

The Adaptive Management Experience of the National Marine Sanctuaries Program

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Abstract: The purpose of the National Marine Sanctuaries Act is “to identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance and to manage these areas as the National Marine Sanctuary System.” The National Marine Sanctuaries Program, within the National Oceanic and Atmospheric Administration, strives to adaptively manage these protected areas to address historic and emerging threats. This article summarizes the Program’s adaptive approach to management, which includes proactive decision-making, a firm commitment to public participation, and the use of best-available science. Case studies from the Florida Keys National Marine Sanctuary and the Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries illustrate how adaptive management principles are implemented at the local sanctuary level.

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I. Introduction

In July, President Obama signed an Executive Order establishing a National Policy for the Stewardship of the Ocean, Coasts, and Great Lakes. The process of creating this national policy began on June 12, 2009, when President Obama established an Interagency Ocean Policy Task Force (Task Force) to be led by the Chair of the Council on Environmental Quality (CEQ) and composed of senior policy-level officials. The Task Force was charged with developing recommendations for, among other things, “a national policy that ensures the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources” and that “provides for adaptive management to enhance

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our understanding of and capacity to respond to climate change.”²

The CEQ issued the *Final Recommendations of the Ocean Policy Task Force* on July 19, 2010,³ and immediately afterwards, the President signed Executive Order 13547. The Executive Order adopted the Task Force’s final recommendations and created a National Ocean Council to enhance ocean governance and coordination between federal and state agencies. The Executive Order also established guiding principles for ocean management and adopted a flexible framework for effective coastal and marine spatial planning. Coastal and marine spatial planning is a comprehensive, adaptive approach to issues of conservation, economic activity, user conflict, and sustainable use of the ocean, coasts, and the Great Lakes. These plans will “build upon and improve existing Federal, State, tribal, local, and regional decision-making and planning processes.”⁴

An important component of this new marine spatial planning process will be the National Marine Sanctuary System. National marine sanctuaries are nationally significant, underwater areas that are designated for the protection and conservation of marine life and resources within those areas. The National Marine Sanctuary System consists of 13 national marine sanctuaries, which vary greatly in size, shape, and resources protected. The smallest sanctuary is less than one square mile, while the largest is over 137,000 square miles. Sanctuary habitats include natural resources, as well as cultural resources, ranging from giant humpback whales to rocky reefs to underwater archaeological sites.

The Office of National Marine Sanctuaries is part of the National Oceanic and Atmospheric Administration (NOAA) and has managed these protected areas since 1972 by “work[ing] cooperatively with the public and federal, state, and local officials to promote conservation while allowing compatible commercial and recreational activities.”⁵ In seeking to fulfill this mission, the Office of National Marine Sanctuaries provides scientific research, monitoring, exploration, educational programs, and outreach to increase public awareness of the importance of national marine sanctuaries.

National marine sanctuaries may be established in a number of ways. The Secretary of Commerce has the authority to designate specific areas of the marine environment as national marine sanctuaries pursuant to provisions of the Marine Protection, Research, and Sanctuaries Act of 1972, now known as the National Marine Sanctuaries Act (NMSA).⁶ Congress can pass laws creating marine sanctuaries and the President is authorized under the Antiquities Act to establish Marine National Monuments, which can be managed by

² The White House, Office of the Press Secretary, Memorandum for the Heads of Executive Departments and Agencies, Subject: National Policy for the Oceans, our Coasts, and the Great Lakes, June 12, 2009, available at

http://www.whitehouse.gov/sites/default/files/page/files/2009ocean_mem_rel.pdf.

³ THE WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY, FINAL RECOMMENDATIONS OF THE INTERAGENCY OCEAN POLICY TASK FORCE (July 19, 2010), available at http://www.whitehouse.gov/files/documents/OPTF_FinalRecs.pdf.

⁴ The White House, Office of the Press Secretary, Executive Order, Stewardship of the Ocean, Our Coasts, and the Great Lakes, July 19, 2010, available at <http://www.whitehouse.gov/the-press-office/executive-order-stewardship-ocean-our-coasts-and-great-lakes>.

