implementation Plan at a cost of \$1.3 million.
- Established a high-level Water Quality Steering Committee and Technical Advisory Committee.
- Fully implemented 26 of 49 high-priority activities and 37 of 95 total activities in the initial Water Quality Action Plan.
- Completed ten years of comprehensive monitoring throughout the Sanctuary related to water quality, seagrasses, and coral reef/hard-bottom communities at a total cost of \$10 million.
- Developed and implemented a Data Management Program for the Sanctuary at a cumulative cost of \$695,000.
- Funded and implemented 15 special studies and research projects designed to identify cause-and-effect relationships between pollutants and ecological impacts at a total cost of \$1.8 million.
- Assisted Monroe County to develop comprehensive wastewater and stormwater master plans.
- Assisted Monroe County to develop a Wastewater Facilities Plan for the Marathon service area.
- Constructed an advanced wastewater treatment facility and collection system for the Little Venice area of Marathon through a Title II Construction Grant in the amount of \$4,326,000 awarded by the Florida Keys Aqueduct Authority.
- Provided more than \$290,000 to the Sanctuary for public education and outreach.

- Provided a \$500,000 grant to Florida Department of Health to identify and test innovative and alternative on-site wastewater systems to reduce nutrient loading in ground and surface waters.
- Worked with the City of Key West to designate the waters surrounding the city as a no-discharge zone.
- Designated all state waters in the FKNMS as a no-discharge zone in 2002. Mobile pump-out facilities were established to support compliance with the new designation.
- Provided a \$400,000 grant to the Florida Audubon Society/Florida Keys Environmental Restoration Trust Fund for restoration projects.
- Prepared and widely distributed the *Report to Congress (1996)* on the Water Quality Protection Program, a white paper entitled “Water Quality Concerns in the Florida Keys: Sources, Effects, and Solutions,” and several annual “Progress Reports on Implementation,” describing the status of the Water Quality Protection Program.
- Implemented a half-million dollar demonstration project for Onsite Sewage Treatment & Disposal Systems (OSTDS) that compared five systems. A final report comparing the nutrient-removal capabilities, costs, and limitations of these systems is available at <https://myflorida.com/environment/ostds/products/products/html>. The results have been used to design and install new and replacement systems with combinations of technologies that meet Florida Keys effluent-disposal standards.
- Completed the *Sanitary Wastewater Master Plan*, which is currently being implemented as a high priority.
- Improved interagency coordination has reduced wastewater pollution by refining and simplifying OSTDS permitting and increasing funds for compliance monitoring and enforcement.
- Improved stormwater management through local government implementation of stormwater management ordinances.

### *Strategies*

The Water Quality Action Plan consists of the 18 strategies listed below. Fifteen of these strategies are included here, grouped under 8 categories, and the remaining 3 strategies are presented in other action plans.

#### *Florida Bay/External Influence Strategies*

- W.19 Florida Bay Freshwater Flow
- W.24 Researching Florida Bay Influences (see the Research & Monitoring Action Plan)

#### *Domestic Wastewater Strategies*

- W.3 Addressing Wastewater Management Systems
- W.5 Developing and Implementing Water Quality Standards
- W.7 Resource Monitoring of Surface Discharges

#### *Stormwater Strategies*

- W.11 Stormwater Retrofitting
- W.14 Instituting Best Management Practices

#### *Marina and Live-Aboard Strategies*

- B.7 Reducing Pollution Discharges
- Z.5 Special-use Areas (see Marine Zoning Action Plan)
- L.1 Elimination of Wastewater Discharge From Vessels
- L.3 Reducing Pollution From Marina Operations

- E.4 Developing Training, Workshops, and School Programs (see Education and Outreach Action Plan)

*Landfill Strategy*

- L.7 Assessing Solid Waste Disposal Problem Sites

*Hazardous Materials Strategies*

- W.15 Hazardous Materials (HAZMAT) Response
- W.16 Spill Reporting
- L.10 HAZMAT Handling

*Mosquito Spraying Strategy*

- W.17 Refining the Mosquito Spraying Program

*Canal Strategy*

- W.10 Addressing Canal Water Quality

Each of these strategies is detailed below. Table 3.14 provides estimated costs for implementation of these strategies over the next five years.

**Table 3.14 Estimated Costs of the Water Quality Action Plan**

Water Quality Action Plan Strategies	Estimated Annual Cost (in thousands)*					Total Estimated 5 Year Cost
	YR 1	YR 2	YR 3	YR 4	YR 5	
W.19: Florida Bay Freshwater Flow	5	5	5	5	5	25
W.3: Addressing Wastewater Management Systems	50,000	125,000	125,000	100,000	100,000	500,000
W.5: Developing and Implementing Water Quality Standards	-	-	-	-	-	0
W.7: Resource Monitoring of Surface Discharges	5	5	5	5	5	25
W.11: Stormwater Retrofitting	1,500	1,500	1,000	1,000	1,000	6,000
W.14: Instituting Best Management Practices	50	50	25	25	25	175
B.7: Pollution Discharges	200	200	200	200	200	1,000
L.1: Elimination of Wastewater Discharge from Vessels	550	200	750	350	350	2,200
L.3: Marina Operations	25	25	25	25	25	125
L.7: Assessing Solid Waste Disposal Problem Sites	20	20	20	20	20	100
W.15: HAZMAT Response	250	250	250	250	250	1,250

W.16: Spill Reporting	10	10	10	10	10	50
L.10: HAZMAT Handling	10	10	10	10	10	50
W.17: Refining the Mosquito Spraying Program	5	5	5	5	5	25
W.10: Addressing Canal Water Quality	1,000	100	100	500	100	1,800
<b>Total Estimated Annual Cost</b>	<i>53,630</i>	<i>127,380</i>	<i>127,405</i>	<i>102,405</i>	<i>102,005</i>	<b>512,825</b>

\* Contributions from outside funding sources also anticipated.



# Florida Bay/External Influence Strategies

Severe water quality and ecological problems have developed in Florida Bay in recent years, and the Bay has undergone rapid changes in community structure. Problems have included a massive seagrass die-off; phytoplankton blooms; sponge die-offs; mangrove die-backs; and a localized overgrazing of seagrass by dense aggregations of variegated sea urchins. All of these phenomena have the potential to cause catastrophic, cascading ecological effects throughout the ecosystem. Since 1987, much of Florida Bay has been affected by a massive, unprecedented seagrass die-off that has left tens of thousands of acres of denuded sediments. The resulting sediment suspension and nutrient release may have contributed to massive phytoplankton blooms that have affected the Bay during recent years. Sponge die-offs caused by phytoplankton blooms have resulted in reduced numbers of juvenile spiny lobsters, which reside by day under sponges for protection from predation.

