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# EVALUATION OF THE EDUCATION AND OUTREACH ACTION PLAN

# OF THE FLORIDA KEYS NATIONAL MARINE SANCTUARY

by

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# EVALUATION OF THE EDUCATION AND OUTREACH ACTION PLAN OF THE FLORIDA KEYS NATIONAL MARINE SANCTUARY

## INTRODUCTION

During the summer of 1996, I had the opportunity to do an internship with the Florida Keys National Marine Sanctuary (FKNMS) at Lower Key Office, Key West, Florida. .Established in November 1990 under the Florida Keys National Marine Sanctuary and Protected Act (FKNMSPA), the FKNMS is a federal agency managed by the National Oceanic and Atmospheric Administration (NOAA) and responsible for the stewardship of marine resources located within the 2,800 square nautical miles surrounding the Florida Keys. The sanctuary encompasses both locally and nationally significant resources including coral reefs, marine fishes, and historic shipwrecks. Tropical ecosystems rarely found in the U.S are abundant in the Keys. Locals make use of natural and cultural resources especially for tourism industry. In 1996 alone 1.33 billion dollars are generated from visitor spending (English *et al.*, 1996).

As conservation and exploitation collide, serious problems and conflicts emerge. As a result, the FKNMS must be prepared to tackle these issues strategically and comprehensively. To this end, the FKNMSPA requires that the Sanctuary be operated under a comprehensive management plan. This plan is composed of 10 management techniques handling different management issues including the Education and Outreach Action Plan (EOAP).

The EOAP is composed of a number of management strategies designed to deal with specific issues of concern and target audiences. The plan not only provides information and promote public awareness, but is also a tool to enhance the understanding between the Sanctuary and the public. It is well recognized that education as a management technique can yield long-term success, if effectively practiced (Causey, 1995). Because the EOAP is a crucial component of the Sanctuary's management plan, its success or failure may be a good indicator of the effectiveness of the overall Sanctuary

plan implementation. It is important that any management plan have an evaluation process to assess the plan's performance. Improvement can then be made in areas that receive poor evaluations. For example, if the level of public awareness does not improve after the management plan has been implemented for awhile, it could mean that the education program may not be effective enough and needs to be changed at some extents.

This report provides an overview of the EOAP as well as offers an evaluation of its effectiveness based upon its policy and plan. The evaluation criteria were developed by Sabatier and Mazmanian (1983), "Can Regulations Work? The Implementation of the 1972 California Coastal Commission." Recommendations are also provided as guidelines to improve the current performance of the EOAP.

# BACKGROUND

## NATIONAL MARINE SANCTUARY PROGRAM

The National Marine Sanctuary Program (NMSP) was established under Title III of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, also called the Ocean Dumping Act. It is administered by the Sanctuaries and Reserves Division (SRD) of the Office of Ocean and Coastal Resource Management (OCRM) within the National Oceanic and Atmospheric Administration (NOAA). The program was initiated amidst nationwide concern over oil spills and the dumping of hazardous materials off U.S. coasts in the late 1960s (Tarnas, 1988). According to Title III of the Act, the primary purpose of the sanctuary program is "preserving and restoring [the] areas for their conservation, recreational, ecological, or aesthetic values" (16 U.S.C. § 1432, 1972). Since its implementation in 1972, 14 National Marine Sanctuaries have been designated within continental U.S. waters and American Samoa. The environmental settings within these sanctuaries vary from large marine mammal habitats to a complex system of tropical coral reefs. They also differ in size ranging from about one square nautical mile (snm) to 4,024 snm (Table 1).

Since its establishment 26 years ago, the National Marine Sanctuary Program has gradually evolved in various ways. The main focus of the program shifted from setting aside areas for absolute protection and preservation to allowing multiple uses in these areas. Although the original legislation permitted multiple use on a case-by-case basis, the public became more aware of the concept with the NMSP Program Development Plan (PDP) of 1982. The PDP provided a framework for operational policy as well as the program's administration, including site evaluation, designation, and management planning processes (NOAA 1982). The goals in this document provide guidelines for designated sanctuaries to follow by focusing on resource protection, education and awareness, scientific research, and sustainable use of resources. These goals are:

Table 1. The U.S. National Marine Sanctuaries

| SANCTUARY | DESIGNATED | STATE | AREA (snm) | PROTECTED RESOURCES |
|---|---|---|---|---|
| 1) *U.S.S. Monitor NMS* | Sept. 1975 | North Carolina | 1 | The remains of the Civil War ironclad, the USS *Monitor* |
| 2) *Key Largo NMS* | Dec. 1975 | Florida | 103 | Coral reefs, seagrass meadows, sandy habitats, tropical fish, shipwrecks |
| 3) *Channel Islands NMS* | Sept. 1980 | California | 1252.5 | Kelp forest, rocky shores, marine mammals, seabirds |
| 4) *Looe Key NMS* | Jan. 1981 | Florida | 5.32 | Spur-and-groove coral reef, reef-associated organisms, tropical fish |
| 5) *Gray's Reef NMS* | Jan. 1981 | Georgia | 16.68 | Tropical/temperate sandstone reef and fish communities |
| 6) *The Gulf of Farallones Islands NMS* | Jan. 1981 | California | 948 | Marine mammals, seabirds, rocky shores, continental shelf and slope |
| 7) *Fagatele Bay NMS* | Apr. 1986 | American Samoa | 0.25 | Tropical coral reefs, Hawksbill turtles |
| 8) *Cordell Bank NMS* | May 1989 | California | 397.05 | Rocky subtidal, seamount, marine mammals, seabirds |
| 9) *Florida Keys NMS* | Nov. 1990 | Florida | 2,800 | Coral reefs, seagrass meadows, mangrove islands, tropical fishes, turtles, shipwrecks |
| 10) *Flower Garden Banks NMS* | Jan. 1992 | Texas/ Louisiana | 41.7 | Coral reefs, algal-sponge communities, artificial reefs, reef fishes |
| 11) *Monterey Bay NMS* | Sept. 1992 | California | 4,024 | Kelp forests, rocky shores,submarine canyon, rockfish, and marine mammals |
| 12) *Hawaiian Islands Humpback Whale NMS* | Nov. 1992 | Hawaii | 981.9 | Humpback whale breeding, calving, and nursing grounds, tropical ecosystems |
| 13) *Gerry E. Studds Stellwagen Bank NMS* | Nov. 1992 | Massachusetts | 638 | Sand & gravel bank, muddy basins, cetaceans, fishes, lobsters |
| 14) *Olympic Coast NMS* | July 1994 | Washington | 2500 | Rocky & sandy shores, kelp forests, marine mammals |
| 15) *Northwest Straits proposed NMS* | proposed and in development | Washington | undecided | Kelp forests, marine backs, rocky shores, killer whales habitat, seabirds |
| 17) *Thunder Bay proposed NMS* | proposed and in development | Lake Huron, Michigan | undecided | Shipwrecks, freshwater species, bird habitats |

(1 square nautical mile = 1.324 square statute miles)

1. Enhance resource protection through the implementation of a comprehensive, long-term management plan tailored to the specific resources;

2. Promote and coordinate research to expand scientific knowledge of significant marine resources and improve management decision making;

3. Enhance public awareness, understanding, and wise use of the marine environment though public interpretive and recreational programs; and

4. Provide for optimum compatible public and private use of special marine areas (NOAA, 1982).

Since the PDP, the NMS program has been emphasizing multiple-use management and resource sustainability rather than resource preservation. This change in emphasis created conflict within the program and confused the public. Tarnas (1988) predicted the shifted focus could make the establishment of new sanctuaries difficult due to the skeptical view of the multiple-use concept.

The NMS program has also attempted to increase the cooperation and coordination with other government agencies and private organizations. Newly designated sanctuaries noticeably cover much larger areas and complex marine systems. As such, the sanctuaries require assistance from other agencies which govern overlapping areas or related management issues. Moreover, impacts on a sanctuary do not always originate within the sanctuary's boundary. That is, impacts may be from adjacent sources such as on-land development or coastal pollution. Title II, the National Marine Sanctuaries Program Amendments and Authorization, of Public Law 100-627 (1988), promotes interagency coordination at Federal and State levels. Furthermore, the National Marine Sanctuaries Program Amendments Act of 1992 (Pub. L. 102-587, Title II, sec. 2108, 1992) specifically requires the sanctuaries to consult and coordinate with Federal agencies, especially the National Estuarine Research Reserve System.

The level of public involvement in sanctuary management has also evolved. In the early stage of the NMS program, the public was encouraged to participate in the sanctuary nomination process known as the List of Recommended Areas (LRA). Under this process, private sectors, environmental organizations, and other government agencies recommended possible sanctuary sites to NOAA which then evaluated the feasibility of designation. The LRA system encouraged the public to comment on the site proposal prepared by the NOAA's regional evaluation team. This was a successful mechanism for encouraging the public involvement, but it also caused NOAA some difficulties in processing the evaluation. Furthermore, the LRA represented a wide range of site characteristics and values, which pressured NOAA to change its strategy in proposing new sites. The Site Evaluation List (SEL) later replaced the LRA in order to eliminate these problems. With the change to SEL, the public, that originally had a "direct" effect at the beginning and end of the site selection process through the LRA, now has only indirect power to comment on the pre-selected sites.

Public participation is not limited only to the site selection process. Indeed, public involvement has been a strong component of the education and outreach program since the early stage of the sanctuary program. The success and effectiveness of the education program or sanctuary program is dependent on public involvement in education activities designed to develop environmental awareness and conservation values. This in turn improves the public's ability to influence the sanctuary program by contributing more thoughtful comments on how to improve or enhance the success of the sanctuary.

For example, the National Marine Sanctuaries Program Amendments Act of (Pub. L. 102-587, Title II, sec. 2112, 1992) mandated the sanctuary to establish its Sanctuary Advisory Council (SAC). The SAC representatives are selected from local user groups, business groups, conservation, scientific, and educational organizations. Public representatives who are more knowledgeable about the sanctuary can be more effective.

This Amendments Act also significantly changed the program's direction and strategies by expanding its purposes and goals:

1. "to identify and designate as national marine sanctuaries areas of the marine environmental which are of special national significance;

2. to provide authority for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner which complements existing regulatory authorities;

3. to support, promote, and coordinate scientific research on, and monitoring of, the resources of there marine areas, especially long-term monitoring and research of these areas;

4. to enhance public awareness, understanding, appreciation, and wise use of the marine environment;

5. to facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities;

6. to develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas;

7. to create models of, and incentives for, ways to conserve and manage these areas;

8. to cooperate with global programs encouraging conservation of marine resources; and

9. to maintain, restore, and enhance living resources by providing places for species that depend upon these marine areas to survive and propagate" (Pub. L. 102-587, Title II, sec. 2101, 1992).

This amendment has finally led the sanctuary program to the next step by providing the sanctuaries with a better definition of resource management, and encouraging the program to establish a more thoroughly comprehensive management plan.

Because of the high variety of environmental settings and management issues, each sanctuary, which is established for different purposes, must develop its own management plan by following the Federal Regulation and PDP as a guideline. For example, the *Monitor* NMS possesses the historically valuable Civil War ironclad, the USS *Monitor*. Therefore this sanctuary's specific management plan is to preserve the actual wreck and surrounding area. Activities that are harmful to the remains and nearby seabed are prohibited or regulated. On the contrary, the Hawaiian Islands Humpback Whale NMS is a sanctuary for the endangered humpback whale of the North Pacific. Its management plan, therefore, focuses on the conservation and protection of this marine mammal habitat by promoting scientific research enhancing the survival of the humpback whale.

## FLORIDA KEYS NATIONAL MARINE SANCTUARY

In the mid 70s after the establishment of the NMSP, Key Largo NMS became the nation's second sanctuary in 1975 and was exclusively aimed at protecting and preserving the coral reef ecosystem. According to Key Largo NMS's regulations (15 C.F.R.§ 929.6, 1995) curtain activities are legal if they do not threaten any marine life or submerged historical resources. Six years later, another sanctuary, Looe Key NMS, was proposed in the Keys area and was specifically designated to protect spur-and-groove coral reefs.

Despite the fact that two major reef ecosystems were protected by laws and regulations, the reefs' health continued to decline. During the reauthorization of the NMS Program in 1988, the Congress became concerned about this problem and proposed three additional sanctuary areas along the Keys which would be combined with the two existing sanctuaries. Coinciding with the proposal, three ships grounded on the reefs within 18 days in 1989 (USDOC, 1996a). In November 1990, under tremendous pressure, Congress finally designated the entire Florida Keys as the Florida Keys National Marine Sanctuary (FKNMS) under the Florida Keys National Marine Sanctuary and Protection Act of 1990 (FKNMSPA) (Pub.L.101-605, 1990).

This legislation provided guidelines to be adopted and incorporated in a comprehensive management plan for the Sanctuary as follows:

1. "facilitate all public and private uses of the Sanctuary consistent with the primary objective of Sanctuary resource protection;

2. consider temporal and geographical zoning, to ensure protection of Sanctuary resources;

3. incorporate regulations necessary to enforce the elements of the comprehensive water quality protection program developed under section 8 unless the Secretary of Commerce determines that such program does not meet the purpose for which the Sanctuary is designated or is otherwise inconsistent or incompatible with the comprehensive management plan developed under this section;

4. identify needs for research and establish a long-term ecological monitoring program;

5. identify alternative sources of funding needed to fully implement the plan's provisions and supplement appropriations under section 9 of this Act and section 313 of the Marine Protection, Research, and Sanctuaries Act of 1972 (16 U.S.C. §1444);

6. ensure coordination and cooperation between Sanctuary managers and other Federal, State, and local authorities with jurisdiction within or adjacent to the Sanctuary;

7. promote education, among users of the Sanctuary, about coral reef conservation and navigational safety; and

8. incorporate the existing Looe Key and Key Largo National Marine Sanctuaries into the Florida Keys National Marine Sanctuary except the Looe Key and Key Largo Sanctuaries shall continue to be operated until completion of the comprehensive management plan for the Florida Keys Sanctuary" (Pub.L.101-605, 1990).