⁵ National Marine Sanctuaries, Frequently Asked Questions, <http://sanctuaries.noaa.gov/about/faqs/welcome.html> (last visited Aug. 5, 2010).

⁶ 16 U.S.C. §§ 1431 - 1445c-1 (2010).

NOAA much like national marine sanctuaries.⁷

The primary purpose of the NMSA is “to identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance and to manage these areas as the National Marine Sanctuary System.”⁸ Once areas are identified, sanctuary managers should “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.”⁹ The NMSA also seeks to “provide authority for comprehensive and coordinated conservation and management of these marine areas”¹⁰ and “enhance public awareness, understanding, appreciation, and wise and sustainable use of the marine environment.”¹¹

The NMSA provides only the designation process for the sanctuaries and an outline of the required management framework. Once a marine area is designated a sanctuary, management plans and implementing regulations must be developed to provide the necessary resource protection to fulfill the purposes of the NMSA. Other environmental laws, such as the National Environmental Policy Act, the Marine Mammal Protection Act, and the Endangered Species Act, mandate additional decision-making processes and provide additional authority for regulating activities within sanctuaries.

The National Marine Sanctuaries Program (NMSP or Program) is managed by NOAA’s Office of National Marine Sanctuaries. The NMSP has a strong community-based focus and works through partnerships and public participation in approaching its mission and finding solutions. Although the Office of National Marine Sanctuaries provides a federal umbrella of national management objectives, each sanctuary is managed by people who live in the area and understand the environment and resources. In addition, the support of the local community is essential for the success of sanctuary programs and management staff solicits input through a variety of mechanisms, including sanctuary advisory councils. The advisory councils, whose membership includes representatives from various user groups, government agencies, and the public at large, provide advice to the sanctuary superintendent on the operation of the sanctuary.¹² Through this local management, the national objectives can be shaped to meet the specific needs of each sanctuary.

In 1992, the U.S. Congress, through amendments to the National Marine Sanctuaries Act, mandated that each sanctuary management plan be reviewed at least once every five years.¹³ Effective marine spatial planning is ecosystem-based, integrated, place-based, adaptive, strategic and anticipatory, and participatory.¹⁴ As discussed below, the five-year

⁷ *Id.* § 431.

⁸ *Id.* § 1431(b)(1).

⁹ *Id.* § 1431(b)(6).

¹⁰ *Id.* § 1431(b)(2).

¹¹ *Id.* § 1431(b)(4).

¹² National Marine Sanctuaries, Sanctuary Advisory Council Overview, <http://sanctuaries.noaa.gov/management/ac/welcome.html> (last visited Aug. 5, 2010).

¹³ Oceans Act of 1992, Pub. L. No. 102-587, § 2104, 106 Stat 5039, 5041-43 (Nov. 4, 1992).

¹⁴ CHARLES EHLER AND FANNY DOUVERE. MARINE SPATIAL PLANNING: A STEP-BY-STEP APPROACH TOWARD ECOSYSTEM-BASED MANAGEMENT. INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION AND MAN AND THE BIOSPHERE PROGRAMME, IOC Manual and Guides No. 53, ICAM Dossier No. 6, 18 (2009).

reviews, in combination with ongoing sanctuary planning processes, facilitate an adaptive approach to management that incorporates all the elements of effective marine spatial planning. Furthermore, the management frameworks of the national marine sanctuaries are likely to form an important part of the foundation upon which the new regional coastal and marine spatial plans mandated by the National Ocean Policy are built.¹⁵

II. Adaptive Management in National Marine Sanctuaries

Although management plans are developed during the designation process, these are not intended to be static documents. As mentioned above, each plan must be reviewed every five years. During this management plan review, the National Marine Sanctuary Program must “evaluate the substantive progress toward implementing the management plan and goals ... [and] revise the management plan and regulations as necessary to fulfill the purposes and policies of [the NMSA.]”¹⁶ An essential element of the management plan review is an evaluation of “the effectiveness of site-specific management techniques and strategies.”¹⁷ The five-year review process, along with other routine sanctuary evaluation efforts, “foster a feedback loop that encourages an internal approach to problem solving and improved performance.”¹⁸ As such, the National Marine Sanctuary Program is one of the few federal agencies with a Congressional authorization to undertake an adaptive approach to management. By continually reviewing the management plans for each sanctuary and the scientific research conducted on the sanctuaries and sanctuary resources and adapting the management techniques and regulations to address identified changes and emerging concerns, the National Marine Sanctuary Program is able to flexibly manage the ocean areas under their care.