Most scientists believe that recent ecological problems in Florida Bay are the result of long-term reduction in freshwater flow from the Everglades. The mechanism has not been documented, but high salinities and a long-term change from an estuarine to a marine system may be contributing factors.

These conditions in Florida Bay are a potential threat to water quality and resources in the Sanctuary. The need to deal with water-delivery problems in Florida Bay has been strongly stressed by workshop participants and other scientists throughout the development of the Water Quality Protection Program. The Florida Bay and Adjacent Coastal Ecosystems Program Management Committee is keenly aware of the role that Everglades restoration plays in future water-quality conditions in the Sanctuary. The *Comprehensive Everglades Restoration Plan* acknowledges that downstream impacts are an important concern in planning restoration activities.

Two strategies have been developed to address this issue:

- *Strategy W.19* recommends that the Steering Committee for the Water Quality Protection Program take a leading role in working to restore historical freshwater flow to Florida Bay.
- *Strategy W.24*, included in the Research and Monitoring Action Plan, supports research that will further document and quantify the influence of Florida Bay on the Sanctuary's water quality and biological resources.

## **STRATEGY W.19**      **FLORIDA BAY FRESHWATER FLOW**

### ***Strategy Summary***

One role of the Water Quality Protection Program's Steering Committee is to ensure that restoring historical freshwater flow from South Florida and the Everglades into Florida Bay will not detrimentally impact Sanctuary resources. Sanctuary representatives work with appropriate federal, state, and local agencies to ensure that restoration plans and surface-water improvement and management plans for South Florida and the Everglades are compatible with efforts to maintain water quality within the Sanctuary. The interagency Florida Bay and Adjacent Coastal Ecosystems Program Management Committee is charged with developing restoration goals and performance

measures for Florida Bay in the *Comprehensive Everglades Restoration Plan*. Goals include restoring the quality, quantity, timing and distribution of freshwater through the Everglades and into Florida Bay.

The *Strategic Science Plan for Florida Bay*, prepared by the Florida Bay and Adjacent Marine Ecosystem Program Management Committee, focuses on science information needs for Florida Bay ecosystem restoration, including restoring more natural freshwater inflow patterns.

## **Activities (2)**

**(1) Establish a Leading Role for the Steering Committee.** The Water Quality Protection Program's Steering Committee includes high-level representatives of all relevant agencies. The Steering Committee has taken a lead role in water-management issues affecting Florida Bay and Sanctuary resources.

*Status:* Implemented and on-going. The Steering Committee was established in 1991 and expanded in 1992 and 1995 in order to initiate activities and generate support for the recommendations in the Water Quality Protection Program. Its leading role in ecosystem restoration activities continues.

*Implementation:* The responsible agencies are EPA and DEP, which jointly administer the Water Quality Protection Program. All other agencies represented on the Steering Committee have a primary role, including NOAA, NPS, USFWS, USACE, Florida Department of Community Affairs (FDCA), Florida Department of Health (FDOH), SFWMD, Monroe County, municipalities, and the Florida Keys Aqueduct Authority.

**(2) Participate in a Review/Revision of Water-management Strategies.** Sanctuary representatives shall participate in the review and revision of restoration plans and water-management plans for Florida Bay and adjacent areas to ensure that the proposals and actions enhance and complement water-quality improvement in the Sanctuary. These plans include but are not limited to the *Comprehensive Everglades Restoration Plan*, the West Dade Wellfield, U.S. 1 widening, and the Lower East Coast Water Supply Plan.

*Status:* Implemented and on-going. The members of the Management Committee or their staff regularly participate in activities associated with planning and implementation of the *Comprehensive Everglades Restoration Plan*, including the Florida Bay and Adjacent Coastal Ecosystems Program Management Committee, the South Florida Environmental Restoration Task Force Working Group, Science Coordination Team, and Project Coordination Team.

*Implementation:* The Water Quality Protection Program Management Committee coordinates and administers water-management activities in the Sanctuary. The responsible agencies are EPA and DEP. NOAA has a primary role. The main agencies involved in water management decisions for the Everglades and Florida Bay are the NPS, SFWMD, and USACE. As the state land-planning agency for a designated Area of Critical State Concern, the FDCA is also involved. Other primary agencies are the USFWS and Monroe County.

# Domestic Wastewater Strategies

The purpose of these strategies is to reduce pollution from land-based sources of domestic wastewater in the Florida Keys. Sources include cesspits, on-site treatment and disposal systems, package plants, and municipal treatment plants. Wastewater pollution from live-aboard boaters is discussed in Marina and Live-Aboard Strategies.

The first two domestic wastewater strategies (W.1 and W.2) are demonstration projects that would provide information to assist in deciding among options for the main engineering strategy (W.3) for wastewater management systems (exclusive of the City of Key West). Strategy W.4 is also an engineering strategy, but is applicable only to Key West. The remaining domestic wastewater strategies (W.5, W.7, and W.8) involve management activities designed to reduce pollution by developing water quality standards (including biocriteria) specific to the Florida Keys, and making the regulatory/management system work more efficiently.

## **STRATEGY W.3            ADDRESSING WASTEWATER MANAGEMENT SYSTEMS**

### ***Strategy Summary***

This strategy will reduce the amount of pollutants entering groundwater by enforcing existing standards. On-site inspection programs would be implemented to identify and eliminate all cesspits and ensure that On-Site Disposal Systems (OSDSs) and package plants are in compliance with existing standards. Penalties would be imposed for non-complying systems. Cesspits are illegal and provide no sewage treatment. OSDSs provide adequate sanitary treatment and limited nutrient reduction; however, there is no routine inspection and enforcement program to ensure that these systems are operating properly. Package plants provide secondary treatment and are inspected routinely (although not frequently). The elimination of cesspits and replacement with approved OSDSs would reduce nutrient loading to groundwater and eliminate health hazards from untreated sewage. Aggressive inspection/enforcement programs for OSDSs and package plants could be expected to further reduce nutrient loadings to groundwater. In addition, this strategy would involve research to estimate the level of reduction in wastewater nutrient loading necessary to restore and maintain water quality and Sanctuary resources. Based on these nutrient reduction targets and the results of the wastewater demonstration projects (strategies W.1 and W.2), a Sanitary Wastewater Master Plan would be developed that would evaluate options for further treatment (e.g., construction of community wastewater plants, upgrading package plants to Advanced Wastewater Treatment (AWT), or the use of alternate, nutrient-removing OSDSs. The Sanitary Wastewater Master Plan would also specify details of costs, schedules, service areas, etc. for implementation.