The goals guide the sanctuary to develop a comprehensive management plan and provide some new approaches for the sanctuary. For example, the Act mandates the Secretary of Commerce to establish an Advisory Council to assist in the development and implementation of the management plan (Pub. L. 101-605, sec.9, 1990). Public

involvement in the management planning process is also encouraged as stated in Pub. L. 101-605, sec.7(b) (1990). Interestingly this happened two years before the Amendments Act of 1992, which mandated the creation of the SAC as described earlier.

Environmental and Physical Settings of the Florida Keys

The Florida Keys are composed of about 1,700 islands and extend approximately 220 miles south-west from the southern tip of the Florida Peninsula to the Dry Tortugas (Figure 1). With relatively low elevation, the Keys are made of oolitic limestone, coral reef limestone, and lithified oolitic sand. To the north and the west of the Keys are the Florida Bay and the Gulf of Mexico, while the south and the east face the Atlantic Ocean. Being surrounded by warm waters at each side, the Keys are characterized by a tropical-like climate with hot and wet summer, and dry winter. Tropical storms and hurricanes with high precipitation are common climatic phenomena in the Keys.

The Florida Keys NMS has authority over coastal water along the 300-foot isobath encompassing an area of approximately 2,800 snm around the Keys (Figure 2). It is estimated that over 6,000 species of flora and fauna reside in the Florida Keys' waters (USDOC, 1996a). Despite the exclusion of the Keys' land within the sanctuary boundary, the Florida Keys NMS still possesses thousands of species that are ecologically and commercially important. The nearshore habitats surrounding the Keys, including rocky shores, sandy beaches, and tidal flats, are inhabited by a variety of marine plants and animals, both vertebrates and invertebrates. At the northeast boundary facing the Florida Bay lies almost 1,860 $km^2$ of seagrass beds and mangrove islands, while the southeast boundary features widely distributed mangrove-fringed shorelines, large seagrass beds, softbottom and hardbottom communities, and scattered patch reefs. These ecological systems provide habitat and foraging ground for fishes, birds, invertebrates, and marine mammals like the endangered manatee. The Florida Bay is greatly influenced by the Everglades drainage system which affects the physical and biological component of the Keys environment.

Figure 1. The Florida Keys (USDOC, 1996b)
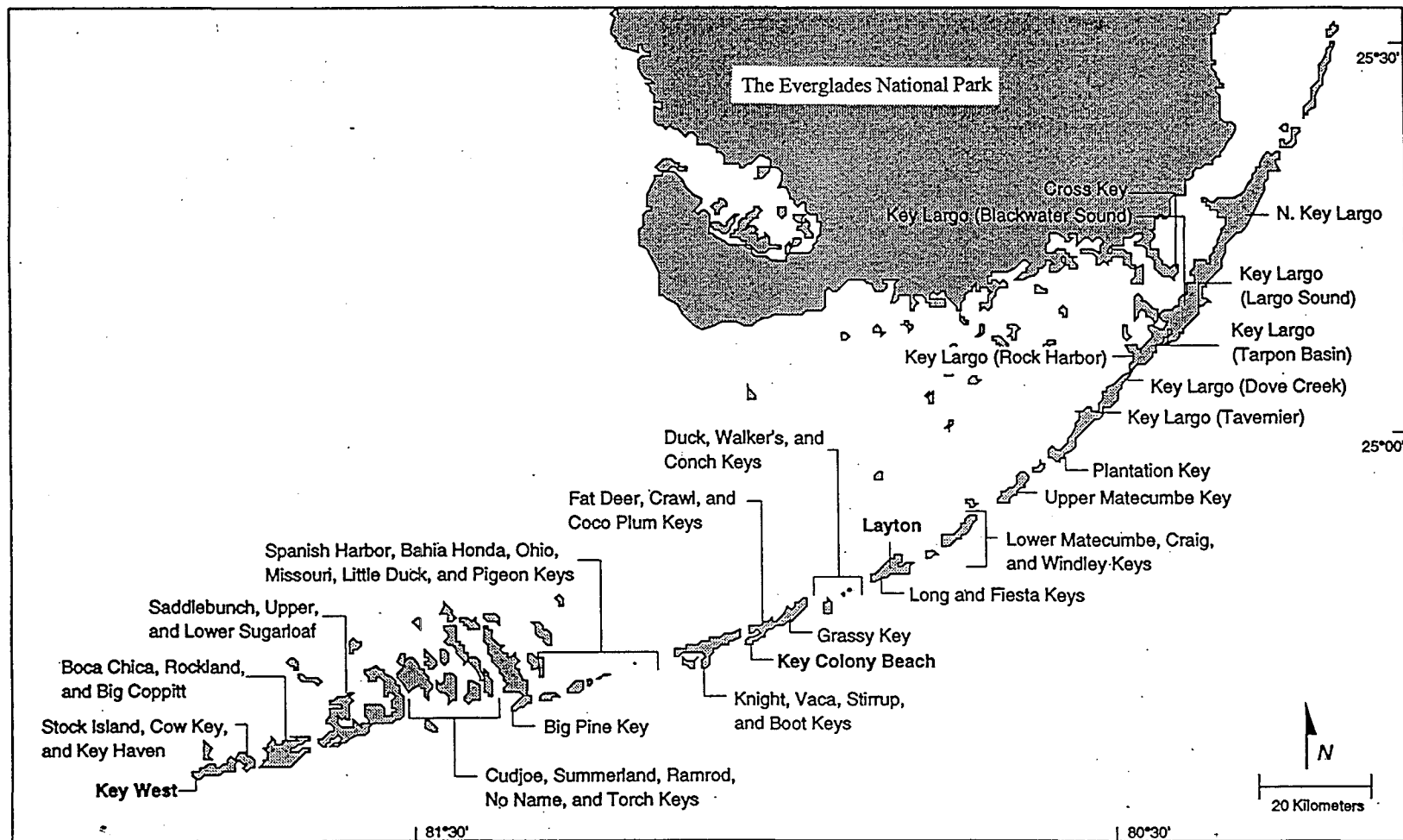
Figure 2. The Florida Keys National Marine Sanctuary (USDOC, 1996b)
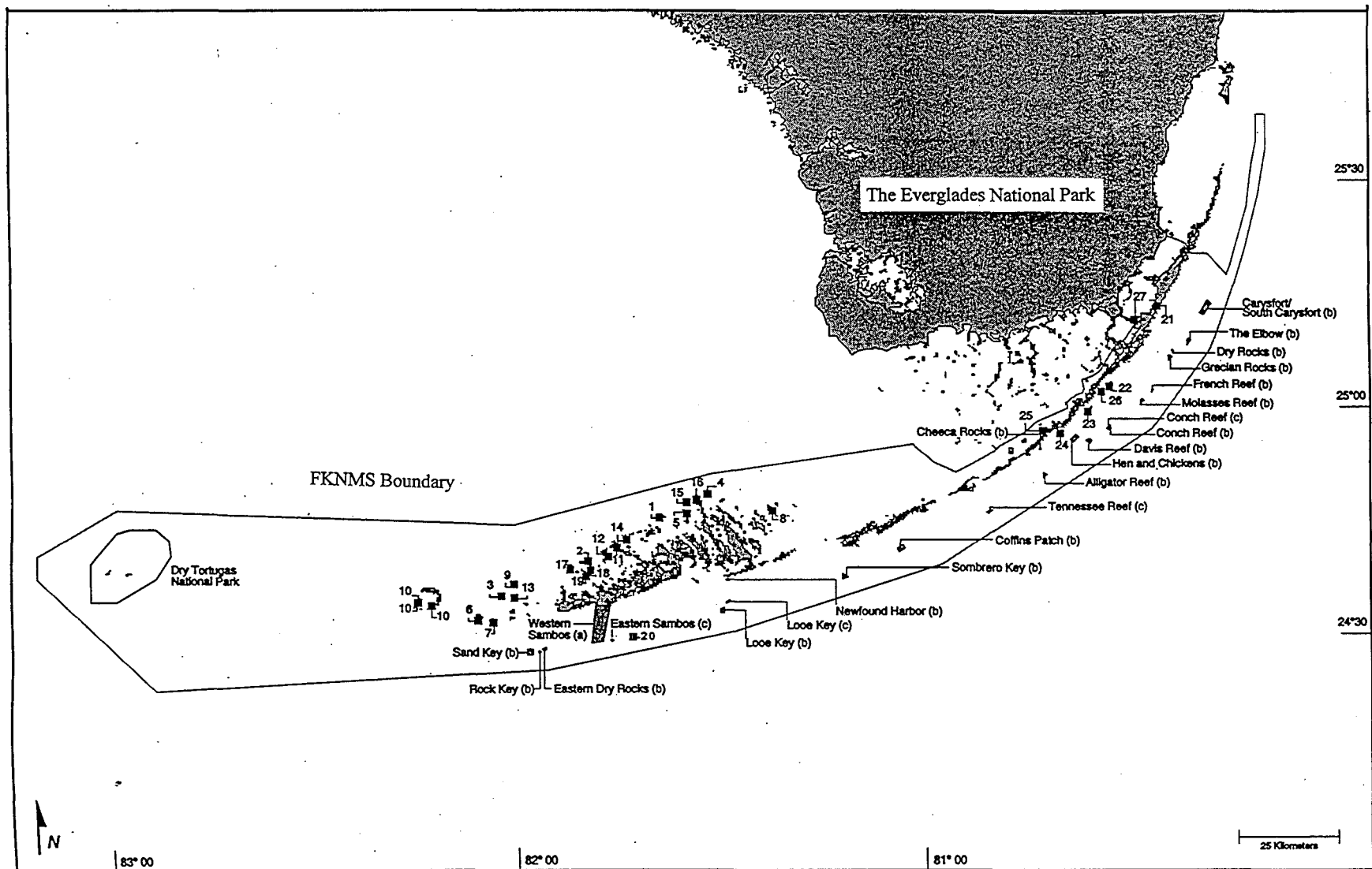
Mangrove fringes and islands, and coral reef are widespread on the Atlantic side of the sanctuary, while seagrass communities are less dominant. Extending 356 km parallel to the Keys in the east, the Florida Reef Tract is composed of living coral reefs featuring a diversity of reef characteristics and profiles. These include offshore patch reef, back reef, bank reef featuring seaward-facing spur-and-groove formations, deep reef, hard- and softbottom communities. Evidently such features provide substantial habitats for ecologically and commercially important fish species, invertebrates, and reptiles.

In addition to these valuable marine resources, the sanctuary boundary also encompasses hundreds of shipwrecks due to a long history of the Keys being on a significant shipping route. Most of the wrecks are found on the Atlantic side of the sanctuary.

Social and Economic Setting of the Florida Keys

The Florida Keys are located within Monroe County which also encompasses the western half of the Everglades National Park (Figure 3). It is estimated that the population of Monroe county in 1996 was approximately 81,000 (Leeworthy and Wiley, 1997a). While the western part of the Everglades is barely inhabited, a much larger proportion of the population lives in the major islands along the Keys, including Key Largo, Islamorada, Plantation Key, Marathon Key, Key Colony Beach, and Key West. Possessing a tropical-like environment and ecological uniqueness, the Florida Keys draw a large number of both domestic and international tourists each year. Between June 1995 and May 1996 there were over 3.05 million tourists visiting the Florida Keys according to a study of Leeworthy and Wiley (1996b). In the same study it is estimated that on an average day the population, counting both residents and visitors, falls between 131,000 and 137,000 people during peak season (December 95 - May 96) and about 105,000 - 112,000 people during non-peak season (June 1995 - November 1995).

The economy of the Florida Keys is largely dominated by tourist industries. During the period of June 1995 - May 1996, it is estimated that tourists contributed about

Figure 3. Monroe County (adapted from Culliton, 1998)
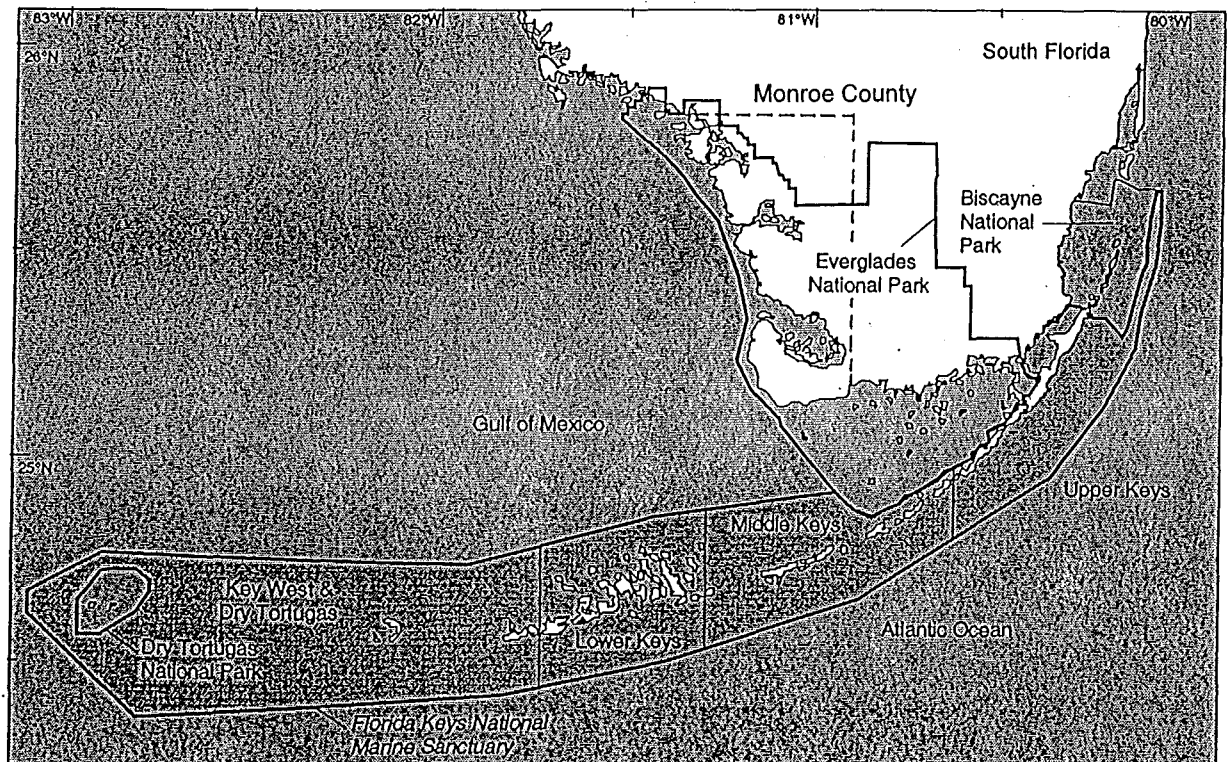
1.33 billion dollars to the economy of Monroe County, or approximately 60 percent of the total sales in Monroe County (English *et al.*, 1996). The contribution to employment was about 46.49 percent.