The National Marine Sanctuary Program’s adaptive approach to management is based on four basic principles. First, a precautionary approach is utilized. Lack of information on a particular sanctuary resource or impacts to that resource is no excuse for sanctuary managers to neglect it. Constant protection must be provided to all sanctuary resources and management measures should be regularly updated. Second, the Program strives for proactive decision-making. While it is not always possible to be proactive, resolving an issue before it becomes a larger problem is the Program’s ultimate goal. Third, the Program has an extremely firm commitment to participatory public processes. This is most visible in the Sanctuary Advisory Councils, which consist of over 400 members across the country, who provide day-to-day input on various issues. Fourth, the Program strives to ensure use of the best available science for its research. Disagreements are common, of course, on exactly what constitutes the “best available” science, but the objective remains.

The Program uses several management mechanisms to apply these adaptive management principles and achieve its management goals. The first management mechanism is the process of designating a marine area as a national marine sanctuary. This process involves forming the boundaries of the sanctuary, making regulations specific to the sanctuary, and looking at, and learning from, past designations. The review and revision of management

¹⁵ OPTF Final Recommendations, *supra* note 3, at 56.

¹⁶ 16 U.S.C. § 1434(e).

¹⁷ *Id.*

¹⁸ National Marine Sanctuaries, Sanctuary Management 101, <http://sanctuaries.noaa.gov/management/mgt101.html> (last visited Aug. 6, 2010).

plans are other management mechanisms that enable adaptive decision-making. Management plans establish the basic management framework for the individual sanctuary. They contain research priorities, outreach and educational goals, and means of protection for the resources specific to each sanctuary. Finally, sanctuary regulations establish enforceable restrictions that are unique to each sanctuary and the regulations can be amended if management changes are necessary.

Other important decision-making processes include decisions on the allocation of funds appropriated by Congress for the management of the National Marine Sanctuaries, the issuance of permits for use of a specific sanctuary or resource, and the enforcement of permit conditions. The National Marine Sanctuaries Program also undertakes numerous educational programs to inform the community, sanctuary stakeholders, and the nation about national marine sanctuaries and their significance. By taking full advantage of these decision-making processes, the Program is able to be firm in enforcing its regulations and standards while still being flexible to respond to changing conditions and circumstances.

Another facet of adaptive management of the sanctuaries is obtaining feedback from various sources on how well the Program is using the management mechanisms outlined above and accomplishing management objectives. The feedback comes from internal sources, such as the management plan reviews and routine sanctuary condition reports which are produced in advance of management plan reviews. Condition reports provide a summary of resources in each sanctuary, the pressures on those resources, the current condition and trends, and management responses to the pressures that threaten the integrity of the marine environment. The condition reports lay the groundwork for any changes that need to be made in the management plans during the five-year reviews. Another important source of internal feedback is the interaction of different branches of the Program. The scientific, policy, and legal staffs in Washington, D.C. and the individual sanctuaries develop programs together and share lessons-learned to improve adaptive management at the sanctuaries.

Feedback also comes from external sources. The primary external source is each sanctuary's Sanctuary Advisory Council. As discussed above, these councils consist of local citizens who volunteer their time to attend meetings every other month to provide input on the status of the local sanctuary and its management. Council members offer a unique view from a local perspective. Other external sources of feedback are evaluations performed by the Department of Commerce's Office of the Inspector General and the National Academy of Public Administration, who review the Program and share opinions on how the Program is performing and whether it is achieving its management goals.¹⁹ So far, all these evaluations have been positive, but there is always room for improvement.