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

***(1) Establish Inspection and Compliance Programs for Cesspits, OSTDS, and Package Plants.*** This activity seeks to establish on-site inspection programs to identify all cesspits and ensure that OSTDS and package plants comply with existing standards. Inspection and enforcement programs for OSTDS and package plants would ensure that these systems operate properly and reduce nutrient loading to groundwater. DEP has an on-going inspection and compliance program for package

plants. Cesspits identified would eventually be replaced with an approved OSTDS or a connection to a community wastewater-treatment plant, as recommended by the *Monroe County Sanitary Wastewater Master Plan* (described in Activity 3). Because development and implementation of the *Sanitary Wastewater Master Plan* was a long-term process, Monroe County developed an interim policy to address non-compliant wastewater-treatment systems. This activity includes a public education and outreach component that informs the public of ways to assess and improve existing wastewater treatment systems.

*Status:* Initiated and on-going. The OSTDS inspection and compliance program has been initiated in compliance with the Governor's Executive Order 96-108, which requires elimination of all cesspits and issuance of an operating permit for each onsite disposal system in Monroe County. A 1997 county ordinance specifies timeframes and procedures for implementing the cesspit replacement. The county ordinance served as an interim response to address non-compliant onsite wastewater systems until the June 2000 *Sanitary Wastewater Master Plan* recommended a change to central collection and treatment systems for large or multiple islands. Onsite systems or small clustered systems were recommended for less-dense areas. As a result, the focus of the cesspit identification and elimination program shifted to only the areas identified for onsite wastewater systems. Grant money is available to assist qualified property owners in replacing onsite systems. In addition, \$4 million in congressional appropriations through EPA is available to initiate an onsite wastewater utility demonstration project. A grant was made to Florida Keys Aqueduct Authority (FKAA), which administers this project.

*Implementation:* DEP and FDOH are the responsible agencies. Other primary agencies involved are the EPA, Monroe County, and local municipalities.

**(2) Evaluate Development of Nutrient-Reduction Targets.** The goal of this activity was to identify and evaluate strategies for developing nutrient reduction targets for wastewater and stormwater in the Sanctuary. The information helped the EPA and the State of Florida to determine if nutrient reduction targets should be developed and if so, how development should proceed.<sup>12</sup>

*Status:* Completed. Further review may be required based upon State of Florida requirements.

*Implementation:* A 1995 workshop concluded that the best short-term approach to reduce nutrient loading from wastewater is a technology-based approach, rather than establishment of nutrient-reduction targets. It was generally agreed that nutrient sources for canals and nearshore waters are known and that these problems can and should be addressed quickly with best-available technology. Workshop participants generally agreed that over the long-term it may be appropriate to develop resource-based, nutrient-reduction targets. The Water Quality Protection Program Steering

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<sup>12</sup> In 1999, the Florida Legislature adopted treatment and disposal standards for the Florida Keys. New and existing or expanding facilities with design capacities of 100,000 gallons per day or greater, must meet AWT standards (5 mg/l CBOD, 5 mg/l TSS, 3 mg/l TN, 1 mg/l TP). New and expanding facilities with design capacities of less than 100,000 gpd must achieve 10 mg/l CBOD, 10 mg/l TSS, 10 mg/l TN, and 1 mg/l TP no later than 2010. Additionally, design specifications were adopted into legislation for Class V injection wells. Facilities with a capacity of greater than 1,000,000 gpd are required to case disposal wells to a minimum depth of 2,000 feet. Facilities with a capacity of less than 1,000,000 gpd are required to case disposal wells to 60 feet. Surface water discharges are prohibited.

Committee (WQSC) approved these recommendations in May 1996. The EPA and FDOH led this activity.

**(3) Implement a Master Plan.** Completion of this activity would result in the implementation of the preferred wastewater-treatment option specified in the *Sanitary Wastewater Master Plan*. The plan recommends that regional wastewater treatment plants be built in Key Largo, Islamorada, Marathon, Big Pine Key, Cudjoe Key, Big Coppitt, and Stock Island. This would provide a high level of treatment for approximately 95 percent of the wastewater flows outside Key West. In addition, the plan recommends that 17 existing package plants be upgraded and expanded to serve local areas.

*Status:* The City of Key West upgraded its treatment facility to meet AWT standards and retrofitted collection systems to significantly reduce infiltration and inflow. In addition, the City retired the ocean outfall and disposes of treated wastewater to a deep well (approximately 3,000 feet). The ocean outfall is retained for emergency use. The City of Key Colony Beach upgraded its treatment facility to meet AWT standards. Key Colony Beach is also addressing infiltration problems. The City of Islamorada began the selection process for treatment facilities for each of its four islands and a Technical Review Committee has made recommendations to its City Council. The committee reviewed the selected treatment and disposal methods and found them consistent with recommendations in the *Monroe County Wastewater Master Plan*.

Key Largo Wastewater Treatment District was formed with the election of inaugural commissioners in November 2002. The District's mission includes the introduction of advanced wastewater treatment and disposal infrastructure to serve all residents and commercial operations on the unincorporated island of Key Largo by 2010. In 2003, contracts to design and build a 0.183 million gallon per day wastewater treatment plant and to install collection systems in Key Largo Trailer Village and Key Largo Park were awarded. Those two communities were identified as hotspots in the Monroe County Wastewater Master Plan. In 2005, the District's activities focused on administration of the engineering design of these projects. The District expects to complete construction of these initial projects and begin the operation of the treatment plant by mid 2006. The District is also planning to construct a main collection line for the northern half of the island, install collection systems in additional communities along the new main, and expand the treatment plant to accommodate the increased flow that these new projects will generate. Engineering design of the new projects was initiated in April 2005.

*Implementation:* The primary agencies are Monroe County, Key Largo Wastewater Treatment District, and FKAA within the unincorporated areas of the County. Other primary agencies involved are EPA, DEP, FDCA, the municipalities, and FDOH. The City of Islamorada has taken primary responsibility for its wastewater improvements and is progressing along lines similar to those recommended in the Monroe County plan. The City of Marathon has adopted the FKAA as its wastewater authority. The FKAA has completed construction of the Little Venice (Marathon) facility, which was dedicated in June 2004, and is preparing a request for proposals for sewage collection and treatment system for greater Marathon. The FKAA is also in the early planning phases for wastewater improvements at Conch Key, Hawks Cay and Bay Point Subdivision on Saddlebunch Key.

**Strategy Summary**

This strategy will reduce the impacts of pollution on Sanctuary resources by determining water quality conditions to ensure resource protection. The intent is to implement water quality standards as guidance in determining permitted discharge limitations. Outstanding Florida Water (OFW) standards will be used until research indicates that new, more-stringent regulations are necessary.

**Activities (2)**

**(1) Develop and Evaluate Indicators.** This activity will identify and evaluate indicators (biochemical and ecological measures to provide early warning of widespread ecological problems) in each type of ecosystem. Examples are tissue C:N:P ratios, alkaline phosphatase activity, and shifts in community structure by habitat. These measures could be incorporated into the Sanctuary's Water Quality Monitoring Program and provide the basis for resource-oriented water-quality standards.