Description of Resource Utilization

Tourists are clearly the majority of users in the Keys. According to a study of Leeworthy and Wiley (1996b), around 83 % of the total number visitors are recreating visitors and about 82 % of total visitors are from the U.S. Activities can be categorized into two major groups: land-based activities and water-based activities. Land-based activities include wildlife observation, sightseeing, visiting historic sites, and cultural events. Water-based activities include snorkeling, scuba diving, fishing, beach going, and boating. The variation is seasonal with participation in water-based activities highest in summer (June - Nov. 1995), while participation in land-based activities occurs more in winter months (Dec.1995 - May 1996). In summer months snorkeling is the number one activity while sightseeing is the most popular in winter. Leeworthy and Wiley (1996b) also found that people tend to visit Key West most frequently followed by Upper Key and during the period of their study it was estimated that Key West received over 1.4 million visitors.

The annual number of visitors to the Keys has been increasing. Looking specifically at Looe Key NMS which is one favorite tourist spot in the Keys, the sanctuary's unpublished data collected by daily marine patrolling around Looe Key from 1988 - 1995 indicates that the number of tourists has been increasing especially in the last two years of data collection (FKNMS, 1996) (Figure 4). In fact, the number of tourists in 1995 are twice as many as in 1988.

Commercial uses in the Florida Keys include commercial fishing, marine life collecting, treasure salvage, and commercial shipping.

Figure 4.  Visitor Statistics (FKNMS, 1996)

**Total Number of Visitors to the Looe Key NMS 1988-1995**



**Number of Visitors to the Looe Key NMS 1988-1995 by Type of Use**
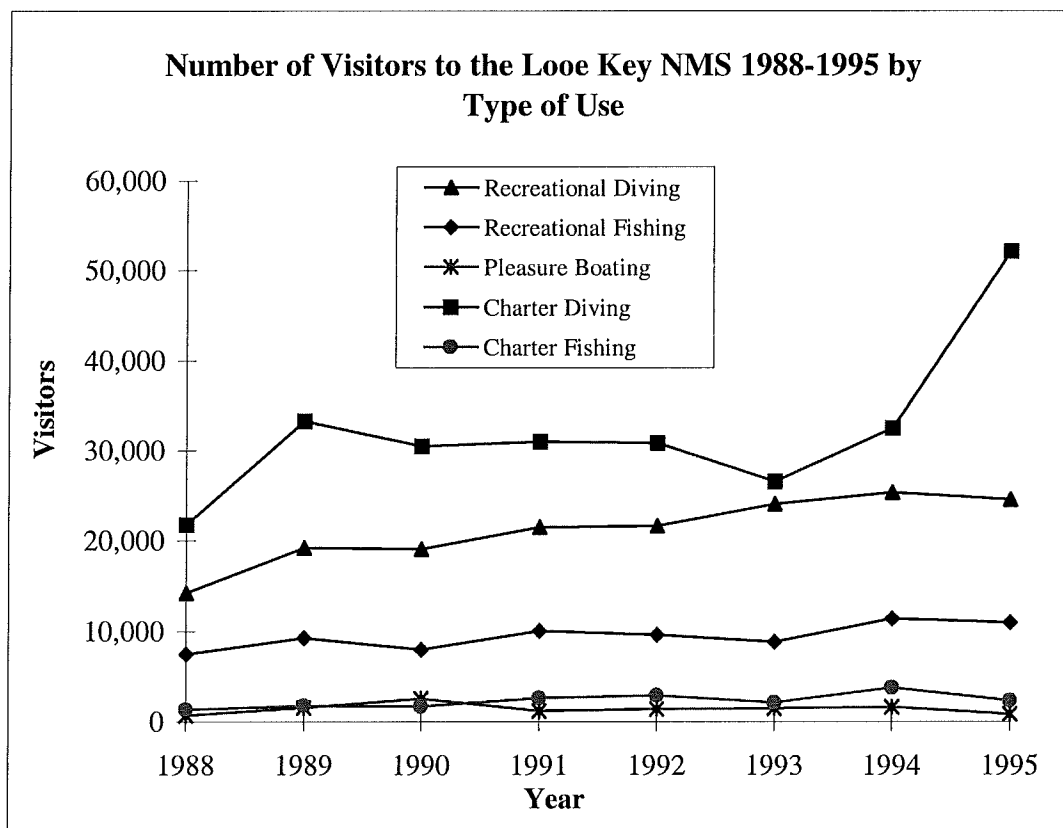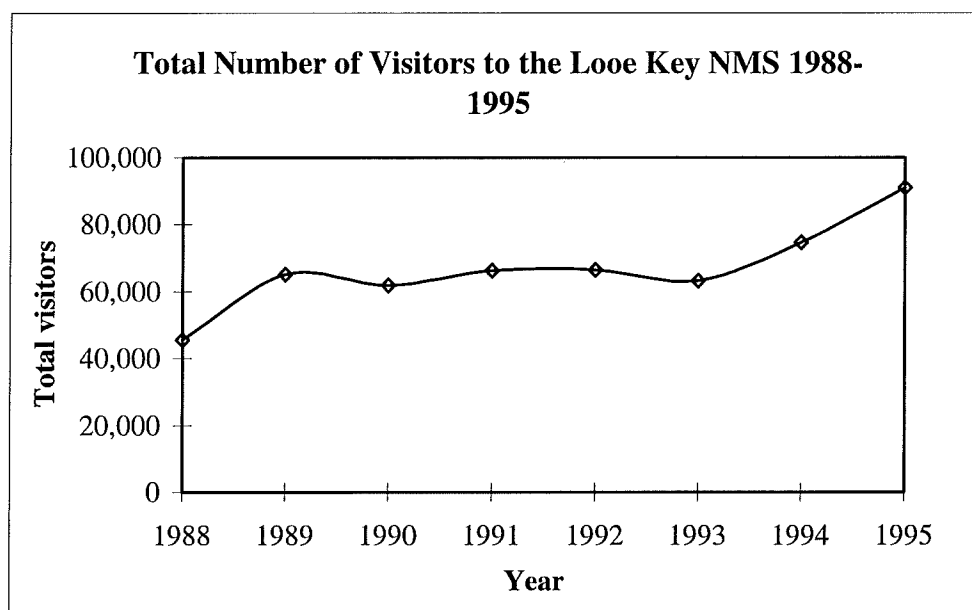
FKNMS Management Action Plans

To manage the entire Florida Keys as a sanctuary is quite a challenge due to a number of important factors. Geographically the existing Key Largo NMS covers an area of 103 snm, and Looe Key NMS only 5.32 snm. The newly designated FKNMS encompasses over 2,800 snm and includes a variety of marine ecosystems and nearshore environments, and diverse species of animals and plants. Furthermore, the economy of the Florida Keys is heavily dependent on the tourism industry so it is impossible to limit all the many uses that have been there for decades.

Similar to other larger marine sanctuaries, the FKNMS is impacted by a variety of sources, such as sewage discharge from developed areas along the keys, recreational uses of the surrounding reefs, and fishing pressure. These sources are under separate or different jurisdictions. For example, the sanctuary is managed by NOAA, dive shops and hotel business are privately owned and fishery issues are governed by the National Marine Fisheries Service. Therefore, managing the large sanctuary requires a more comprehensive and well-planned management framework and collaboration from every sector involved with resource utilization is crucially needed.

To manage such complex environmental systems under complex authorization conditions is already difficult, but to make the management successful and achieve goals is even harder. Therefore, good management planning can assure effective implementation and potentially successful resource management. With these challenges, the FKNMS developed a very thorough and comprehensive management plan as required by the FKNMSPA of 1990. According to the guidelines in the FKNMS Protection Act, the FKNMS management plan is required to "ensure coordination and cooperation between Sanctuary managers and other Federal, State, and local authorities with jurisdiction within or adjacent to the Sanctuary" (Pub. L. 101-605, Sec.9(a), 1990). Similar to the concept of integrated coastal zone management, the nature of the sanctuary is truly multi-sectoral. It involves various levels of authorities and lateral agencies. Different agencies and authorities are likely to move from different directions, but mostly toward the same goal. It is necessary to assure that each sector coordinates with the

others to achieve such goal without conflicts or overlapped authorization. Tarnas (1988) points out that cooperation among authorities is very crucial especially when the sanctuary's resources are affected by activities outside the sanctuary's authority.

The Final Management Plan released in September 1996 is composed of frameworks and management strategies to address each specific management issue. Most of the management tools used in the plan have shown successful results in other marine management areas including the Key Largo and Looe Key NMSs. The final management plan addresses very important issues and management approaches including zoning, channel/reef marking, education and public outreach, research and monitoring, regulatory efforts, and agency cooperation.

To meet all guidelines given in the FKNMSPA (Pub. L. 101-605, 1990), the comprehensive management plan calls for the collaborative assistance of Federal, State, local governments, and the general public. During the planning process, preferred management alternatives were developed, reviewed, and then selected to be used as final management strategies. The total of ten action plans were generated.

**Channel/Reef Marking and Mooring Buoys Action Plans**

The sanctuary uses channel/reef marking as a means to give navigational aids to boaters, and control and manage public access to the sanctuary's resources. Markings are placed to indicate the accessible waterway in order to minimize damage on seagrass beds, coral reefs, and hardbottom caused by propeller and boat grounding. It is estimated that of the total of 1.4 million acres of seagrass bed located within the sanctuary boundary over 30,000 acres are damaged by the boat propellers (USDOC, 1996b). In order to decrease the damage caused by boat anchoring, mooring buoys are installed in major reefs and hardbottom throughout the keys. In Looe Key NMS where anchoring on reefs is banned, over 60 mooring buoys are installed for fishing and recreational purposes.

**Enforcement Action Plan**

When the general public or user groups are not well aware of regulations, law enforcement is critically needed. The violation statistics strongly suggest that

Sanctuary officers enforce both State and Federal regulations and in the FKNMS they are also a part of the education and interpretive program. More specifically the sanctuary officers are also responsible for reaching out to on-site users by providing information or materials regarding the sanctuary and its missions. The sanctuary enforcement is a result of cooperation between NOAA, the State of Florida Department of Natural Resources, and the US Coast Guard (Causey, 1995). The sanctuary officers are appointed from the Florida Department of Environmental Protection (FDEP) Florida Marine Patrol Officers (USDOC, 1996a).

## Regulatory Action Plan

Using the Code of Federal Regulation, 15 CFR Part 922, amended for the National Marine Sanctuary Program as a guideline of regulatory actions, the FKNMS implements regulations as appropriate for the associated resources and human uses. Prohibited activities include mineral and hydrocarbon exploration and development, coral exploitation, alteration of seabed, improper vessel operation. In the areas previously managed by other agencies or pre-existing sanctuaries, additional regulations are also applied. A permit system is used by the sanctuary mostly in the cases of survey/inventory and research/recovery. Differing from the prohibition action, this system still allows certain uses to take place, and allows sanctuary managers to assess, if necessary, the anticipated impacts and react to such consequences (Kenchington, 1990).

## Research and Monitoring Action Plan

Research and monitoring are expected to provide important information necessary for management and decision-making. The action plan includes establishing an ecological monitoring program, producing periodic reports on scientific findings, investigating fisheries impacts, and permitting and coordinating research activities (USDOC, 1996a).

## Submerged Cultural Resources Action Plan

The Submerged Cultural Resources (SCR) action plan aims at protecting shipwrecks and artifacts located within the sanctuary's boundary. These national treasures are under threat from human commercial and recreational activities. The SCR permit system is established to protect and manage uses of cultural resources. The plan prohibits recovery of SCRs in the areas that have coral reefs, seagrass, and other natural resources; however, the plan allows the private sector to recover certain types of objects located in specific areas as long as the excavation is done with extreme caution, and is environmentally and archaeologically sound. The plan also allows the use of SCR for research, education, and recreational purposes.

## Volunteer Action Plan

The volunteer action plan tries to improve public education and awareness among user groups and enhance community involvement. The plan is also an important component of the Education and Public Outreach Action Plan. A number of the education programs are dependent upon this volunteer program because volunteers assist in developing and distributing printed materials. Other action plans also benefit from the volunteer program. For example, volunteers help with research and monitoring, mapping channel/reef marking areas, monitoring ecological conditions, and assessing damage from boat groundings.

## Water Quality Action Plan

Water quality is a significant issue since the quality of water around the Florida Keys has been declining for years. The plan calls for corrective actions, monitoring, research and special studies, and public education and outreach. The combination of such approaches attempts to improve water quality by identifying sources of pollution, developing the regulatory system, monitoring water quality and other natural resources, and increasing public awareness of the impact of water pollution. The water quality action plan works as a part of the Water Quality Protection Program (WQPP) as mandated in section 8 of the FKNMSPA of 1990. The Section 8 requires the

Environmental Protection Agency (EPA) and the State of Florida to develop the WQPP
in consultation with the Department of Commerce (Pub. L. 101-605, 1990).