¹⁹ See, e.g., U.S. DEPARTMENT OF COMMERCE, OFFICE OF THE INSPECTOR GENERAL, NATIONAL MARINE SANCTUARY PROGRAM PROTECTS CERTAIN RESOURCES, BUT FURTHER ACTIONS COULD INCREASE PROTECTION, FINAL INSPECTION REPORT, No. IPE-18591 (Feb. 2008), available at <http://www.oig.doc.gov/oig/reports/2008/IPE-18591.pdf>; NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, READY TO PERFORM: PLANNING AND MANAGEMENT AT THE NATIONAL MARINE SANCTUARY PROGRAM (Oct. 2006), available at <http://sanctuaries.noaa.gov/news/pdfs/napareport.pdf>.

III. Case Studies

Adaptation can occur at anytime within a sanctuary. Education programs can be redesigned to address an emerging user conflict. Sanctuary regulations can be amended to prohibited activities recently identified as harmful to sanctuary resources. Research can be commissioned to answer questions as to the impact of user activities or changing environmental conditions and inform future management decisions. Adaptation can also occur during the initial designation process, as highlighted by the first case study on the Florida Keys National Marine Sanctuary. A second case study on a joint management plan review for three California sanctuaries illustrates the adaptive nature of the five-year reviews.

A. Florida Keys National Marine Sanctuary

The Florida Keys National Marine Sanctuary (FKNMS) is an example of sanctuary designation that utilized an adaptive approach. In 1990, Congress established the FKNMS through the Florida Keys National Marine Sanctuary and Protection Act.²⁰ The FKNMS covers 2,800 square nautical miles surrounding the Florida Keys, including the productive waters of Florida Bay, the Gulf of Mexico, and the Atlantic Ocean.²¹ The Act established as national policy the protection and preservation of the “living and other resources of the Florida Keys marine environment.”²²

The cornerstone of the Sanctuary’s adaptive management approach is its “Zoning Action Plan.”²³ FKNMS contains 24 fully protected (no-take) marine zones, which are managed according to the needs of each zone. The designated zones allow managers to apply more restrictive measures to critical areas and allow more expansive private and public use in other areas. According to the FKNMS website, “marine zoning allows the sanctuary to focus the majority of its management efforts on a small portion of the sanctuary while addressing water quality and habitat degradation in the broader unzoned portions of the area.”²⁴

Zoning is critical to achieving the Sanctuary’s primary goal of resource protection. Its purpose is to protect and preserve sensitive components of the ecosystem by regulating within the zoned areas, while facilitating activities compatible with resource protection. Zoning will ensure that areas of high ecological importance will evolve in a natural state, with minimal human influence. Zoning will also promote sustainable use of the Sanctuary resources, and will protect areas representing diverse Sanctuary habitats and areas important for maintaining natural resources (e.g., fishes, invertebrates, etc.) and ecosystem functions.²⁵

²⁰ Pub. L. No. 101-605, 104 Stat. 3089 (Nov. 16, 1990) (codified in 16 U.S.C. § 1433).

²¹ Florida Keys National Marine Sanctuary: Visitor Information, http://floridakeys.noaa.gov/visitor_information/welcome.html (last visited Aug. 6, 2010).

²² Florida Keys National Marine Sanctuary and Protection Act, *supra* note 20, § 3(a).

²³ NOAA, FLORIDA KEYS NATIONAL MARINE SANCTUARY: FINAL MANAGEMENT PLAN/ENVIRONMENTAL IMPACT STATEMENT, Vol. II, at 257 (1996) available at <http://floridakeys.noaa.gov/regs/fmpl.pdf> . [hereinafter *FKNMS Final Management Plan*].

²⁴ Florida Keys National Marine Sanctuary, The Zoning Action Plan, <http://floridakeys.noaa.gov/regs/zoning.html> (last visited Aug. 6, 2010).

²⁵ FKNMS Final Management Plan, *supra* note 23, at 257.