*Status:* The DEP has initiated a process to develop appropriate bioassessment methods and criteria for various water body types. Field tests and data analysis have been initiated in streams, lakes, and wetlands throughout the state. At present, there are no plans to incorporate biocriteria in Water Quality Standards for marine waters. Florida, in response to draft numeric nutrient criteria published by EPA, is initiating efforts to develop new water quality standards for nutrients. This strategy is also included in the Research and Monitoring Action Plan.

*Implementation:* The EPA and DEP are the responsible agencies through the Sanctuary Management Plan's Research/Special Studies Program. NOAA and NMFS may have a research role. FKNMS research staff will monitor any developments in this area.

**(2) Develop Water Quality Standards.** This activity will develop water quality standards, including nitrogen and phosphorus standards and biocriteria, appropriate to Sanctuary resources. The intent is to implement water quality standards as guidance in determining permitted discharge limits. Outstanding Florida Waters (OFW) standards will be used until research indicates that new, more stringent regulations are necessary.

*Status:* The existing water quality standards for marine waters are published in Rule 62-302.530 of the Florida Administrative Code (FAC). Chapter 62-302 FAC. also designates the Keys' ambient waters as OFWs, subject to special protection. The intent of the designation is to maintain existing ambient water quality and provide authority to regulate activities that may cause pollution of those waters. Existing water-quality standards already prohibit discharges that may cause biological imbalance in the receiving waters. There are no current plans to develop new water quality standards for nutrients specific to waters of the Keys however on-going research or emergent information may require action in this area.

*Implementation:* The lead agency for any revisions to the state's water quality standards will be DEP, which would initiate formal rule-making procedures. Once enacted, the new standards would be implemented at the time new permits are issued or existing permits reissued. Other primary agencies will be EPA and FDOH.

**Strategy Summary**

This strategy will help to evaluate environmental impacts of point-source discharges by requiring all National Pollutant Discharge Elimination System (NPDES)-permitted surface dischargers to develop resource monitoring programs. This could be accomplished in one of two ways: 1) EPA could eliminate the baseline exemption for resource monitoring under the Ocean Discharge Program as it applies to the Keys. All surface dischargers, except the City of Key West sewage treatment plant, are currently exempted from developing resource monitoring programs because the end of their discharge pipe does not extend beyond the baseline (the mean low-tide line); or 2) DEP, through the State of Florida's permitting authority, could require resource monitoring when individual NPDES permits come up for renewal. This approach would probably be easier because it can be accomplished under existing rules, whereas eliminating EPA's baseline exemption would require a federal rule change.

**Activity**

**(1) Require Resource Monitoring.** This activity seeks to evaluate environmental impacts of discharges by requiring all NPDES-permitted surface dischargers to develop monitoring programs.

Status: On-going. Monitoring of the City Electric cooling-water outfall on Stock Island continues. In October 2001, Key West began using a deep well for disposal of wastewater effluent, retaining the ocean outfall for emergency use only. This change eliminated the other major surface water point discharge in the region. It is not anticipated that any new surface water discharges will be permitted in the future.

Implementation: EPA and DEP are the responsible agencies.

# Stormwater Strategies

Since the 1996 management plan, two of the strategies developed to reduce pollution from stormwater runoff in the Keys have been completed. Strategies W.12 and W.13 worked together to require enactment of stormwater management ordinances and master plans that would cover the entire Keys. These plans are now being implemented through strategy W.11 that involves engineering modifications at hot spots to control pollutants in stormwater runoff. Another strategy, W.14, involves the development and implementation of widely used Best Management Practices and public education to reduce pollutants entering stormwater runoff.

## *STRATEGY W.11      STORMWATER RETROFITTING*

### *Strategy Summary*

This strategy will reduce loadings of sediment, toxics, and nutrients to Sanctuary waters through engineering methods applied to stormwater hot spots (e.g., commercial and industrial facilities) and limited sections of U.S. 1.

### *Activity*

**(1) Retrofit Hot Spots and Portions of U.S. 1.** This activity involves using grass parking, swales, pollution-control structures, and detention/retention facilities to control pollutants in stormwater runoff. Swales and detention facilities are being installed along portions of U.S. 1. Engineering actions are underway to control stormwater runoff in areas handling toxic and hazardous materials.

*Status:* Implemented and on-going. This activity has a high priority in Monroe County's and Islamorada's Stormwater Management Master Plans and implementation began in 2002. It is estimated that it will take approximately five years to completely retrofit hot spots. The City of Key Colony Beach is addressing stormwater runoff by creating swales and retention basins. The City of Key West has an inadequate stormwater-management system with many outfalls discharging untreated stormwater. The City has begun construction of new stormwater control and treatment structures.

*Implementation:* Monroe County is the responsible agency for stormwater retrofitting. Other primary agencies involved are the DEP, Florida Department of Transportation (FDOT), and SFWMD.

## *STRATEGY W.14      INSTITUTING BEST MANAGEMENT PRACTICES*

### *Strategy Summary*

This strategy will reduce pollution by instituting a series of "Best Management Practices" and a public education program to prevent pollutants from entering stormwater runoff.

### *Activity*

**(1) Develop and Implement Best Management Practices and a Public Education Program.** This activity seeks to reduce pollution from stormwater runoff through a variety of programs, including



street sweeping; ordinances to control fertilizer application on landscaping; collection locations and public education regarding the proper use and disposal of fertilizers, pesticides, motor oil, and other hazardous chemicals; and strenuous litter-control programs.

*Status:* On-going. DEP provides public information on proper disposal of oil and is currently preparing information on proper disposal of boater wastes. DEP has several stormwater public education materials available on its Web site. Local governments have provided some information on best management practices for residential stormwater. Local ordinances require use of best management practices for stormwater on residential construction projects.

*Implementation:* The responsible agencies are local governments. Other primary agencies are the DEP, FDCA, SFWMD and FDACS. Educational aspects are coordinated with the Sanctuary's educational staff.

# Marina and Live-Aboard Strategies

These five strategies and activities aim to reduce pollution from marinas and live-aboard boaters. Strategy B.7 seeks to reduce pollution by restricting discharges and educating the public. Strategy Z.5, found in the Marine Zoning Action Plan, concentrates live-aboards in areas where wastewater-treatment facilities can be provided. Strategy L.1 (expanded to include previous strategy L.6) increases the availability of pump-out facilities. Strategy L.3 will reduce pollution from marina operations. Finally, strategy E.4, included in the Education and Outreach Action Plan, will reduce pollution from boaters and marinas in general by expanding an existing education and environmental-awareness program.

## **STRATEGY B.7            REDUCING POLLUTION DISCHARGES**

### ***Strategy Summary***

This summary aims to strengthen implementation and enforcement of existing regulations to reduce pollution discharges and the impact of discharges on the marine environment.