**Zoning Action Plan**

Zoning strategy is commonly used by a number of marine protected areas and has
been very successful in the Great Barrier Reef Marine Park in Australia. Zoning is
simply defined as "a system of designating areas of land or water to be allocated to
specific (often exclusive) uses" and can be assigned through "space and time" (Clark,
1995). Permitting certain kinds of uses in different areas helps lessen conflicts among
user groups and allows authority to control and manage the impacts more effectively.
The FKNMS is the first U.S. marine sanctuary to incorporate this concept in its
management action. Using this management tool, the sanctuary aims to protect resources,
reduce impacts on ecosystems, minimize user conflicts, and provide sites for scientific
research and monitoring. The FKNMS established five different zones:


1. *Existing Management Areas*
Areas previously designated under other authorities including two existing
sanctuaries, state parks, aquatic preserves;

2. *Wildlife Management Areas*
Areas set aside for protection and preservation of endangered and threatened
wildlife resources including national wildlife refuges managed by the U.S. Fish
and Wildlife Service;

3. *Ecological Reserves*
Areas providing habitat, and spawning and nursery grounds for marine life to
retain biodiversity of the Florida Keys marine ecosystem;

4. *Sanctuary Preservation Areas*
Areas selected from heavily used and degraded reefs, and set aside for
protection by prohibiting all consumptive activities; and

5. *Special-use Areas*
    Areas set aside for scientific research, education, restoration, and monitoring
    (USDOC, 1996a).
The sanctuary program recognizes the significant role the public plays to keep the
sanctuary alive. The program encourages the public to be involved in sanctuary site

selection process by giving comment on proposed sites. The public in this sense may include state and local governments, industry, business, conservation group, and local people. In the case of the FKNMS, the SAC involvement process is slightly different. Since the designation of the FKNMS was enacted by Congress, not NOAA, the sanctuary did not go through a time-consuming site selection and designation processes. However, public involvement is crucially needed as mandated in the FKNMSPA of 1990.

> "... The Secretary of Commerce, in consultation with the Governor of the State of Florida and the Broad of County Commissioners of Monroe County, Florida, shall established *an Advisory Council to assist the Secretary in the development and implementation of the comprehensive management plan for the Sanctuary*" (Pub. L. 101-605, Sec.9(a), 1990)

The FKNMS Sanctuary Advisory Council (SAC) is represented by various user groups including government agencies, fishery industry, dive business, environmental conservation groups, and scientific research institutes. The SAC assist NOAA in developing and reviewing sanctuary management plan, coordinating between the sanctuary and user groups they represent, and implementing the plan.

# EDUCATION AND PUBLIC OUTREACH AS MARINE RESOURCE MANAGEMENT TOOLS

Kenchington (1990) mentions that if people are not aware of the existence of the management plan and their impacts on resources, they cannot be expected to follow the regulations, unless informed. To deliver information and, thus, create awareness among users, education and public outreach are two mechanisms used to perform the task. Education and public outreach are a means of communication and distribution of information between administrators and public. In general, the education plan aims at promoting public awareness and appreciation of the protected resources, and increasing the public understanding of the regulation, impacts associated with misuse, and public benefits from protection. Kenchington (1990) also suggests that the program should also persuade users to *cooperate* and *support* the management.

The use of education has shown some positive results in many marine protected areas including a number of national marine sanctuaries. The Key Largo and Looe Key NMSs carried out programs and activities to educate the public by means of classroom instruction, workshops, seminars, interpretive exhibits, and the media. When these two sanctuaries were incorporated into the Florida Keys NMS, the larger sanctuary adopted these management approaches into its comprehensive management plan. The Channel Islands NMS provides a number of educational activities including lectures, workshops, interpretive programs, intern and volunteer program, environmental awareness events, and school program. The Monterey Bay NMS uses exhibits, publications, events, and intern program to educate the public. The Great Barrier Reef Marine Park Authority enhances the public's understanding in marine conservation and sustainable use by implementing school programs, user training activities, support public relation programs, and managing the aquarium as the education center.

## EDUCATION AND OUTREACH ACTION PLAN FOR THE FKNMS

### Goals and Objectives

Upon the development of the Education and Outreach Action Plan (EOAP), the NMSP provides a specific guideline as follows:

- Provide educational leadership in marine conservation and protection efforts throughout the nation's national marine sanctuaries and national estuarine research reserves;

- Adopt a Sanctuary Program/system-wide unity and identity to promote greater national awareness, while encouraging site-specific individuality;

- Link the sanctuaries and reserves programs to each other through national environmental education programs; and

- Establish a standard of excellence that is attained through the education programs of all sites (USDOC, 1996a).

With the NMSP guideline and public comments, the education program planners, consisted of Sanctuary Working Group, Sanctuary Staff, and SAC, identify education-related issues which will be addressed by the EOAP (Figure 5). Next, the planning group set up site-specific goals and objectives the EOAP attempts to accomplish (Figure 6). Basically, goals and objectives state the desirable conditions which should result if the plan is successfully implemented (Kenchington, 1990). The goals and objectives direct the appropriate actions and management approaches that resource managers will take. To achieve the desired outcomes, the administration needs a vehicle in order for the plan to reach its goals. Management strategies serve such purpose. Theoretically, a good strategic planning and management arrangement should at least lead to the effective implementation of the EOAP. Further, careful implementation of sound management strategies improve the program's chance for success.

Figure 5. The FKNMS Management Process

**Problems:**
- Boat Grounding
- Resource degradation
- Use Conflicts
- Water Pollution
- Fisheries-related

Resource Management Needs

**U.S. Congress / NMSP**
- Legislation
- Management Arrangement
- Program Planning

**Florida Keys National Marine Sanctuary**

**Education and Outreach Action Plan**

Intra-agency Cooperation and Interdependency e.g. Interpretive Enforcement

**Other Action Plans**
- Channel/Reef Marking
- Enforcement
- Mooring Buoy
- Regulatory
- Research and Monitoring
- Submerged Cultural Resources
- Volunteer
- Water Quality
- Zoning

Sanctuary Working Group, Sanctuary Staff, SAC, and Public identify problems and management issues to be addressed by EOAP

Goals and Objectives

**Management Strategies**
- Training/Workshop/School Programs
- Education Advisory Board
- Public Forum
- Special Events
- Professional Development
- Printed Materials
- Audio-Visual Materials
- Signs/Displays/Exhibits
- Public Service Announcements
- Promotional/Educational Materials

Enhancing Factors

Limiting Factors

**Overall Performance of the FKNMS Management**

**Education and Outreach Program Outcome**

Implementation of EOAP
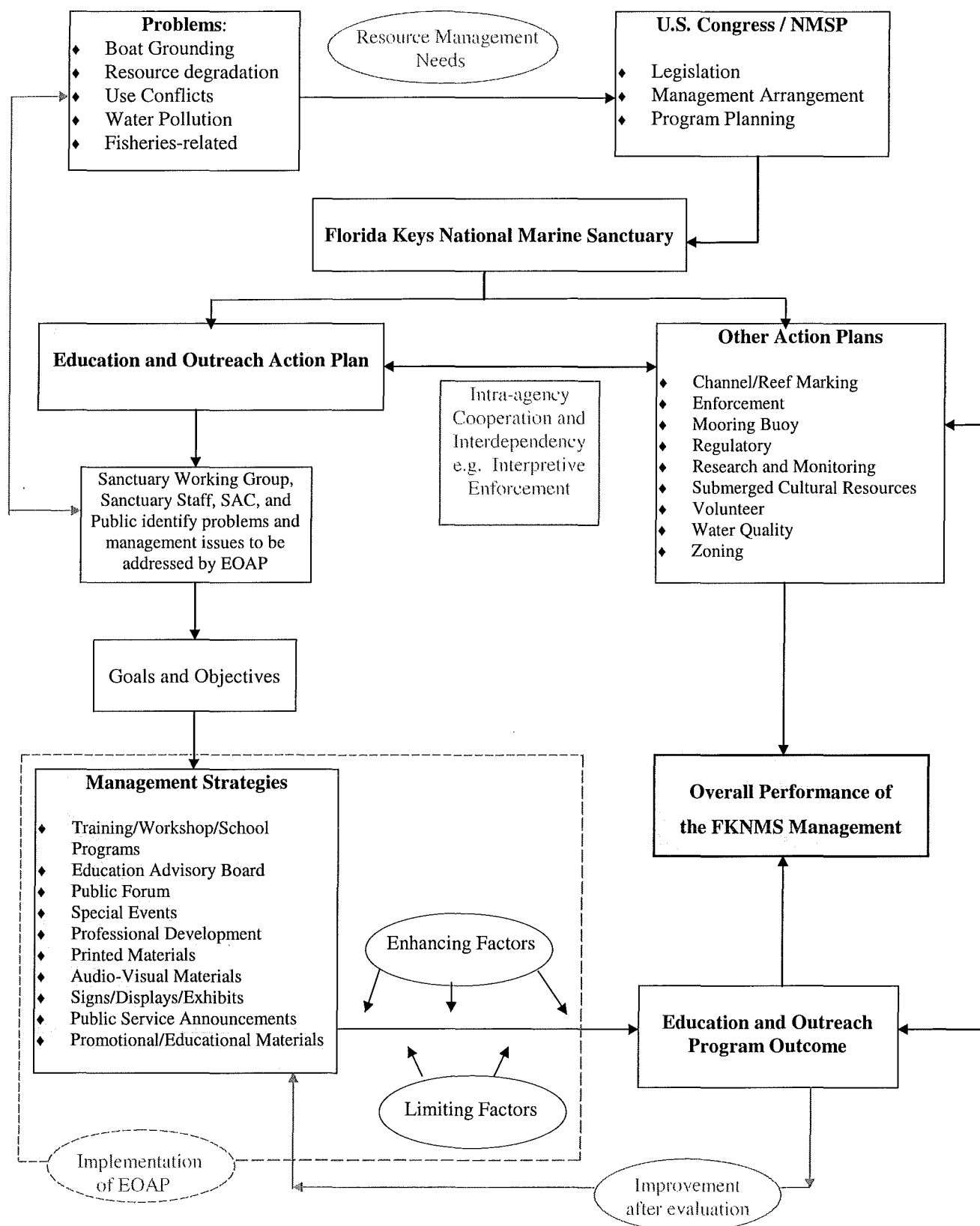
Improvement after evaluation

Figure 6. The FKNMS Education and Outreach Action Plan Goals and Objectives'

**Staff and Education Provider** *Goals*

- Facilitating environmental education opportunities for all segments of society
- Promoting and supporting education and training opportunities for Sanctuary staff and entities providing education programs within the Sanctuary

**Staff and Education Provider** *Objectives*

- Support, develop, and establish cooperative agreements to promote innovative educational projects regarding the Sanctuary and/or the Keys' marine ecosystem
- Provide and support multi-disciplinary environmental education experiences
- Provide and support training opportunities for resource users
- Utilize the existing network of educators and environmental education organizations and institutions already in place
- Provide orientation and continuing education for FKNMS education staff, officers, and others on ways to teach target groups about the resources in the Sanctuary, both at a cognitive and a skill-based level
- Cross reference regulatory and interpretive enforcement in the Education/Outreach Action Plan
- Provide educational opportunities for the educational community, including organizations and agencies delivering environmental, natural historical, cultural, and socio-economic education information, so that they may have access to consistent, accurate scientific information
- Provide mechanisms so that new ideas and policies can be introduced and incorporated into the ongoing Education and Outreach Action Plan
  Provide permitting mechanisms so that pre-existing education organizations and new entries may carry out their activities within the Sanctuary with minimal processing

**Learner Outcome** *Goals*

- Promoting a holistic view of the Keys' ecosystem as an interrelated and interdependent system of habitats
- Encouraging and promoting a sense of user stewardship regarding the marine environment by imparting strategies and skills which will help reduce the occurrence and effects of future resource impacts
- Promoting and fostering a clear awareness of the economic, biological, recreational, educational, and cultural values of the Keys' ecosystem, as well as the interdependence of these factors upon one another
- Fostering increased recognition and understanding of:
    1. social and political issues associated with these resource impacts; and
    2. associated management strategies intended to reduce or eliminate such impacts
- Fostering knowledge and understanding of the historical relationship between humans and these ecological systems, with attention to resource impacts, and the limitations of current scientific knowledge

Figure 6.—*Continued*

**Learner Outcome** *Objectives*

- ◆ Provide the public with information gained through research in a timely fashion
- ◆ Provide educational information at technical and scientific meetings
- ◆ Provide education for visitors to the Sanctuary
- ◆ Provide a cognitive understanding of broad interactions as well as a skill-based understanding
- ◆ Facilitate specific education for Monroe County youth that emphasizes that interconnectedness of the Keys ecosystem through traveling sequential field trip programs
- ◆ Provide education for audiences outside of the Florida Keys (state, national, and international)
     Provide on-site opportunities for resource education

**Sanctuary Outcome** *Goal*

- ◆ Promoting the awareness of, and support for, the Florida Keys National Marine Sanctuary Program through community partners in education, outreach, awareness, enforcement, and management

**Sanctuary Outcome** *Objectives*

- ◆ Increase NOAA and other organizations' awareness of educational programming activities in the Keys by non-agency organizations
- ◆ Increase public awareness of current Sanctuary activities
- ◆ Encourage community cooperation and participation in Sanctuary management
- ◆ Increase the understanding of, and voluntary compliance with, sanctuary resource management efforts (channel marking, mooring buoys) and regulatory requirements (e.g. zoning regulations)
- ◆ Provide the public with information gained through research
- ◆ Increase public awareness of cumulative environmental impacts in the Keys
- ◆ Provide opportunities for individuals to become "caretakers" of the environment
- ◆ Provide information at "high-profile" locations
- ◆ Provide information environmental education and outreach programs to school systems
- ◆ Provide exposure to environmental education, introducing an ecosystem approach over time
- ◆ Provide multilingual environmental education materials and programs
- ◆ Provide environmental education opportunities for adults

Education and Outreach Acton Plan Management Strategies

The EOAP finalizes ten management strategies, which are categorized into (1) Community Involvement/ Community Program, and (2) Product Development.