The Research and Monitoring Action Plan for FKNMS establishes that research and monitoring will be conducted within areas zoned as Sanctuary Preservation Areas and Ecological Reserves to provide information for better management.²⁶ The Plan calls for coordination between the Sanctuary and the EPA and the Florida Department of Environmental Protection Water Quality Monitoring Program “to maximize the use of limited resources.”²⁷ Many different groups participate in monitoring, including local, state, and federal agencies, public and private universities, environmental organizations, and trained volunteers.²⁸

In addition to the monitoring efforts, scientific reports, such as the *2002-03 Florida Keys National Marine Sanctuary Science Report* (updated in 2006), provide information on the effectiveness of the zoning plan. Managers use this information to adjust management techniques for specific zones. In 2003, the Pew Oceans Commission concluded that marine zoning had substantially improved management of the Florida Keys coral reef ecosystem.²⁹

B. Cordell Bank, Gulf of the Farallones, and Monterey Bay Jmpr

In November 2001, NOAA issued a “Notice of Initiation of Joint Review of Management Plans/Regulations (Jmpr) for the Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries.”³⁰ Because the three sanctuaries, located along the northern and central California coast, are adjacent to one another and share many of the same resources and issues, a joint review was seen as more cost-effective and efficient than conducting individual reviews. Seven years of study, planning, and extensive public comment later, NOAA announced the release of the final revised management plans, regulations, and a joint final environmental impact statement for the three sanctuaries.³¹

While the final plans consist primarily of non-regulatory actions to expand research, education, outreach, and enforcement programs, the Jmpr did result in some significant regulatory changes to strengthen protections to sanctuary resources.³² The management decisions with respect to two sanctuary resources, Davidson Seamount and white sharks, are illustrative of how the NMSP was able to respond to emerging issues during the Jmpr.

1. Davidson Seamount

Davidson Seamount, the remnant of an ancient volcano, is located 120 kilometers to the

²⁶ *Id.* at 150-51.

²⁷ *Id.* at 151.

²⁸ U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL MARINE SANCTUARY PROGRAM, 2002-03 FLORIDA KEYS NATIONAL MARINE SANCTUARY SCIENCE REPORT: AN ECOSYSTEM REPORT CARD AFTER FIVE YEARS OF MARINE ZONING, Marine Sanctuaries Conservation Series NMSP-06-12, 19 (Brian D. Keller & S. Donahue eds., 2006).

²⁹ PEW OCEANS COMM’N, AMERICA’S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE: A REPORT TO THE NATION 49 (2003).

³⁰ 66 Fed. Reg. 56540-41 (Nov. 8, 2001).

³¹ National Oceanic and Atmospheric Administration, Press Release, NOAA Release Plans for Managing and Protecting Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries, Nov. 20, 2008.

³² *Id.*

southwest of Monterey and is one of the largest known seamounts along the western coast of the United States.³³ Although Davidson Seamount is 2,400 meters tall, it remains 1,250 meters below the surface.³⁴ The Davidson Seamount is populated by a diversity of deep-sea corals and has been called “An Oasis in the Deep” due to its large coral forests, vast sponge fields, crabs, deep-sea fishes, shrimp, basket stars, and high numbers of rare and unidentified benthic species.³⁵

Although the original boundaries of the sanctuary established upon its designation in 1992 did not include Davidson Seamount, NOAA had been concerned with protecting Davidson Seamount and its resources for some time. Many of the Davidson Seamount coral species are large and fragile to physical disturbance.³⁶ After Sanctuary scientists captured stunning images of the biological communities living in and around Davidson Seamount during an expedition in 2002,³⁷ the Monterey Bay National Marine Sanctuary (MBNMS) Advisory Council unanimously voted in August 2003 that Davidson Seamount meets Sanctuary designation standards.³⁸ During the JMPR, managers identified a number of existing and potential threats to Davidson Seamount including “bio-prospecting, cumulative impacts from research collecting of long-lived species, new or unknown forms of seafloor disturbance, new technologies to harvest from the seabed, ‘exploratory’ benthic fishing which could destroy habitat and long-lived species, and marine debris/dumping.”³⁹