### ***Activities (3)***

**(1) Implement the 1994 Florida Clean Vessel Act.** The Florida Clean Vessel Act prohibits boaters from discharging raw sewage into state waters, effective October 1, 1994. In addition, all vessels 26 feet or more in length with an enclosed cabin and berthing facilities are required to have a toilet on board. Houseboats and floating structures must, by October 1, 1996, have permanently installed toilets attached to Type III marine sanitation devices (a holding tank), or directly connect their toilets to shore-side plumbing. Full implementation and enforcement of the Clean Vessel Act is expected to reduce sewage in Sanctuary waters.

Status: On-going.

Implementation: The FWC enforces the Clean Vessel Act. FKNMS works with EPA and the state to phase in implementation in federal waters after public review of the draft rules and public hearings, prior to issuance of final regulations. Sanctuary regulations prohibit discharge from all marine sanitation discharges in the Ecological Reserves and SPAs.

**(2) Enforce No-discharge Zones.** At the request of the City of Key West, EPA was asked to designate no-discharge zones in accordance with provisions of marine-sanitation devices where live-aboard vessels congregate, and where there is a history of water-quality violations. In 2000, EPA designated all waters within the city's 600-foot jurisdiction as a no-discharge zone. The Steering Committee passed a resolution recommending that Monroe County pursue designation of a no-discharge zone for state waters in the Keys. In turn, the Monroe County Board of County Commissioners passed a resolution requesting that the Governor petition EPA to declare all state waters in the Sanctuary as a no-discharge zone. EPA published the proposed rule in the Federal Register and the comment period expired on October 26, 2001. EPA responded to all public comments and announced a final determination in the Federal Register, effective June 19, 2002.

Status: On-going.

Implementation: The EPA is the responsible agency. Enforcement procedures and responsibilities are being coordinated through an interagency management committee. DEP and Monroe County have assisting roles.

**(3) Develop and Implement a Public Education Program.** This activity would create a program to educate the boating public about ways to reduce pollution from vessels. The program would include providing information about the Clean Vessel Act and other regulations affecting discharges from vessels. This activity is also included in the Education and Outreach Action Plan.

Status: FKNMS has worked with the City of Key West and Reef Relief to develop and implement a "Pump it, Don't Dump it!" boater-education program. Marina and pump-out locations have been incorporated in *The Upper Keys Boater Guide*, published by Florida Fish and Wildlife Research Institute and Monroe County. This information and a detailed fact sheet are posted on Monroe County's Web site. An intergovernmental task force will prepare an implementation plan for the designation of all state waters within the Sanctuary as a no-discharge zone. The plan includes a public education and outreach component. An interagency committee has developed a management plan for the Keys-wide no-discharge zone.

Implementation: FWC is the lead agency, with assistance from EPA and NOAA.

#### **STRATEGY L.1            ELIMINATION OF WASTEWATER DISCHARGE FROM VESSELS**

##### ***Strategy Summary***

This strategy will work to eliminate discharge of wastewater, whether treated or not, from all vessels into Sanctuary waters. Although sewage discharges from vessels may be a relatively minor contributor to the total pollutant load, vessels are normally moored or anchored in confined waters that may be more susceptible to the impacts of such loading. By requiring marinas to provide pump-out facilities, two problems will be resolved: 1) boats in marinas that do not currently pump out will be provided the means to do so; and 2) boats that moor outside of marinas can take advantage of the increased number and availability of pump-out facilities.

##### ***Activities (5)***

**(1) Develop a Plan to Eliminate Vessel Sewage Discharge.** This activity has resulted in the development of a comprehensive plan to address problems associated with sewage discharges from live-aboards and other vessels. The plan includes elements such as requiring all marinas to install pump-out facilities; enforcing pump-out use; establishing mobile pump-out services; establishing mooring fields; and evaluating the treatment and disposal of pumped out wastewater.

Status: EPA published in the Federal Register the intent to declare all state waters in the Sanctuary as a no-discharge zone. The deadline for public comments expired on October 26, 2001. EPA responded to the public comments and published them and its decision in the Federal Register, effective June 19, 2002. An interagency task force developed an implementation plan that will recommend the number of pump-out facilities to adequately serve the boating public. Additional financial assistance for marinas currently without pump-

out facilities is being pursued. The implementation plan also includes education and enforcement components.

*Implementation:* EPA has designated all state waters in the Sanctuary as a no-discharge zone. Implementation is by Monroe County and the municipalities. The DEP and FDCA have a primary role. The EPA, USCG and NOAA continue to assist.

**(2) Require Marinas to Install Pump-out Facilities.** This activity seeks to require all marinas (10 or more slips, as defined by the state) to provide pump-out services, greatly increasing their number and accessibility.

*Status:* In progress. Monroe County and several municipalities have prepared ordinances; adoptions are anticipated throughout 2002.

*Implementation:* This activity is implemented by local ordinances requiring marinas offering overnight docking to boats over a given length to have stationary or mobile equipment to pump holding tanks. Monroe County has actively sought funding and plans to coordinate with marinas to facilitate compliance.

**(3) Establish Mobile Pump-out Services.** Establish mobile pump-out services through local governments or franchises with private contractors to pump out live-aboard vessels and other anchored or moored vessels located outside of marinas.

*Status:* On-going. Key West's Garrison Bight Marina provides mobile pump-out facilities for vessels using the local mooring field. A mobile pump-out facility is also in place in Boot Key Harbor.

*Implementation:* Local governments are responsible to assure that pump-out facilities are available for vessels located outside of marinas.

**(4) Establish Mooring Field.** Establish mooring fields at congested anchorages throughout the Keys as a means of managing transient and live-aboard boaters and ensuring compliance with sewage disposal regulations.

*Status:* On-going. Monroe County is increasing the number of moorings at existing mooring fields as well as planning for the implementation of moorings at least three other locations in the Keys. Studies are being conducted to look at the feasibility of installing moorings at Blackwater Sound, Community Harbor and Pine Channel.

*Implementation:* The Monroe County GMD will be responsible for the planning, permitting, funding, and implementation of additional mooring fields. The County will likely partner with privately owned marinas to manage the mooring fields.

**(5) Enforce Pump-out Use.** This activity seeks to enforce use of pump-out facilities. Coordinated enforcement procedures are being developed as part of the implementation plan. Historically, pump-out usage had been low, in part because there was no law requiring it. Also, more pump-out facilities are needed in areas identified in the implementation plan. One enforcement tool considered is the issuance of a sticker for boats anchored in or passing through the Sanctuary. Each time a vessel's holding tanks are pumped, the sticker could be date stamped. If the vessel does not have its tanks pumped within a given length of time based on its size and occupancy, a citation would be issued.