## 1. Community Involvement/Community Program

*Training, Workshops, and School Programs*

Training and workshops help educate sanctuary staff especially law enforcement officers, volunteers, and educators. Monroe County schools and teachers are encouraged to participate in a week long workshop which provides both in-class and on-site experiences. Developed by the Key Largo and Looe Key NMSs, the "Coral Reef Classroom" is one of several programs that the sanctuary has carried out a number of years. The program targets students in grades 7-9. The program provides classroom-based education about marine ecosystems and it also offers field experience through scientific observation and experiment. Similar to the Coral Reef Classroom, Water Conservation Warrior and The Zoning Plan are educational programs targeting elementary and high school students, respectively.

*Education Advisory Board*

The Education Advisory Board is a multi-sectoral panel established to advise and guide the education program to the direction according to the program's goals and objectives. The 14-member board is represented by different groups of users, institutions, and organizations that specialize in education. The Education Advisory Board is also responsible for providing information on current education activities, and encouraging cooperative efforts and stewardship (USDOC, 1996a).

*Public Forum*

To communicate with the public and enhance understanding between each other, the sanctuary provides a series of public meetings and lectures periodically. The meeting

participants will be updated on current management issues including regulation compliance, research information, and education activities. Not only the sanctuary will have an opportunity to express their concern and point of view through management perspectives, but the commercial and recreational users can also present their thoughts on the same issues but from different view.

*Special Events*

Two main actions the sanctuary plans to take are developing displays for public events and organizing its own events. Informational displays and interpretive booths are developed to install in public events including seafood festivals, boat shows, travel shows, and conferences. Kid's Week and Sanctuary Awareness Week are two environmental expositions the sanctuary plans to implement. The events aim at enhancing public awareness in environmental issues in the Keys area and the information on the sanctuary program.

*Professional Development*

Targets of the activities are the current and new education staff. Before being able to educate public, the staff should have the best knowledge in resource and management issues. Moreover, the staff should understand how to use different educational techniques as a means to educate different user groups.

## 2. Product Development

*Printed Materials*

The sanctuary develops printed material including brochures, a monthly newsletter called "Sounding Line," posters, nautical charts, and an environmental atlas. These materials will provide users and the general public with information on the Keys natural and historical resources, impacts from human activities, and the sanctuary regulations and action plans. The printed materials will be distributed to businesses, local communities, environmental organizations, and tourists throughout the Keys. Media that

the sanctuary uses to distribute such materials varies depending on the target group, but the sanctuary attempts to make information as easily accessible as possible.

*Audio-Visual Materials*

Audio-visual materials are another effective method for distributing messages from the sanctuary. Graphics and photos have always been interesting and attractive to audiences. These materials include slides, videos, and audio tapes. The "Waterways" is a thirty-minute television program broadcast weekly on 17 channels in the Florida. The program presents scientific, recreational, and educational activities that take place within the Florida Keys. In addition to the TV program, the sanctuary also produces other educational programs on video format regarding specific management issues such as enforcement and boat grounding.

*Signs/Displays/Exhibits*

The sanctuary develops roadside signs and exhibits to be installed along the road and where high-level uses occur such as boat ramps, marinas, and dive shops. The sanctuary visitor centers will be established in at specific locations while permanent displays will be installed through out the Keys including airports, car rental agencies, and the Chamber of Commerce's visitor centers.

*Public Service Announcements (PSAs)*

The radio is another medium that the sanctuary uses to reach out to the communities. The public service announcements are developed and broadcasted through radio stations within the South Florida area. In addition, the sanctuary also develops 30-second video PSAs to be televised in the Keys and Monroe County.

*Promotion/Educational Materials*

This strategy calls for the development of visitor centers to distribute educational materials about the sanctuary and resource protection. It also proposes to establish an interagency visitor center with the US Department of Interior and the Florida Department

of Environmental Protection which will provide visitors with information on environmental protection and the sanctuary's program.

Ideally, after the program has been implemented, management strategies should deliver desired outcomes, and show effectiveness and efficiency. In practice, however, there are a number of independent factors which directly influence the program's performance, both negatively and positively. For instance, political initiative and public support must exist from the beginning of the establishment phase through the implementation phase. Lack of this support can severely limit the continuation of the management program. Also, public involvement must be encouraged in order to obtain information and ideas from user groups and incorporate that information into the management strategies to meet users' needs and expectations. To assure the success of the implementation, program evaluation is critically needed, so that the management practice will be improved.

# METHODS FOR EDUCATION PLAN EVALUATION

## EVALUATION CRITERIA

Program evaluation is a significant component of resource management. The evaluation is a feedback mechanism which provides crucial information indicating the implementation status and which strategies work and which do not. It identifies weaknesses and strengths of the management plan which will allow resource managers to improve the performance and achieve a better result.

There are two aspects of evaluation that apply: policy or process evaluation and management outcome evaluation (Sorensen and McCreary, 1990). Sorensen and McCreary (1990) identify these two types of evaluation as

> "**Policy evaluation** examines the means by which goals are achieved.
> **Outcome evaluation** measures the extent to which the program's goals or objectives are achieved."

The authors also suggested that the evaluation of the management plan should be made only when the plan has reached maturity after being implemented for a certain period of time. Even though the final comprehensive management plan was released in September 1996, passed by the State of Florida, and enforced in July 1, 1997, a number of the EOAP management strategies were adopted from the management plans of the Key Largo and Looe Key NMSs, which had been previously implemented. Therefore, the FKNMS' Education and Outreach Action Plan seems to fit Sorensen and McCreary's criteria because of the continuation of the education programs. However, it should be noted that new strategies are also incorporated into the final plan as well. That is, some strategies have not had enough time to perform and reach maturity.

The evaluation of education program is vitally need but is extremely difficult to measure since it involves people's attitude, perception, and behavior (Hudson, 1987; Lemay and Hale, 1989). However, the likelihood of *policy* effectiveness can be measured

by looking at the achievement of statutory objectives throughout the implementation process. Criteria used to evaluate the EOAP are developed by Sabatier and Mazmanian (1983). They suggest several conditions that if met by the management regulatory program, it should yield a successful implementation. The conditions are as follows:

> *Condition 1.* The enabling legislation mandates policy directives that are clear and consistent (or at least provides substantive criteria for resolving goal conflicts).

> *Condition 2.* The legislation incorporates a sound theory identifying the principal factors and causal linkages affecting policy objectives, as well as the changes in target group behavior and other conditions necessary to attain the desired goals.

> *Condition 3.* The statute not only gives implementing agencies sufficient jurisdiction over target groups (and other critical areas of intervention) but also structures the implementation process so as to maximize the probability that target groups will perform as desired.

> *Condition 4.* The leaders of the implementing agency (agencies) possess substantial managerial and political skill and are committed to statutory objectives.

> *Condition 5.* The program is actively supported by organized interest groups and by a few key legislators (or the chief executive) throughout the implementation process, with the courts being neutral or supportive.

> *Condition 6.* The relative priority of statutory objectives is not significantly undermined over time by the emergence of conflicting public policies or by changes in relevant socioeconomic conditions that undermine that statute's underlying causal theory or political support.

Sabatier and Mazmanian (1983) also mention that the conditions may be achieved at different levels depending upon "(1) the difficulty and expense of change required in target group behavior, (2) the predisposition of target groups toward the mandated change, and (3) the diversity in proscribed activities of target groups."

## RESULTS AND DISCUSSION

The following discussions are concluded in Table 2.

### Condition 1. Clear and Consistent Goals and Objectives

Statutory goals and objectives must be clear and consistent in order to guide resource managers to the desired direction. Clear and consistent goals are also important when the program needs to be evaluated, as the managers will know exactly whether they have achieved the stated goals and to what extents. In the case of having multiple goals, there should be criteria provided to resolve goal conflicts (Sabatier and Mazmanian, 1983).

Goal is basically a broad statement of *desirable outcome* that the plan will accomplish if successfully implemented. Objective is a *concise* and *measurable* statement of what the plan will accomplish within a given time frame (Good and Goodwin, 1992). The objective also identifies what kind of actions will be undertaken and at what degree. Using this framework to evaluate how well the EOAP goals and objectives are written, it is clear that the EOAP goals and objectives are poorly written. Instead of stating explicitly what outcomes the sanctuary wants to achieve, the EOAP incorrectly states goals as "approaches" to be taken or what kind of information to be given to the public.

Table 2. Evaluation of the EOAP based on the theoretical conditions developed by
Sabatier and Mazmanian (1983)

| CONDITION | OVERALL EDUCATION AND OUTREACH ACTION PLAN |
|---|---|
| 1. Clear and Consistent Goals and Objectives | ◆ Misconception of goals and objectives<br>◆ Objectives poorly serve goals<br>◆ Cross reference with the Enforcement and the Volunteer Action Plans to reduce conflict and redundancy |
| 2. Actions Lead Towards Goals | ◆ Lack of connection between goals/objectives and management strategies<br>◆ Difficult to determine which goals/objectives have been achieved<br>◆ Target groups are not clearly identified<br>◆ Different education approaches and messages needed for different user groups |
| 3. Plan Structured to Maximize Success | ◆ Importance of the Education Advisory Board<br>◆ Weak compliance and support from users<br>◆ No clear incentives<br>◆ Inadequate financial support<br>◆ Public involvement is encouraged, but not required |
| 4. Leader's Commitment | ◆ NOAA, EPA, and the State of Florida are mandated by law to be responsible for the implementation<br>◆ Interagency cooperation should be closely monitored to ensure a strong commitment of the agencies<br>◆ Intra-agency cooperation with the Enforcement and Volunteer programs<br>◆ Support from business sector is needed |
| 5. Active Constituent Support | ◆ Public support to the EOAP is uncertain because of the rejection to the overall sanctuary regulations<br>◆ Key legislators are strongly supportive, but it may change over time due to changes in political motives |
| 6. Changes in Socioeconomic Conditions and Political Support Over Time | ◆ Changes in some socioeconomic factors but not dramatic<br>◆ Tourism industry will remain an influent role in the Keys economy<br>◆ So far, political support is in favour of the sanctuary, but it is difficult to predict changes over time due to the political complexity |

For example, the goal, *"to encourage and promote a sense of user stewardship regarding the marine environment by imparting strategies and skills which will help reduce the occurrence and effects of future resource impacts,"* emphasizes the promotion of user stewardship instead of directly stating the expected outcome which is to decrease the resource impacts. Or the goal, *"to promote a holistic view of the Keys' ecosystem as an interrelated and interdependent system of habitats,"* basically specifies what kind of scientific information to be distributed, not what kind of result the sanctuary expects to see if the education plan is successful. That is, it cannot be determined whether the "goals" have been achieved because the desired outcomes are not specified.

The whole idea behind an establishment of the sanctuary is to protect marine resources and reduce the human impacts using the comprehensive management. The way the EOAP goals are written indicates that the sanctuary will provide public with education but does not ensure that the public will actually understand the information and react in a way that will decrease the impacts.

Despite the fact that the EOAP goals are already misleading, the objectives, which supposedly implement the goals, do not show any causal linkage with those goals. For example, under the sanctuary outcome goal, "[to] promote the awareness of, and support for, the Florida Keys National Marine Sanctuary *through community partners* in education, outreach, awareness, enforcement, and management," most objectives do not mention anything about the community partners which should be the key element of this goal. As mentioned, the objective should be measurable so that level of accomplishment can be assessed. The EOAP objectives do not specify exactly what will be accomplished, at what degree, and in what time frame. To demonstrate how the goals and objectives should be written, I have provided some examples as shown in Figure 7. Good and Goodwin (1992) suggest that "the simplest way to write a goal is to turn a negative problem statement into a positive one." In conclusion, the first condition of the effective policy is not met by the EOAP because of the miswritten goals and objectives and the lack of connection between them.

The EOAP has its own evaluation criteria to supposedly assess the program's effectiveness and efficiency. Most of them are about assessing the level of public

acceptance, media exposure, and information distribution, although no specific goals or objectives are devoted to ensure public acceptance or support. Improvement of the environmental condition is an important factor left out from the EOAP's evaluation criteria. As mentioned, the fundamental idea behind the establishment of the sanctuary is to protect, preserve, and improve the condition of marine resources. When this particular criterion is disregarded, any education program can be considered successful as long as people are exposed to information, but do nothing to protect or improve the environment. The EOAP barely addresses the expected outcomes in terms of better condition of marine resources. Although there are many factors contributing to the healthier environment, such as stricter law enforcement, better zoning regulation, and less human disturbance, education and outreach activities can surely contribute to the improvement of the condition at certain extends. The result may be more obvious especially in the case of some areas that zoning regulation does not strictly apply or law enforcement does not have sufficient capacity to monitor every human activity.

Figure 7. Examples of Goals and Objectives

**Goal 1.** **To support marine education, conservation, and management by providing public with scientific and educational information.**

Objective 1.    Establish "measures" or "mechanisms" to distribute the information, such as visitor centers, printed materials, and public broadcast through various media.

Objective 2.    Develop education activities targeting different target audiences.

Objective 3.    Increase of knowledge about marine environments among different user groups

**Goal 2.** **To eliminate improper uses and encourage proper uses of marine resources that cause least impacts or improve resource condition.**

Objective 1.    By the end of each 5-year interval, the number of boat groundings will be reduced to 75 percent of the original number.

Objective 2.    Decrease in the amount of seagrass areas damaged by boat propellers.

Objective 3.    Increase in a number of commercially significant fish and species in areas vulnerable to fishery and tourism industries.

**Goal 3.** **To achieve the compliance and public support to sanctuary regulations and management.**

Objective 1.    Increase in a number of participants in education activities.