In response to the scientific information generated during the 2002 expedition and a follow-up expedition in 2006⁴⁰ and input from MBNMS Sanctuary Advisory Council, NOAA’s revised management plan proposed expanding the Monterey Bay National Marine Sanctuary to include the Davidson Seamount Management Zone, 585 square nautical miles of ocean waters and the submerged lands underneath centered on the summit of Davidson Seamount.⁴¹ “By incorporating the seamount into the MBNMS, its resources will be protected and opportunities will be provided for a better understanding of the seamount.”⁴² Given the serious impact bottom trawling might have in the area, NOAA also issued regulations which prohibited fishing within the DSMZ below 3,000 feet.⁴³

³³ Andrew P. DeVogelaere et al, *Deep-sea Corals and Resource Protection at the Davidson Seamount, California*, U.S.A., 1190 in COLD-WATER CORALS AND ECOSYSTEMS (A. Freiwald & J.M. Roberts eds., 2005).

³⁴ *Id.*

³⁵ Monterey Bay National Marine Sanctuary, Davidson Seamount, <http://montereybay.noaa.gov/research/dsmz/welcome.html> (last visited Aug. 6, 2010).

³⁶ DeVogelaere, *supra* note 33, at 1196.

³⁷ For more information on the 2002 Davidson Seamount Expedition, see NOAA Ocean Explorer, Davidson Seamount, <http://oceanexplorer.noaa.gov/explorations/02davidson/welcome.html>.

³⁸ DeVogelaere, *supra* note 33, at 1196.

³⁹ NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL OCEAN SERVICE, NATIONAL MARINE SANCTUARY PROGRAM, MONTEREY BAY NATIONAL MARINE SANCTUARY FINAL MANAGEMENT PLAN 134-35 (Oct. 2008), available at <http://sanctuaries.noaa.gov/jointplan/fmp/101408mbnmsfmp.pdf> [hereinafter *MBNMS Final Management Plan*].

⁴⁰ NOAA Ocean Explorer, Davidson Seamount: Exploring Ancient Coral Gardens, <http://oceanexplorer.noaa.gov/explorations/06davidson/welcome.html> (last visited Aug. 6, 2010).

⁴¹ MBNMS Final Management Plan, *supra* note 39, at 135.

⁴² *Id.*

⁴³ *Id.* at 112.

2. White Sharks

Gulf of Farallones National Marine Sanctuary (GFNMS) has one of the largest seasonal concentrations of white sharks (*Carcharodon carcharias*) in the world.⁴⁴ In 2001, the Point Reyes Bird Observatory (PRBO) Conservation Science, a San Francisco-based non-profit organization, submitted a petition to the GFNMS expressing concern over activities by for-profit enterprises attempting to show white sharks to paying customers in the GFNMS and requesting emergency regulations to protect white sharks from these commercial activities.⁴⁵ While white sharks are protected from harassment by provisions of the Endangered Species Act, at the time of the JMPR there were no Sanctuary-specific protections for white sharks. GFNMS regulations addressed wildlife disturbance through prohibitions against disturbing seabirds or marine mammals by flying motorized aircraft at low altitudes and discharging or depositing matter into Sanctuary waters.⁴⁶

During the JMPR, NOAA's Office of National Marine Sanctuaries found that "Disturbance related to human interaction is increasing as a result of controversial cage shark diving operations, also known as adventure tourism, and other wildlife watching operations. These activities may degrade the natural environment, impacting the species as a whole, and individual sharks may be negatively impacted from repeated encounters with humans and boats."⁴⁷ To resolve user conflicts between shark researchers and adventure tourism and prevent interference with the seasonal feeding behavior of white sharks, the final revised management plan and implementing regulations for the GFNMS prohibit white shark attraction. Attraction "means the conduct of any activity that lures or may lure any animal in the Sanctuary by using food, bait, chum, dyes, decoys (e.g., surfboards or body boards used as decoys), acoustics or any other means, except the mere presence of human beings (e.g., swimmers, divers, boaters, kayakers, surfers)."⁴⁸ The new regulations also prohibit approaching within 50 meters of a white shark within 2 nautical miles around the Farallon Islands. In addition, the GFNMS initiated the White Shark Stewardship Project that includes: (1) public and boater outreach, (2) naturalist training, (3) school education programs, (4) permitting, (5) monitoring, and (6) coordinating with the NOAA Office of Law Enforcement.⁴⁹ These efforts, in combination with the new regulations, will "greatly increase the protection of the white sharks known to make an annual migration to the Farallon Islands to feed and would prevent disturbances and/or alterations in their natural