*Status:* An interagency committee is developing an enforcement strategy for the no-discharge zone. Coordination is expected to be formalized through memoranda of understanding and inter-local agreements.

*Implementation:* FWC, USCG, Monroe County Sheriff's Department, and local governments to coordinate enforcement.

### **STRATEGY L.3            REDUCING POLLUTION FROM MARINA OPERATIONS**

#### ***Strategy Summary***

This strategy aims to reduce pollution from marina operations by establishing appropriate infrastructure and information resources.

#### ***Activities (2)***

***(1) Prevent Discharge of Pollutants from Marinas.*** This activity would establish paved and curbed containment areas for boat-maintenance activities, such as hull scraping and repainting, mechanical repairs, fueling, and lubrication. It would create secondary containment, generally in the form of curbing or synthetic liners, for areas where significant quantities of hazardous or toxic materials are stored. Procedures to avoid or reduce fuel spillage during refueling operations would be evaluated.

*Status:* The voluntary Florida Clean Marina Program is being implemented and periodic workshops encourage non-participating marinas to join. DEP has been conducting compliance inspections and audits of marinas and boat yards. Inspections target marinas that are the subject of complaints or which have large, full-service marinas. Marinas are encouraged to limit boat-maintenance areas. Waste containment is required. DEP has suggested that EPA provide an overview of the NPDES permitting requirements and a list of marinas that have applied for or received permits.

*Implementation:* The responsible agency is the DEP. Local governments (Monroe County and the municipalities) may have an assisting role. The NPDES stormwater discharge rule is the mechanism to implement this activity. In 1990, the EPA enacted rules to control stormwater discharges from a variety of uses, known as the NPDES Permit Application Regulations for Stormwater Discharges. The rules require applicants to describe plans to eliminate pollutants generated by marina activities. Applicants must identify the Best Management Practices used. Marina owners are encouraged to participate in environmentally oriented organizations, such as the Marine Industry Association and the Florida Clean Marina Program.

***(2) Encourage Marina Owners to Provide a User Manual with Local Environmental Information.***

The information could include locations of pump-out facilities and trash receptacles, as well as sensitive habitats.

*Status:* Implemented and on-going. Yearly discharge prevention and response certificate inspections are conducted at marinas with diesel-fuel operations. During inspections, marinas receive educational materials, information about approved clean-up methods, proper handling of used oils, and local hazardous-waste collection locations. DEP's draft Best Management Practices for marinas is also distributed. The Florida Clean Marina Program's

booklet, "Clean Boating Habits," is available to boaters through local marinas, Marine Industries Association, and Florida Sea Grant agents.

Implementation: The responsible agencies are Monroe County and municipalities working with DEP.

# Landfill Strategy

This strategy addresses potential pollution problems due to leaching from landfills. All landfill sites in the Florida Keys, with the exception of the Cudjoe Key expansion, were developed prior to current regulations that require bottom liners and leachate collection. At many sites, filling with solid waste probably occurred below the water table in the early stages. Consistent with common practice at the time, there was probably little or no control over materials deposited in the landfills. These conditions result in a significant potential for ground- and surface-water contamination.

Although the potential exists for problems, monitoring data do not indicate leaching or water quality degradation due to landfills; therefore, no corrective actions are currently proposed. However, two investigative activities are proposed under strategy L.7, Sanitary Waste Disposal Problem Sites. These activities involve searching for and assessing abandoned landfills and dumps, and intensifying existing monitoring programs around landfills to ensure that no leaching into marine waters is occurring, and implementing remedial actions if problems are discovered.

## **STRATEGY L.7            ASSESSING SOLID WASTE DISPOSAL PROBLEM SITES**

### ***Strategy Summary***

This strategy aims to address contamination of marine waters from landfills through assessment, monitoring, and, when required, remedial action.

### ***Activities (3)***

**(1) Conduct a Historical Landfill Search and Assessment.** Conduct a comprehensive search for abandoned landfills and dumps. Evaluate sites to determine if they contain hazardous materials or cause environmental problems. Knowledgeable state and local government personnel believe there are a number of abandoned landfills and dumps, many on private property, within the Florida Keys. A comprehensive program needs to be set up to locate, map, and evaluate these historic, casual dumps.

*Status:* Implemented and on-going. The locations of landfills have been identified; however, illegal dumping is a continuing problem, and DEP continues to identify abandoned, unlined, and unmonitored sites. Funds are lacking for cleanup and disposal of illegally dumped wastes. The U.S. Navy is assessing and conducting remedial action at former solid waste disposal sites on Navy properties.

*Implementation:* Monroe County, working with the DEP, is the responsible agency. The U.S. Navy has a primary role in dealing with landfills on its properties. The EPA has an assisting role.

**(2) Intensify Landfill Monitoring.** Intensify existing monitoring around landfills to ensure that no leaching is occurring into marine waters. Identify and monitor old landfills that were never permitted, and therefore have no closure plans or closure permits. This activity seeks to ensure that existing monitoring programs are adequate to detect leaching from landfills. Current data from landfills do not indicate a leaching problem; however, the number of monitored locations is small and

should be increased. In addition, this strategy seeks monitoring of older landfills that are not now monitored. Monroe County is currently complying with all state and federal monitoring guidelines.

Status: Fully implemented and on-going. All permitted landfills in Monroe County are closed. Landfills at Key Largo, Long Key, Cudjoe Key, and Stock Island have been properly closed with a top liner and a permit requirement includes quarterly monitoring.

Implementation: The responsible agency is DEP. The U.S. Navy has a primary role in dealing with landfills on its properties. EPA has an assisting role.

**(3) Evaluate and Implement Remedial Actions.** If problems are discovered, evaluate and implement appropriate remedial action, such as boring or mining, upgrading, closure, collecting and treating leachate, constructing slurry walls, or hauling.

Status: On-going. To date, no need for remedial action has been determined.

Implementation: The responsible agency is Monroe County, working with DEP. The U.S. Navy has a primary role for landfills on its properties. EPA has an assisting role.



# Hazardous Materials Strategies

These strategies and activities aim to reduce the likelihood of pollution from spills of hazardous materials in and near the Keys. The current management strategy appears to be functioning adequately; however, some actions could be taken to further reduce the potential for accidental spills. These management strategies would enhance HAZMAT response (W.15), improve spill reporting (W.16), and develop an inventory of hazardous materials handling and use in the Keys (L.10).

## *STRATEGY W.15      HAZMAT RESPONSE*

### *Strategy Summary*

This strategy seeks to reduce the chances that a spill of oil or other hazardous materials will have a significant negative impact on Sanctuary resources. This will be accomplished by improving coordination and cooperation among the federal, state, and local agencies responding to spills; by encouraging improvements in response and containment technologies appropriate to the Keys and by creating a spill contingency plan for the Sanctuary that includes crew and equipment staged in the Keys. The strategy recognizes that hazardous materials spills are handled independently of marine spills and improvement measures will be developed for both response programs.