Objective 2.    Ensure the compliance with the sanctuary regulations by working cooperatively and cross-referencing with the Enforcement Action Plan.

Objective 3.    Develop mechanisms enhancing the communication between the sanctuary and community.

**Goal 4.** **To develop and maintain strong and effective partnerships with local, State, Federal agencies, NGOs, and local community in implementing education programs.**

Objective 1.    Cooperate with other local, State, Federal governments to develop

Objective 2.    Involve local community in educational and outreach activities at various stages.

Condition 2. Actions Lead Towards Goals

The policy must not only have clear and consistent goals, but it must also address the causal linkages of problems and should clearly identify policy targets and factors which affect the policy's objectives (Sabatier and Mazmanian, 1983). This allows the policy makers to design regulations or management strategies that can solve the problems and achieve the stated goals.

The EOAP focuses mostly on providing educational and scientific information as stated in the goals and objectives. Public awareness and understanding of the environment can be developed after receiving the information. It, then, can lead to user compliance and support to the sanctuary because the public now understands why resource management and regulation are necessary. However, the EOAP does not clearly specify policy targets, nor prioritize which target the sanctuary should approach first. The EOAP frequently refers to "the public" as its target audience without sufficiently addressing the fact that the public is composed of many different user groups. Identifying target audiences is a crucial step in program planning because the resource managers need to know exactly who is affected by the problems, who causes the problems, and whose support is important to the program (Hudson, 1987; Lemay and Hale, 1989; and Kaza, 1995). This step is even more important especially when the program funding is scarce. For example, if the problem of propeller scar left on seagrass bed in one area is cause by boating activity, it may not be necessary to put a tremendous effort into promoting awareness among those who kayak. By that way, certain groups may be over-emphasized while others are drawn out of the picture. Further, being target-specific is essential especially to any education and outreach programs because different user groups are better approached by specific messages due to the differences in their background and interests (Hudson, 1987). That is, to make a successful communication is to deliver the right *message* to the right *target audience* using the right *media*.

The EOAP not only lacks a bridge between goals and objectives, but also a link between management strategies and objectives. The plan does not specify which strategies are designed to implement which goal or which objective. This results in a

difficulty in evaluating which goals/objectives have been achieved. Even though a number of educational techniques are used, it does not guarantee that every goal/objective is implemented because of the lack of connection.

In addition to addressing the problems, a good policy should identify all factors that affect the policy. Those may not be obvious when the policy is created, but could become very crucial later. Potential factors limiting or enhancing the effectiveness of the program include community involvement, funding, inter-agency cooperative agreement, and priority in implementation. The sanctuary plan gives the community involvement a medium-to-high priority level of implementation. Management strategies associated with this issue mostly target local schools and colleges with high priority of implementation in Year 1, which started on July 1, 1997. On the contrary, activities targeting local businesses and adult residents are given low priority. That is a limiting factor to the management. Since the establishment the FKNMS has not received a strong support from local community. Many residents and businesses fear that the sanctuary would take away their rights to exploit natural resources resulting in a dead end of their businesses. This is obviously an issue of misunderstanding and incorrect information that can be solved by the education and outreach programs. Instead of prioritizing local residents and tourism industry, the EOAP mistakenly focuses more on school-based targets. A short-term result is a less effective education plan. The benefits gained from being allied with tourism businesses and local residents can be vital. It is very difficult for the sanctuary to go after individual user considering that three millions visitor come to the Keys each year. It is a mutual benefit for both sanctuary and businesses because the industry can help distribute information and enforce sanctuary regulations to visitors, especially when businesses depend solely upon the healthiness of resources. In addition, the locals and businesses that show a strong concern about the environmental issues can psychologically influence the visitors as well. In addition, the sanctuary can probably cut some costs associated with information distribution. As a conclusion, the EOAP could be more effective in both short term and long term if it prioritized the business-based targets.

As the plan does not specify the audiences, management strategies may not work as effectively as desired. The strategies use various kinds of mass media to communicate

with the public. The main focus is on using printed materials. This is because the cost of production is more likely to the sanctuary's limited budget, and is relatively lower than establishing other forms of media. This strategy has a high priority level of implementation, while the strategies for using other media have lower priority. The choice of a distribution site is a controlling factor the effectiveness of this method. According to a personal communication with Laura Urian, the FKNMS Education and Outreach Program coordinator, approximately 52,000 brochures were distributed within a period of three months in 1995 through 300 sites from South Miami to Key West. Distribution sites included hotel accommodation business, tourist development council, the Florida Keys Chamber of Commerce, and recreation-related businesses. The material distribution site must be appropriate for the expected target audiences. In this case, possible audiences are visitors and businesses, while local people and non-government organizations may not benefit when materials are distributed through tourism-related sites.

Audio-visual techniques are very effective at gaining the attention of audience and have a relatively high persuasive value. However, to make this method effective, the audio-visual program should be target-specific as different audience groups have different levels of understanding. For example, kids would not understand a complex message as well as adults. Currently the sanctuary has a 30-minute TV program called "Waterways" which they broadcast every week in the Keys area. This is more likely to reach out to the local community and businesses located on the Keys, rather than visitors who spend a short period of time in the area.

Other broadcast media to be established are VHF and AM radio frequencies including public service announcements (PSAs). The PSA program has begun, while the VHF and radio projects have not been implemented as needs are not urgent and the establishment requires a large amount of funding. PSAs are currently broadcasted in the Keys area through a few radio stations. Although AM radio broadcast seems perfect for mass communication, it has some limitations. The sanctuary has to bear the burden of establishment and maintenance cost, and it must assure that their message reaches targeted audiences. Again, local community and local businesses are more likely to

become prime targets than visitors. From the survey of Leeworthy and Wiley (1996b), approximately 25% of visitors use one of the AM radio stations in the Keys which provides information about Key deer and John Pennekamp Coral Reef State Park. Foreign visitors, who contribute about 17% of total visitors, also show the same percentage of radio use. Before implementing the PSA program the sanctuary should be assured that it is cost-effective.

Considering that 82% of total visitors travel by auto (Leeworthy and Wiley, 1996b), wayside displays, exhibitions, signs, and billboards should be effective methods for catching the attention of visitors, and providing a simple message from the sanctuary. These methods may also be more cost-effective for the sanctuary's limited budget.

The sanctuary also plans to organize special events such as the sanctuary awareness week and an environmental exposition, and participate in local festivals or trade shows to provide information about its mission. Some limitations of this strategy are the frequency of events and the diversity of audiences. It is almost impossible to organize such events frequently with limited funding. However, if the sanctuary cooperates with other environmental agencies, their funding will go further. According to Leeworthy and Wiley (1996b), only 2.9 % of total visitors participate in the special events sponsored by the Monroe County Tourist Development Council. This indicates that the proposed organization of special events may not attract as many tourists as the sanctuary expects. However, the education program may have to focus these events on the local community instead.

The FKNMS Education and Outreach program plans to provide education for kids and adults in Monroe County through school programs and promoting awareness among those who are outside the school systems. The program attempts to develop both cognitive- and skill-based knowledge through regular classroom activities and particular programs. Projects such as Coral Reef Classroom, a Kids' Week, and a poster contest are designed to serve the purpose of local youth education. Coral Reef Classroom is one of the most effective and successful programs the sanctuary is implementing. The outcomes of the program have proved that the classroom strategy is very effective as students who participated in 1995 improved their test scores by 25% in the post-test (FKNMS, 1998).

Nonetheless, providing education to only kids and adults in school would not yield the best and most successful results for the education and outreach program and, importantly, the overall management plan. The need to educate more of the local community was demonstrated during the 1996 national election when one ballot asked voters in Monroe County if the FKNMS should continue to exist. Unexpectedly 55% of the voters were against the sanctuary administration. When this large sanctuary was established in 1990, the local community, especially in the lower Keys, had negative attitude towards the sanctuary. Compared to residents in the upper and middle Keys where the Key Largo and Looe Key NMSs are located, the establishment of the more encompassing FKNMS was probably still relatively new to people in the lower keys. They did not realize the advantage of protecting their marine resources under the sanctuary program. According to Urian (1998), it is believed that the causes of such public reaction are related to public misconceptions within the community. This emphasizes importance of the relationship between the public and the education/outreach plan. Lack of public support due to an ineffective communication between resource managers and the entire community can easily put the entire management program into jeopardy. An effective education program targeted at all community members could carry across the right kind of message and change the public's misconceptions. To date, the sanctuary has gained more public support and the community has a better understanding of what the sanctuary tries to accomplish.

Tourism businesses can be considered an audience as well as a secondary information provider. Considering the business sector as a message recipient, the education plan focuses on providing industry with information about the marine environment, sanctuary regulations, proper uses of resources, and impacts from malpractice. Different kinds of businesses are approached including shipping, charter, and tourism-related businesses. As a secondary educational information provider, the businesses are encouraged to participate in a specifically designed activity called a certification program. The program provides training for business operators to become aware of environmental issues, so they can in turn practice safe operation and help deliver the sanctuary's message to visitors. According to the visitor survey results of Leeworthy

and Wiley (1996b), visitors tend to use charter boats for diving and boating activities rather than private boats. Therefore, dive operators and boat operators have a better chance to deliver the message because they have more access to and direct contact with visitors than the sanctuary. Using trained business operators for educational delivery should enhance the effectiveness, even success, of the education and outreach program and the overall sanctuary program.

Before one can educate others, he/she must have a good understanding of the issues. FKNMS Education and Outreach Plan calls for enhancing the knowledge of the education and outreach program staff, as well as the law enforcement staff. Besides enforcing regulations, enforcement officers are also responsible for distributing brochures and delivering the sanctuary messages to visitors, especially those on-site.

As a secondary messenger, local educators should deliver correct information to students and community. Environmental education workshops for school teachers encourage delivery of accurate and consistent information to the education community. The strategy proposes to seek a co-sponsorship for financial support because as the sanctuary's education program has limited funding for this activity. Currently the supporters include Monroe County school system and local environmental education programs. The agencies which are the most likely partners for providing financial and technical assistance are those which govern other management areas within and adjacent to the Florida Keys. These areas, such as the National Park, National Estuarine Research Reserve, National Wildlife Refuges, State Parks, and Aquatic Preserves, are managed by the Federal government and the State of Florida. Although these areas are managed by different jurisdictional authorities with different regulations, they share the similar goal of protecting the Keys. Moreover, terrestrial and marine ecosystems are interdependent. Therefore, those agencies appear to be good candidates for helping to deliver accurate information about the Keys environments and lift the financial burden off the sanctuary administration.

These approaches should succeed or at least show a desirable results. This is not only because there is a promising possibility that the sanctuary should receive assistance

from other agencies, but also the fact that the target audiences, who are local educators, are capable of receiving and delivering information effectively.

Condition 3. Plan Structured to Maximize Success

The statute must give implementing agencies sufficient jurisdiction over target groups and structure the implementation process to maximize the probability that target groups will comply as desired (Sabatier and Mazmanian, 1983). In order to maximize the probability, Sabatier and Mazmanian suggest that the statute should

"1) assign implementation to agencies supportive of statutory objectives that will give the new program high priority;

2) provide substantial hierarchical integration within and among implementing agencies by minimizing the number of veto/clearance points and by providing supporters of statutory objectives with inducements and sanctions sufficient to assure acquiescence among those with a potential veto and among target groups;

3) provide adequate financial resources to the implementing agency (agencies) to hire the staff and conduct the technical analyses involved in the development of regulations, the administration of permit systems, and the monitoring of target group compliance;

4) bias the decision rules of the implementing agency (agencies) in favor of adherence to statutory objectives; and

5) provide ample opportunity for interest groups and sovereigns supportive of statutory objectives to intervene in the implementation process."

The FKNMSPA mandates NOAA, EPA, and the State of Florida to provide assistance to the EOAP in forms of funding, staff, and resources. Five education and outreach staff members, including a volunteer coordinator from the Nature Conservancy, are assigned to implement the EOAP with the assistance of interns and volunteers. Staff are located in three sanctuary offices, Key Largo, Marathon, and Key West, and each is

responsible for specific programs which are implemented sanctuary-wide. The EOAP is expected to require over 22 full-time positions plus 80 volunteers, but so far it has not happened. It is probably related to the sanctuary's financial burden. The EOAP only receives approximately five percent of the total sanctuary funding from NOAA (Urian, 1998). In 1992 the cost of implementing the existing education programs was over $140,000, including salaries (USDOC, 1996). Funding for salaries comes from NOAA and Florida Department of Environmental Protection (FDEP) (USDOC, 1996). Seeking partnership with Federal, State, and local agencies and NGOs not only means more financial support to the program, but also more alliances in resource conservation.

As the sanctuary anticipated the possible funding limitation, the EOAP states that if the budget falls below the projected requirement, the sanctuary will have to seek private support. If private support is not available, the EOAP must prioritize the projects to be implemented. In this case, it may not meet the criteria set by Sabatier and Mazmanian (1983) that the implementing agency should adhere to the policy objectives. This does not surely mean that the EOAP cannot maximize the probability that the users will comply, but means that the probability still can be maximized depending upon which projects have the most priority.

Not only the responsibility in program implementation belongs to the staff and volunteers, but also to the EOAP's Education Advisory Board (EAB). The 14-membered EAB is established to ensure efficiency and consistency in the EOAP. The members are appointed from user groups, academics, and non-government organizations. The EAB acts as a supervisor on the projects by providing recommendations, allocating project funding, and promoting stewardship and cooperative partnerships. In addition to those responsibilities upon the implemented management programs, the EAB is designing a long-term education and outreach management plan to be used after the current plan expires in the year 2003.