⁴⁴ U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Final Rule, Gulf of the Farallones National Marine Sanctuary Regulations; Monterey Bay National Marine Sanctuary Regulations; and Cordell Bank National Marine Sanctuary Regulations, 73 Fed. Reg. 70488, 70490 (Nov. 20, 2008), available at http://sanctuaries.noaa.gov/jointplan/fmp/112008final_rule.pdf [hereinafter *Final Rule*].

⁴⁵ PRBO Conservation Science, Regulations Protecting White Sharks, <http://www.prbo.org/cms/index.php?mid=173#petition> (last visited Aug. 6, 2010).

⁴⁶ NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL OCEAN SERVICE, NATIONAL MARINE SANCTUARY PROGRAM, CORDELL BANK, GULF OF FARALLONES, AND MONTEREY BAY NATIONAL MARINE SANCTUARIES FINAL ENVIRONMENTAL IMPACT STATEMENT, 2-15 (Sept. 2008), available at http://sanctuaries.noaa.gov/jointplan/feis/091608feis_jmpr.pdf [hereinafter *Final EIS*].

⁴⁷ Final Rule, *supra* note 44, at 70499.

⁴⁸ *Id.*

⁴⁹ Gulf of Farallones National Marine Sanctuary, White Shark Stewardship Program, <http://farallones.noaa.gov/eco/sharks/sharks.html> (last visited Aug. 6, 2010).

behaviors, including feeding, breeding, aggregating, and migrating.”⁵⁰

IV. Conclusion

As illustrated by the above case studies, the National Marine Sanctuaries Program does have the flexibility to respond to changing circumstances at the individual sanctuaries. However, while it is an adaptive approach to management, it is not “pure” adaptive management. For instance, constituent expectations require that certain aspects of management, such as regulations, be more permanent than others. In general, people expect regulations to stay the same and businesses often make important strategic decisions based on that assumption. This expectation of permanence, however, is not in line with the ideals of adaptive management, which are flexibility and continual improvements and revisions. Limited resources, including funds, people, and capabilities, also make it difficult to successfully implement every management mechanism in every situation.

The National Marine Sanctuary Program is always looking for ways to improve, however. Recently the Program has been working to improve the process for making changes and improvements after feedback is obtained through public participation or management reviews and needed changes are identified. Whether in the form of revising a regulation or providing some new form of protection for a resource, the revisions need to be made quickly and efficiently. This is a challenging area for any federal agency. In addition, there is always room for improvement with respect to the amount of scientific feedback the Program receives. There is always a need for more research and data, and the Program continually seeks opportunities to collaborate with other federal agencies in gathering available data. The Program is also striving to focus more on outcomes rather than output. For example, instead of focusing on how many educational programs are offered in the sanctuaries, the Program is trying to focus on how many people are reached with each education program and how many minds are being enlightened about the importance of sanctuaries.

Strong legislative mandates and an adaptive approach to management enable sanctuary managers to address a range of threats to the sanctuaries including overfishing, pollution, habitat loss, and invasive species. Climate change, however, poses a monumental challenge to sanctuary managers. The effects of climate change, such as ocean acidification, sea level rise, and increasing global sea surface temperatures, have the potential to fundamentally alter the coastal and marine ecosystems. Fortunately, the National Marine Sanctuary Program has the tools available to understand these global changes and their effects at the local level and it is already working to develop tailored strategies to manage impacts to sanctuary habitats and marine life.⁵¹

⁵⁰ Final EIS, *supra* note 46, at 3-58.

⁵¹ *Rising to the Challenge: Managing Climate Impacts in the Sanctuaries*, SANCTUARY WATCH 6 (Spring 2009), available at <http://sanctuaries.noaa.gov/news/pdfs/sanctuarywatch/sw0609.pdf>.