### *Activities (3)*

**(1) Develop and Periodically Revise Sanctuary Spill Contingency Plan.** This activity would involve creating and periodically revising the spill contingency plan for the Sanctuary that includes crew and equipment staged in the Keys (possibly including skimmers). The plan should cover spills of a size not responded to by the USCG and should include training and education of a local response team. The USCG Marine Safety Office in Miami will coordinate marine HAZMAT response. Because spills of hazardous materials are handled independent of marine spills, improvement measures will be developed for both response programs.

*Status:* On-going. DEP has personnel on-call 24 hours a day for initial response to environmental emergencies. Oil spill equipment is available at the Port of Key West. The USCG has a Marine Safety Office located in Marathon. The USCG has the responsibility to develop a HAZMAT protocol and has officially adopted the National Interagency Incident Command System as its response management system when responding to oil and hazardous substance spills. That system unifies the efforts of industry, and federal, state, and local government agencies and the entity responsible for the pollution incident. The USCG has designated response regions. The Sanctuary is part of the South Florida Oil Spill Contingency Plan Area Committee. An "Area Contingency Plan" includes area contacts.

*Implementation:* USCG and DEP are responsible. NOAA, Monroe County and FDCA assist.

**(2) Improve Coordination and Cooperation.** This activity seeks to improve coordination and cooperation between federal, state, and local agencies responding to spills.

*Status:* Initiated and on-going. The National Preparedness for Response Exercise Program (PREP) was developed in conjunction with the Oil Pollution Act of 1990 to provide a workable

exercise program. PREP is a unified federal effort and satisfies the exercise requirements of USCP, EPA, Research and Special Programs Administration, Office of Pipeline Safety, and the Minerals Management Service. PREP exercises are an opportunity to improve the response plan and response system. Participation in PREP exercises allows agencies to work together and facilitates response in the event of a pollution incident. The Florida Coastal Management Program has hosted a series of Florida Summits, attended by DEP Bureau of Emergency Response, NOAA, USCG, and FWRI staff. In addition, regional coordination is conducted at contingency plan meetings, regularly held by USCG in Miami.

Implementation: The responsible agencies are USCG, DEP, NOAA, Monroe County, and the FDCA assist.

**(3) Improve Response/Containment Technologies.** This activity encourages improvements in response and containment technologies appropriate to the Keys.

Status: Initiated and on-going. FWRI has compiled an environmental sensitivity atlas and developed a computerized spill-analysis system. The USCG's Area Contingency Plan is updated annually. Sanctuary personnel participate as observers in the National Preparedness for Response Program field exercises. NOAA conducts training workshops in Key West and Key Largo on spill response.

Implementation: USCG and DEP are the responsible agencies. NOAA, FWRI, Monroe County, and FDCA assist.

## **STRATEGY W.16      SPILL REPORTING**

### **Strategy Summary**

This strategy will ensure that Sanctuary managers are informed of all spills (e.g., of petroleum products) in and near the Sanctuary.

### **Activities (2)**

**(1) Establish a spill-reporting system.** This activity establishes a reporting system to ensure that all spills documented by various agencies are reported to Sanctuary managers. In particular, small spills occur frequently, are under-reported, and may have a significant cumulative effect on water quality.

Status: Implemented and on-going. A reporting system is in place. Education is required to increase awareness of the reporting program.

Implementation: The responsible agency is the USCG. Other primary agencies involved are NOAA and DEP. DEP assists in reporting land-based spills that might affect FKNMS waters. The National Response Center is notified of all spills.

**(2) Establish and Maintain a Sanctuary Spills Database.** This activity establishes and maintains a geo-referenced database for the Sanctuary to track spill information (locations, quantities, types of material, environmental impacts).

Status: Implemented and on-going. DEP has established and maintains a database that includes marine and upland spills and coastal emergency response incidents. It is DEP's

responsibility, in conjunction with USCG, to initially determine the severity of a coastal discharge or pollution incident within its jurisdiction. The Bureau of Emergency Response maintains a spill database, seeks reimbursement for expenses, and assesses natural resource damage. Education is required to increase reporting of all spills.

Implementation: USCG is the responsible agency with assistance from DEP and NOAA.

## **STRATEGY L.10            HAZMAT HANDLING**

### ***Strategy Summary***

This strategy supports the importance of inventorying and assessing the handling of hazardous materials in the Florida Keys. Such oversight is a preventative measure increasing protection of the marine environment from potential spills or mishandling.

### **Activity**

**(1) Conduct a HAZMAT Assessment/Inventory.** This activity involves conducting an assessment and inventory of hazardous materials handling and use in the region, including facilities, types and quantities of materials, and transportation. Information is added to GIS databases.

Status: Monroe County Emergency Management Authority has a *Hazardous Materials Plan* that is revised annually. The plan includes a list of facilities with reportable quantities of hazardous materials. DEP regulates hazardous wastes, but not materials.

Implementation: The responsible agency is DEP. Other primary agencies involved are DEP, Monroe County Emergency Management Authority, and Monroe County Health Department, which maintains a database on hazardous materials. FDCA has an assisting role.

# Mosquito Spraying Strategy

This strategy seeks to reduce pollution from pesticides used in mosquito control. Currently, there is little information on environmental concentrations and effects of pesticides in the Sanctuary. Additional data concerning pesticide concentrations in sediments and biological tissues throughout the Sanctuary will be collected through the Water Quality Research Program. Strategies for major changes to the Mosquito Control Program are not appropriate at this time. Additional data from the Water Quality Research and Monitoring Program will help to determine if major changes are warranted.

## *STRATEGY W.17      REFINING THE MOSQUITO SPRAYING PROGRAM*

### *Strategy Summary*

This strategy seeks to reduce the amount of pesticides entering Sanctuary waters by refining the existing aerial spraying program. Ground spraying by truck is the current method of choice for controlling the adult mosquito population. However, aerial spraying is initiated when the mosquito population reaches a certain threshold, as determined by mosquito landing counts at test sites. Although the Monroe County Mosquito Control District attempts to avoid marine areas during aerial spraying, the potential for pesticides to reach marine waters could be further reduced.

### **Activities (2)**

**(1) Review the Aerial Spraying Threshold.** The threshold for initiating aerial spraying will be reviewed to determine whether it can be raised.

*Status:* No action has been taken on this activity at this time. EPA funded a special study in 1997 to assess potential impacts of mosquito spray chemicals and their breakdown products. Although the study was not conclusive, it did determine that sprayed chemicals reach surface waters in concentrations that are of concern. The study raises continuing concerns about the impacts of the chemicals on non-target organisms. More research is required.