Another mechanism assuring target's compliance is sufficient jurisdiction over target groups. The FKNMS does have the absolute jurisdiction over users when it comes to zoning regulations, but not education. The compliance to the EOAP is about people's attitude, perception, and willingness. There are no actions taken against users who do not

volunteer for any activities or participate in the public meeting. There is no clear incentive for any individual to take advantage of educational programs, unless their lives are affected by the sanctuary regulations or they are benefit from the program. For example, if the areas that used to allow commercial fishing are now regulated under zoning regulations, some fishermen may have an incentive to gather information about the regulations. However, it may not be true in the case of individuals who have negative attitude towards the sanctuary management. The reaction can be seen throughout the Keys such as the sign, "Say NO to NOAA." However, in many cases, specific incidents such as large vessel groundings can make the public become concerned about the resources, that may create an incentive for users to develop sense of ownership and increase the environmental awareness. The level of reaction probably depends upon how important the damaged resources are to the individuals.

The program such as certification program, that trains and certifies boating and diving businesses to become environmentally friendly operators, may develop an incentive among business operators. Those businesses can actually use that as their marketing campaign and probably could pressure other operators to become certified, if it proves profitable. Nevertheless, this may backfire if operators participate just to increase their economic advantages without a real environmental concern. But again, the certification is not required by any regulation. Therefore, without strong incentive, the EOAP must keep reaching out to the public with more information as much as it can. Besides giving certification, rewarding can also crate a public incentive. Instead of focusing on the punishment of wrong-doing, awarding private or government organizations, that are environmentally concerned, can promote the incentive of the conservation of marine environment. Similarly to the certification program, the rewarded organization or businesses also get benefits by using the award to publicize themselves.

Other suggestion from Sabatier and Mazmanian (1983) is that there should be a mechanism provided by the agency to let the interest groups intervene in the implementation process. Public participation, especially from the local community, is a means that allows the public to intervene and communicate with the sanctuary. Lemay and Hale (1989) also mention that as the education program evolves, the educational

messages, target audiences, and management techniques could change, but the necessity of local support and involvement will remain. The sanctuary can use information from public input to improve its management by understanding the issues from community's point of view.

The EOAP attempts to create a sense of stewardship among the users and the community which in turn encourages compliance with management regulations, providing input to the administration, and giving feedback on policies. The public is encouraged to get involved in different aspects of the management plan. The Volunteer action plan is designed to serve a number of purposes including enhancing public participation and awareness, and establishing a task force to assist sanctuary staff in various programs. Volunteers are recruited mostly from the local community. Voluntary assistance is a crucial component in the education/outreach program as some tasks may not be accomplished within the scheduled time frame or efficiently without volunteer support. Team O.C.E.A.N. (Ocean Conservation Education Action Network) is an example of the education/outreach project that relies and receives a tremendous support from volunteers. Team OCEAN is a group of staff and volunteers responsible for distributing brochures and educational materials at heavily used locations, installing signs and wayside exhibits at the boat ramps. This project is mostly funded by the Nature Conservancy and the Florida Advisory Council for Environment Education.

Another activity enhancing public involvement is a public forum. As part of the education/outreach objectives, the sanctuary aims to provide "mechanisms so that new ideas and policies can be introduced and incorporated into the ongoing Education and Outreach Action Plan." The sanctuary holds a maritime committee meeting from time to time. Feedback on regulations and policies from the people who are directly impacted by the regulations will help staff address the problems more effectively.

As a conclusion, inadequate financial resource, and lack of users' consent and incentives are three major constraints minimizing the EOAP' success and probability that target groups will perform as desired.

Condition 4. Leader's Commitment

The leader of the agency must have substantial managerial and political skill, and be committed to the statutory objectives (Sabatier and Mazmanian, 1983). As previously mentioned, the EOAP appointed five staff from NOAA and other agencies. Each has different areas of expertise necessary for the program implementation. Some of them were employed at the Key Largo NMS before being incorporated into the FKNMS.

Sabatier and Mazmanian (1983) suggest that "political skill involves the ability to develop good working relationships with sovereigns in the agency's subsystem." That is the EOAP must be able to coordinate with other agencies or other Action Plan that can directly affect the EOAP.

Managing a large sanctuary is indeed a difficult task for only one agency. There are a number of agencies and organizations located in the Florida Keys and South Florida region that actually work towards similar types of environmental conservation and protection. It is mandated by law that NOAA, EPA, and the State of Florida provide assistance to the implementation as leading agencies, and coordinate the involvement of organizations (USDOC, 1996). The EOAP apparently relies heavily on coordination and cooperation with a lot of agencies to implement their joint projects (Appendix A). The matrix indicates which agency or organization provides assistance to which educational project. It is of mutual benefit to both parties to establish a cooperative partnership which helps to decrease overlapping or conflicting management implementation, authority or regulations. By working with other institutions that have different technical expertise and management experience the sanctuary will be more able to develop and introduce new management approaches. Another expected benefit from cooperative partnerships is the opportunity to combine funding to develop more comprehensive and higher quality projects. Cooperative partnerships will also help the sanctuary create a more acceptable public image, especially when the partners are the Everglade National Park of the National Park Service, the State Park, the National Wildlife Refuge, Aquatic preserve, and the U.S. Fish and Wildlife Service (USFWS). Currently, the EOAP does not seem to have any agreement with the NOAA's National Estuarine Research Reserves program

(NERR) although the sanctuary is required to have a cooperation with the NERR under the FKNMSPA of 1990. There are two NERRs located in Florida, and one is being proposed. Further, according to Suman (1997), the EOAP still lacks cooperative agreement with local government. The strong local support especially from government sector can build the relationship between the sanctuary and the local people.

Besides government agencies, the sanctuary tries to develop a partnership with private businesses because they are a major stakeholder in resource utilization substantially influencing the management decisions and implementation. If the sanctuary can convince the business sector to understand the benefit gained from marine resource management and, thus, to comply with the sanctuary's regulations, possible conflicts between these two parties may be reduced. In response to their effort to cooperate with private business in the management process, the sanctuary expects the industry to support its projects administratively and financially. The approach used by the sanctuary is to target key players, including Chamber of Commerce, Tourist Development Council, hotel & motel association, and associations of dive operators. If these key players, which have influence on the smaller businesses, cooperate with the sanctuary administration, the smaller businesses should follow as well. Furthermore, this approach should save the sanctuary some time as it would be a bigger task to work directly with each small individual business. However, an underlying problem is, again, lacking of incentives and consent.

Intra-agency cooperation and coordination are also important to EOAP because the plan overlaps with the Volunteer and Enforcement Action Plans. Strategies in each section within the Volunteer Action Plan are designed to work interdependently with, and provide assistance to, each sanctuary action plan, especially the education and outreach plan. Most strategies overlapping with those in the EOAP plan require a substantial amount of labour, for example, installing roadside signs, distributing brochures on-site, and preparing public meetings. Therefore, as long as the funding remains scarce, the volunteer program is a critical component assisting in the implementation of educational projects. Volunteers allow the program to function without having to depend heavily on paid works. The other advantage of including volunteers into the sanctuary task is that

this action will create a sense of community stewardship and improve the relationship between the community and the sanctuary administrators.

Law enforcement is a good example of both intra- and interagency cooperation. The law enforcement authority is a cooperative agreement between the FKNMS and the Florida Department of Environmental Protection (FDEP) (Causey, 1995). The enforcement officers are employed by FDEP, and certified by the Florida's Criminal Justice Standards and Training Commission and the Florida Marine Patrol (Causey, 1995).

Similar to any other law enforcement units, the responsibility of the sanctuary's enforcement officers is to ensure that resource users comply with the sanctuary regulations and commit no violations. However, this method may differ from other enforcement units in that the sanctuary officers also practice "interpretive" law enforcement. This represents an overlap between the education/outreach and the enforcement action plans. More specifically, the sanctuary officers tasks include delivering information to on-site users regarding the sanctuary's mission, user impacts on marine environment, and proper use of resources. Because this applied educational technique it is proactive and involves direct communication with target users, it should be effective for the outreach program. One possible limitation of this method is the ratio of the officers to the total sanctuary area covered by the officers. Currently there are seven sanctuary officers on duty for the entire 2,800 snm FKNMS, leaving each officer responsible for approximately 400 snm. Of the approximately 3.05 million visitors per year, 68.8 % participated in water-based activities (Leeworthy and Wiley (1996b). That is, one officer is responsible for roughly 820 visitors per day. This crude estimation is made on the assumption that all officers work every day and visitors are evenly distributed throughout the year. That means in reality each officer has to handle many more visitors daily resulting in a less effective law enforcement operation. Such ratio is a significant factor limiting the number of education opportunities as well as their ability to enforce the laws and regulations. It should also be noted that the rest of the visitors who do not prefer to participate in the water-based activities also contribute the environmental impacts to the sanctuary's resources without having to get into the water. Land-based

problems such as sewage discharge from hotels is another factor causing resource degradation.

Overall, it may seem that the EOAP lifts off some burden by seeking for cooperative agreement with other organizations. However, it may be too risky for the sanctuary to rely solely on too many partners without knowing whether those agencies are *committed* entirely to the implementation, especially with respect to financial allocation.

## Condition 5. Active Constituent Support

According to Sabatier and Mazmanian (1983), the policy must be actively supported by key legislators and organized interest groups throughout the implementation process. It may not be apparent if the EOAP is specifically supported by legislators. However, as a whole, the sanctuary has received a strong support from several key legislators. One of them is the then-Florida Congressman Dante Fascell who introduced the issue of resource degradation and he had long been a environmental supporter of the South Florida. The bill was introduced by Senator Bob Graham who still serves as the senator of Florida and a strong supporter to the FKNMS. Another active supporter is the Congressman, U.S. Rep. Peter Deutsch, who refused sanctuary opponents to present the bill to deactivate the sanctuary to the Congress. The detailed discussion is presented in the next section.

Besides the cooperative support from other government agencies as required by law, the EOAP is strongly supported by non-profit organizations that share similar interest in marine environment education. Those include State education and teacher organizations, conservation groups, local schools, public education programs, pro-sanctuary groups, and sport fishermen program. However, the sanctuary also has the opponents who do not approve the sanctuary regulations including the Victims of NOAA, and the outspoken group, the Conch Coalition. The coalition is a Middle Keys citizen group who does not believe in the sanctuary especially because it is a Federal agency. The Coalition may not act against the education program specifically, but to the whole

sanctuary plan, which definitely can affect the projects under implementation of the sanctuary including the education and outreach.

To conclude, the sanctuary has both strong supporters and oppositions, but currently the balance seems to move towards the positive way by the support from State legislators. However, the situation could change over time because of a change in political motives.

Condition 6.  Changes in Socioeconomic Conditions and Political Support Over Time

Sabatier and Mazmanian (1983) state that the emergence of conflicting public policies or change in socioeconomic condition must not undermine the priority of statutory objectives or political support over time.

The estimated resident population of Monroe County is 63,188 in 1980, 78,024 in 1990, and 81,919 in 1997 (U.S. Bureau of the Census, 1998). Estimated in July 1997, the largest age group is 25-44 years old contributing to about 33.2 percent of the total, followed by the 45-64 age group, 25.5 percent. These estimates slightly changed from those of 1990 which were 34.8 and 23.4 percent, respectively. According to the estimation in 1997, the largest ethnic groups are non-Hispanic whites, composed of about 76.5 %, and Hispanic, 15.6 %. Both numbers differ from those in 1990 which were 81.5% and 11.8%, respectively. The percentages of high school graduates and college graduates (age 25 and over) in 1980 were 36.5 and 15.9, respectively, while it is 29.1 and 20.3 percent in 1990, respectively. According to a survey conducted by Florida State University in 1996, the numbers remain similar to the 1990 estimations, noted that the population only increased by five percent from 1990 to 1996 (Leeworthy and Wiley, 1997). Per capita income has increased from $13,246 in 1980 to $18,869 in 1990 and $23,582 in 1996 (U.S. Bureau of Census, 1998). Employment rate increased by 1.1 % from 1980 to 1990, while employment in service businesses increased from 18.6 % in 1980 to 19.4 % in 1990 (U.S. Bureau of Census, 1998).

The above statistics present some changes, though, not dramatic. Population increased while age-group ratio varied. This certainly could affect the EOAP as a number

of target audiences increase. A trend shows that white residents decrease while Hispanics increase which could affect the effectiveness of educational techniques or media, at least language-wise. Level of education is another important factor determining how well individuals can understand complicated information from the sanctuary. Although a trend shows that a number of high-school graduates have decreased, the college graduates have risen. Higher literacy could probably contribute to the effective education activities. However, the Monroe County still shows economic dependency on tourism industry as a number of employment and an amount of money associated with this business have remained steady with small increases. That is because the Florida Keys did just not start to develop, but has been a tourist spot for several decades. As a result, an increase of tourists should be expected. The EOAP is more qualitatively oriented than quantitatively. Therefore, the increasing visitors may not affect the implementation of programs, such as PSA program, wayside exhibits, radio station, but it could affect the quantitatively oriented program such as printed materials, especially if the funding remains scarce.

As previously mentioned, the support to the sanctuary management can be lessened over time due to the change in political support. The sanctuary has gone through a difficult in period such as the election of 1996. In the election, the Monroe County included a non-binding local referendum, "Do you believe there should be a Florida Keys National Marine Sanctuary?" Of the total of 32,523 voters, 55 percent said no. The opponents of the sanctuary then tried to persuade the Congressman Peter Deutsch to present a bill to abolish the sanctuary. Before the election, Rep. Deutsch said that he would withdraw his support from the sanctuary if Monroe County voters were against the sanctuary (Wadlow, 1996). The repeal of the FKNMSPA has never happened. This is a good example of political support that has not changed over time by the emergence of conflicts, but continued to bias the decision in favour of adherence to the statutory objectives (Condition 3).

# CONCLUSION AND RECOMMENDATIONS

The Education and Outreach Action Plan shows some failures and prospects. Above of all, the EOAP fails to understand what exactly are goals and objectives which greatly affects the rest of the plan and its performance. Moreover, connections among goals, objectives, and management strategies are not addressed. Therefore, there is no way of knowing the management's goals have already been met. Regardless of unconnected gaps, some education and outreach strategies seem capable of solving some environmental and management issues and may even lead towards goals if it was ever linked. However, the EOAP fails to specify and prioritize its target audiences. By doing that, it could enhance the efficiency and effectiveness of the communication between public and the sanctuary.