*Implementation:* The responsible agency will be the Florida Department of Agriculture and Consumer Services (FDACS) and FDCA will have an assisting role.

**(2) Review Flight Plans and Equipment.** The aerial spraying program should be reviewed to determine whether refining flight lines, alternative spray technologies, or the use of improved equipment could reduce the amount of pesticide released over water.

*Status:* Ultra low-volume aerial spray has been adopted. Use of ultra low-volume spray has significantly reduced the volume of pesticide applied and has eliminated the use of fogging oil contamination. However, the area being sprayed is now harder to define because the spray is not visible. The drift of finer particles released in ultra low-volume spray needs further definition. No other actions have been taken on this activity at this time.

*Implementation:* FDACS is the responsible agency. FDCA has an assisting role.

# Canal Strategy

This canal strategy strives to reduce water-quality problems in canals. Although many water quality problems are linked to wastewater discharges from cesspits and septic tanks of homes along canals and stormwater discharges, others may be due to a canal's structure and orientation. These physical factors can lead to low flushing and the buildup of weed wrack, which consumes oxygen and releases nutrients as it decays. The strategy described here would inventory and characterize canals and investigate technologies to determine whether it would be worthwhile to implement corrective actions, such as weed gates and aeration systems, to improve water quality. Any plan for implementing such improvements in canal circulation and flushing would have to be developed in coordination with plans for dealing with stormwater and wastewater pollution from cesspits and septic tanks, which contribute to water quality problems in many canal systems. The goal is to reduce nutrient loading to other surface waters from canal systems.

## *STRATEGY W.10 ADDRESSING CANAL WATER QUALITY*

### *Strategy Summary*

This strategy will improve water quality in nearshore, confined areas, with emphasis on dead-end canals and basins where reduced circulation increases the risk of reduced dissolved oxygen, retention of both dissolved and particulate pollutants, and potential impacts on benthic and pelagic environments. A comprehensive management plan will be developed for improving water quality in nearshore confined basins and canals. Improvement strategies will be implemented in all canals and basins identified as hot spots throughout the Sanctuary.

### *Activities (7)*

**(1) Evaluate and Revise Hot Spot List.** A priority list of areas of degraded water is required to effectively focus needs for remedial action and efficiently utilize available resources.

*Status:* Initial list development was completed. Period review and revisions to the list are ongoing. A hot spot list was developed as part of Phase I of the Water Quality Protection Program. That list was revised by the SFWMD as a result of a workshop held in early 1996. The SFWMD list includes recommended actions to improve water quality at priority hot spots. The list has been updated for the Monroe County Sanitary Wastewater Master Plan and Stormwater Master Plan.

*Implementation:* The responsible agency is South Florida Water Management District. Other agencies with primary roles are EPA, DEP, Monroe County, and the City of Key West.

**(2) Inventory and Characterize Canals.** An inventory of dead-end canals and other confined water bodies will be conducted to identify areas where reduced circulation increases the risk of depressed dissolved oxygen, retention of both dissolved and particulate pollutants and potential impacts on benthic and pelagic environments. Canals with water quality problems attributable mainly to their physical structure, flushing rates, and orientation (e.g., allowing weed wrack buildup), would be targeted for improvements.

Status: On-going. In 2001, a contract was granted to inventory canals in the Keys and prioritize potential canal improvement projects. The inventory is expected by Fall 2002.

Implementation: The responsible agency is Monroe County and FDCA. Other agencies with primary roles are EPA, DEP, and the municipalities.

**(3) Develop and Evaluate Improvement Strategies.** A comprehensive management plan will be developed for improving water quality in nearshore confined basins and canals. Potential methods of improving water quality (e.g., aeration, weed gates, and air curtains) will be tested in limited areas to determine whether widespread application is appropriate.

Status: On-going. In 2001, a contract was granted to conduct an inventory of canals in the Keys and prioritize potential canal-improvement projects. This project is underway.

Implementation: The responsible agencies will be Monroe County and FDCA. Other agencies with primary roles will be EPA, DEP, and the municipalities.

**(4) Identify and Compile Technologies.** This activity seeks to identify and compile a list of technologies for improving water quality in canals.

Status: On-going. In 2001, a contract was granted to conduct an inventory of canals in the Keys and prioritize potential canal improvement projects. This project is underway.

Implementation: The responsible agency is Monroe County and FDCA. Other agencies with primary roles are EPA, DEP and the municipalities.

**(5) Develop Community Education and Involvement Program.** This activity involves developing a community education program, including citizen monitoring.

Status: A volunteer citizen monitoring program (Florida Bay Watch) was established by The Nature Conservancy, which published quarterly and annual reports on the weekly analyses of canal and nearshore water quality provided by Florida International University. Florida Bay Watch was terminated in 2002. Florida Keys Watch was initiated in 2002 and provides information on bacteria and virus concentrations in canals. This activity is also included in the Education and Outreach action plan.

Implementation: The responsible agency is DEP and EPA. Other agencies with primary roles are Monroe County and the municipalities.

**(6) Conduct Canal System Restoration Pilot Project.**

Status: On-going. Residential canals at Sunset Acres (Key Largo) have been opened to tidal flushing. Permits for opening the canals included shallowing, implementing a stormwater collection system, eliminating onsite sewage treatment systems, and monitoring. Pre- and post-project monitoring have been performed. In May 2001, a multi-year monitoring project was initiated in canals and nearshore waters of Little Venice (Marathon). Water-quality data was collected weekly from ten stations for approximately two years before completion of the central wastewater collection and treatment systems. Monitoring will continue for approximately two years after all homes and businesses are connected. This project is expected to demonstrate changes to water quality in canals and nearshore waters with improved sewage treatment practices.

*Implementation:* The responsible agency is Monroe County and FDCA. Other agencies with primary roles are EPA, DEP and the municipalities.

**(7) Implement Improvement Strategies.** Effective improvement strategies identified through previous activities will be implemented in all canals and basins identified as hot spots.

*Status:* On-going. Physical improvements have been made at two canal systems (Cudjoe Gardens and Jolly Roger Estates) by local homeowner associations. Both projects include monitoring before and after improvements. The on-going canal inventory study cited above will develop a prioritized list of canal improvement projects and cost estimates.

*Implementation:* The responsible agency is Monroe County and FDCA. Other agencies with primary roles are EPA, DEP, and the municipalities.

#### **PREVIOUS STRATEGIES**

The following strategies from the 1996 management plan are not included in this action plan because they have been completed and do not require further action:

- W.1 OSTDS Demonstration Project
- W.2 WT Demonstration Project
- W.4 Evaluating Wastewater Disposal, City of Key West
- W.8 OSTDS Permitting
- W.12 Stormwater Permitting
- W.13 Stormwater Management
- L.2 Assessing Marina Siting and Design