Besides the internal factors summarized above, other external factors can jeopardize the implementation process as well. Financial problem seems to be the major threat to the program. The sanctuary certainly should not depend entirely on the joint funding on the cooperative projects. The FKNMSP does provide an open end to the sanctuary by allowing the sanctuary to solicit donation and financial support from business sector. The EOAP seems to depend on too many cooperative partnerships that could lower the efficiency of the cooperation, instead of increasing quality of the projects. The connection between the EOAP and the local community is strongly needed. Moreover, not only with the local people, but the EOAP should build a bridge with the local government as well.

It is unlikely that the long-term management plan to be implemented in year 2003 will be much different from the current in terms of education techniques. It is very important to improve the effectiveness of the current plan since it is built as a foundation for the future plan. Below are some recommendations that may be useful for improving the performance of the current plan, and a guideline for the future plan.

1. The Education Advisory Board that is currently planning the next EOAP to be used in 2003 needs to clarify the goals and objectives of the plan. Furthermore, the new plan must link the gaps between goals, objectives, and management strategies, so that it

can be easily identified which goals or objectives have been achieved. Improvement of environmental condition should be added as a goal of the program. The EOAP should also clearly identify who are the target groups and approach them with specific educational programs in order to increase a chance that the right message will get the right audience.

2. After the goals and objectives are re-written, the actual *outcome* evaluation can be done. It means that the education plan should make a difference once implemented, but what factors or criteria should be put into consideration? In terms of improvement of the environmental condition, several factors can be used including types, number, and density of key species in certain areas. Values before and after the implementation of the sanctuary can be compared and contrasted to determine whether the plan is working effectively. There are a number scientific studies and monitoring that can be used as a baseline for the comparison and evaluation. Nevertheless, it may be very difficult to measure increase of public support to the sanctuary management as an indicator of program effectiveness. Baseline for such evaluation should be established. Surveys on public attitudes towards the sanctuary can provide some information for future references. Changes in a number and types of participants in education activities or changes in number of violation or compliance could also indirectly indicate concern towards the environmental problem and support to the sanctuary.

3. Targets should be prioritized especially when the funding is very scarce. Local residents and local businesses should be approached first because, if successful, they will have a great influence on visitors and cause no difficulties to the implementation as much as it currently does.

4. The EOAP should continue seeking public support and enhance more public involvement. Seek alliance with local government and environmental groups such as Reef Relief which are pro-sanctuary and environmental preservation. That should make anti-Federal groups feel less invaded by the image of the sanctuary as the Federal agency.

5. As the education seems to be undervalued although the education is a crucial component of the resource management, so if possible, the NOAA administrator should

increase funding to the education program. A possible financial support which is done by other sanctuaries includes money from selling publications about the marine environment.

6. The EOAP should strengthen the commitment between other agencies with respect to cooperative partnership as the EOAP seems to rely heavily on the agreement.

7. The EOAP should educate the public about other sources of problems that do not originate in the water. This underlying water-quality problem is not area that the current plan actually focus on.

8. The EOAP should promote users' consent and incentives such as giving awards to businesses that operate with environmental concern. Punishment incentives may not work, it may even cause more tension and conflicts between the sanctuary and the opposition.

9. Instead of giving out the message to local people by emphasizing how valuable the resources are ecologically, esthetically, and educationally, the EOAP could change the emphasis to how important the resources are *economically*. Since the economy of the Keys relies on the healthiness of resources, the locals may become more concerned as their lives depend on such value.

10. The EAB should reconsider the strategies to be implemented since some of them may not reach the targets or at the high degree as expected. The EOAP should also consider using the world wide web as another tool of distributing information since it costs less.

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# APPENDIX

## Appendix A. Agencies/Organizations Identified for Implementing Strategies/Activities (USDOC, 1996a)

| Strategy/Activity | NOAA | USEPA | NPS | USFWS | FDEP | FDOEd | FDOS/BAR | Monroe County | Sea Grant | SAC | NPO | Ch. of Com. | TNC | TDC | Academia | Bhg. Imp. Fnd | Media | Citizens of S.FL | FK Aque. Auth. | Reef Relief | Southern Bell | FADO/KADO | OFF | Planning Cncl. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COMMUNITY INVOLVEMENT/COMMUNITY PROGRAM** | | | | | | | | | | | | | | | | | | | | | | | | |
| **E.4 Training, Workshops, and School Programs** | | | | | | | | | | | | | | | | | | | | | | | | |
| Promote/Support Environmental Education in Monroe County and State Schools | ● | | ● | O | ● | | | | | | | | | | | | | | | O | | | | |
| Produce the Florida Keys Environmental Education Directory | ● | | | | ● | | | | | | | | | | | | | | | | | | | |
| Provide/Support Environmental Education Workshops for Educators | ● | O | O | O | ● | O | O | O | O | | | | | | | | | | | O | | | | |
| Provide Environmental Education for Law Enforcement Personnel | ● | | | | ● | | | O | O | | | | | | | | | | | O | | | | |
| Sponsor/Support Adult Environmental Education | ● | O | | | ● | O | | | | O | O | | O | O | | | | | O | O | | | | |
| Certification Program | ● | O | O | O | ● | | | | | O | O | | O | O | O | O | | O | O | O | | O | O | |
| Provide mechanisms Outside Law Enforcement to Help Deliver On-site Resource Education | ● | | | | | | | | | | | | | | | | | | | | | | | |
| **E.6 Education Advisory Board** | | | | | | | | | | | | | | | | | | | | | | | | |
| Establish Education Advisory Board | ● | O | O | O | ● | O | | O | O | | O | | | O | | | | O | O | O | | | | |
| **E.10 Public Forum** | | | | | | | | | | | | | | | | | | | | | | | | |
| Establish a Public Meetings Program | ● | | | | ● | | | | | | | | | | | | | | | | | | | |
| Develop a Speakers Bureau and Lecture Series | ● | O | O | O | ● | | | | | | O | | O | O | O | | O | | O | O | | | | |
| Conduct a Poster Contest | ● | | | | ● | O | | O | O | | O | O | | | | | | | | | | | | |
| Conduct a Photo Contest | ● | | | | ● | | | | | | O | | | | | | | | | | | | | |
| **E.11 Special Events** | | | | | | | | | | | | | | | | | | | | | | | | |
| Develop Trade Show Information Booths | ● | | | | ● | | | | | | | | O | | | | | | | O | | | | |
| Organize Environmental Exposition | ● | O | O | O | ● | | | O | O | | O | O | O | O | | | | O | O | O | | O | O | O |
| Hold a Grand Opening | ● | O | | | ● | | | | | | | | O | O | | | | | | | | O | O | |
| Implement Kid's Week | ● | O | O | O | ● | O | | O | O | | O | O | O | O | | | | | O | O | | O | O | |
| Design and Implement a Sanctuary Awareness Week | ● | O | | | ● | | | | O | | O | | O | | | | | O | | | | | | |
| **E.12 Professional Development of Education Staff** | ● | | | | | | | | | | | | | | | | | | | | | | | |
| **PRODUCT DEVELOPMENT** | | | | | | | | | | | | | | | | | | | | | | | | |
| **E.? Printed Materials** | | | | | | | | | | | | | | | | | | | | | | | | |
| Design and Print FKNMS Brochure | ● | | | | ● | | | | | | | | | | | | | | | | | | | |
| Produce a Monthly FKNMS Newsletter | ● | | | | ● | | | | O | | | | | | | | | | | | | | | |
| Provide Information to Shipping Businesses | ● | | | | ● | | | | | | | | | | | | | | | | | | | |
| Provide Information to Community Leaders/Decision Makers/Organized User Groups | ● | O | | | ● | | | O | O | | O | O | O | O | | | | | | O | | | | O |
| Provide Interpretive Information to Periodicals/Publications | ● | O | | | ● | | O | | | | O | | O | | | | | | | O | | | | |
| Provide Information to Businesses about FKNMS Resources and Activities | ● | | | | ● | | | | O | | O | O | O | | | | | | | O | | | | |

● Lead  ● Primary Role  O Assist

Appendix A.—*Continued*

| Strategy/Activity | NOAA | USEPA | NPS | USFWS | FDEP | FDOEd | FDOS/BAR | Monroe County | Sea Grant | SAC | NPO | Ch. of Com. | TNC | TDC | Academia | Btng. Imp. Fnd | Media | Citizens of S.FL | FK Aque.Auth. | Reef Relief | Southern Bell | FADO/KADO | OFF | Planning Cncl. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **E.1 Printed Materials (cont.)** | | | | | | | | | | | | | | | | | | | | | | | | |
| Provide Multilingual Information to Marine Rental Businesses | ● | | | | ◉ | | | | O | | O | O | | | | | | O | O | | | | | |
| Distribute Educational Materials at Public Boat Ramps | ● | | | | ◉ | | | | O | | O | O | | | | | | | O | | | | | |
| Produce and Distribute Fact Sheet on FKNMS Boating Rules, Regulations and Etiquette with Annual Boat Registration | ● | | | | ◉ | | O | | O | | | | | | | | | | O | | | | | |
| Produce FKNMS Fact Sheet for Tourist Development Council | ● | | | | ◉ | | | | | | | | | O | | | | | | | | | | |
| Distribute Information regarding FKNMS in Utility Bills, Newsletters, and Licenses/Registration | ● | | | | ◉ | O | | | | | | | | | | | | | O | O | O | | | |
| Provide Information to Service Industries about Environmentally Safe Practices | ● | | | | ◉ | | | | O | | O | O | O | O | | | | | O | | | | | |
| Produce a Color Environmental Atlas for the Sanctuary | ● | O | O | O | ◉ | O | | | O | | | | | | | | | | | | | | | |
| **E.2 Audio-visual Materials** | | | | | | | | | | | | | | | | | | | | | | | | |
| Establish Audio and Video Library | ● | | | | ◉ | | | | | | | O | | | | | | | | | | | | |
| Produce Video and Audio Tapes and Theme-Oriented Slide Presentations | ● | O | O | O | ◉ | | | | O | | O | O | O | | O | | | | O | | | | | |
| **E.3 Signs/Displays/Exhibits** | | | | | | | | | | | | | | | | | | | | | | | | |
| Establish Wayside Exhibits in the Florida Keys | ● | | | | ◉ | | O | | | | | | | | O | | | | O | | | | | |
| Establish Static Displays at Appropriate Locations | ● | O | O | O | ◉ | O | O | | O | | O | O | O | O | | | | | O | O | | | | |
| Develop Mobile Displays with Information on All Aspects of the FKNMS Program | ● | O | | | ◉ | | | | | | | | O | O | | | | | O | | | | | |
| Develop Interactive Computer Stations | ● | O | O | O | ◉ | | | | O | | | | | O | | O | | | | | | O | O | |
| Establish Information "Stations" at South Florida Airports/ Car Rental and Visitor Centers along US 1 | ● | O | O | O | ◉ | | | | O | | O | O | O | | | | | | | | | | | |
| Design and Install Roadside Signs | ● | | | | ◉ | | O | | | | | | | | | | | | | O | | | | |
| **E.5 Public Service Announcements** | | | | | | | | | | | | | | | | | | | | | | | | |
| Develop a Program of PSAs | ● | O | O | O | ◉ | | | | O | O | O | | | | | | O | | O | | | | | |
| Develop a Media Packet | ● | O | | | ◉ | | | | | | | | | | O | | | O | O | | | | | |
| Develop and Produce a Series of Video News Releases | ● | O | | | ◉ | | | | O | | O | O | | | O | | | O | O | | | | | |
| Print Marine Etiquette on Marine Related Materials Packaging | ● | O | | | ◉ | | | | O | | O | | | | | O | | O | O | | | | | |
| Develop VHF and Dedicated AM Radio Station | ● | O | O | O | ◉ | | | | O | | | | | | | | | | | | | | | |

● Lead    ◉ Primary Role    O Assist

Appendix A.—*Continued*

| Strategy/Activity | Agencies/Organizations | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NOAA | USEPA | NPS | USFWS | FDEP | FDOEd | FDOS/BAR | Monroe County | Sea Grant | SAC | NPO | Ch. of Com. | TNC | TDC | Academia | Btng. Imp. Fnd | Media | Citizens of S.FL | FK Aque.Auth. | Reef Relief | Southern Bell | FADO/KADO | OFF | Planning Cncl. |
| **E.7 Promotional Educational Materials** | | | | | | | | | | | | | | | | | | | | | | | | |
| Establish Visitor Booths/Displays to Distribute Educational Materials | ● | | | ◉ | O | | | | | | | | | | | | | | | O | | | | |
| Establish Interagency Visitor Center for Orientation Purposes | ● | O | O | O | ◉ | | | | O | | | | | | | | | | | | | | | |

● Lead　　　◉ Primary Role　　　O Assist

Abbreviations: NOAA, National Oceanic and Atmospheric Administration; USEPA, U.S. Environmental Protection Agency; NPS, National Park Service; USFWS, U.S. Fish and Wildlife Service; FDEP, Florida Department of Environmental Protection; FDOEd, Florida Department of Education; FDOS/BAR, Florida Department of State/Bureau of Archaeological Resources; SAC, Sanctuary Advisory Council; NPO, Nonprofit Organizations; CH. of Com., Chambers of Commerce; TNC, The Nature Conservancy; TDC, Tourist Development Council; Btng. Imp. Fnd, Boating Improvement Fund; Citizens of S. FL., Citizens of South Florida; FK Aque. Auth., Florida Keys Aqueduct Authority; FADO/KADO, Florida Association of Dive Operators/Keys Association of Dive Operators; OFF, Organization of Florida Fisherman; Planning Cncl., Planning Council.