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Maintaining Unimpaired Ocean Resources and Experiences: A National Park Service Ocean Stewardship Strategy

Foreword

IN 2001, THE NATIONAL PARK SERVICE ADVISORY BOARD PREPARED A REPORT focused broadly on the purposes and prospects for the National Park System for the next 25 years. The board indicated that stewardship of the sea lagged far behind even the lax stewardship of the land, and that the marine world was degrading more rapidly as pollution and overfishing overwhelm the coast. The board strongly suggested that the National Park Service should play a leadership role for the nation to develop a strategically designed system of marine reserves and to “think beyond the vision of maintaining sustainable parks to encourage sustainable communities and ecosystems with parks as part of them” (National Park System Advisory Board 2001).

The National Park Service Leadership Council also recognized the plight of coastal ecosystems and the disparity of stewardship afforded ocean resources in the National Park System (NPS 2002). Director Fran Mainella expressed support for developing National Park Service capacity for coastal conservation. The director instructed Associate Director Mike Soukup to lead a planning effort to explore National Park Service and partner experiences and successes in marine conservation and to develop strategies for the future. This report is a result of that planning effort.

During 2002–2003, we sought and received comments and suggestions from more than 100 coastal national park and national marine sanctuary superintendents

and their professional staffs and partners in workshops and interviews. We explored and discussed cooperative ocean conservation strategies with leaders of the National Oceanic and Atmospheric Administration (NOAA) Marine Protected Areas Center, Sanctuary Program, Fisheries, and International Affairs Office (and revitalized a June 2001 NOAA Sanctuaries–NPS agreement). We collaborated with colleagues in scientific symposia to review and evaluate National Park Service ocean stewardship experiences. Finally, we summarized these discussions at the 2003 George Wright Society Conference in San Diego, California, in a series of four workshops on “Marine Protected Area Science,” “Political Realities of Ocean Stewardship,” “Partner-

ships in Ocean Conservation,” and “An Action Plan for National Park Service Ocean Stewardship.”

This strategy summarizes the results of these discussions and presents recommendations for how the National Park Service could improve ocean park stewardship and contribute to sustainable communities and ecosystems with parks as part of them. Adoption of this strategy will require additional direction and more detailed action plans to identify responsible parties to execute the recommendations. However, the National Park Service and its partners first need to commit to a shared vision, goals, and actions.

Executive Summary

Americans expect their National Park System to contain unimpaired resources and to exhibit values that represent the nation’s heritage in superlative natural, historical, and recreational areas. More than 40 ocean parks, however, currently fail to meet these expectations. The ocean has changed. People can no longer see or catch the fish they could just a few years ago in parks. National parks afford little or no special protection to nature in the ocean, which surprises and upsets many citizens. To address this issue, ocean park superintendents and other park professionals invited people from other agencies and organizations to draft an “Ocean Park Strategy.” They identified several major issues. They also recommended ways to address them with a shared vision and goals, and through cooperative actions.

The partners included the National Oceanic and Atmospheric Administration, U.S. Geological Survey, U.S. Fish and Wildlife Service, California State Parks Department, American Fisheries Society,

Sport Fishing Institute, Sea Web, The Ocean Conservancy, Environmental Defense, National Parks Conservation Association, Wild Coast, Reef Environmental Education Foundation, Student Conservation Association, Partners in Parks, and a dozen universities. To find common ground among participants and develop the strategy, the partners held six regional workshops and four topical workshops on, respectively, marine protected-area science, political realities of ocean conservation, partnerships and public involvement in ocean conservation, and an action plan to improve coastal conservation in the National Park System.

Ocean stewardship is complicated by many factors. Human-driven global forces that alter climate and sea level render concepts of *natural* and *unimpaired* difficult to grasp when considering the ocean. Coastal watersheds exert powerful influences on nearshore environments. Pollution and invasive non-native species also threaten ocean parks, but the effects of people removing thousands of tons of fish and other sea life from parks every year far exceed those threats. States regulate ocean fishing in most national parks, and don’t differentiate parks from surrounding waters. Overfishing that has depleted sea life populations throughout U.S. waters also depleted fish and sea life in the parks. Consequently, parks have lost fishing and other recreational opportunities dependent on living ocean resources. In addition, ecological effects of overfishing have cascaded through parks, dramatically altering entire ecosystems. Except in a few small reserves, flattened, disturbance-adapted sea urchin barrens, algae-covered rocks, and other diminished communities have replaced diverse and productive giant kelp forests, coral reefs, and sea grass meadows in parks.

The four pillars of park stewardship—*Know, Restore, Protect, and Connect*—provide a simple way to organize the Ocean Park Strategy. As for what to know, park stewards need to better understand ocean ecosystems and human roles in them. They need resource inventories, submarine habitat maps, monitoring, and more clearly defined ocean boundaries and jurisdictions. On land, the National Park System plays an important role in national conservation strategy and policy, but in the ocean relationships with other resource management agencies are not as clear. The National Park Service also needs to increase its capacity to explore and understand the ocean realms of parks and to revitalize its once-robust and pioneering scientific and public safety diving program. The strategy proposes a “Restore Impaired Ocean Park Resources” initiative to address critical restoration issues and to improve park protection. Ocean parks need to assess performance of newly established marine recovery areas in parks, develop joint systems science-based fishery management plans with states, prevent extirpation of native species, and establish ocean damage assessment teams.

The critical keys to improved ocean conservation in the National Park System are partnerships with other ocean-concerned agencies and communities to facilitate cooperation, collaboration, and communication. But doing a better job of connecting people to ocean parks may be the most important task ahead. The strategy recommends an ocean park task force to coordinate all of these activities. It would help resolve misperceptions about the need to change traditional ocean conservation and improve communication among ocean park professionals and with the public. It would also engage artists, students, and vol-

unteers in parks, and raise NPS awareness about its ocean responsibilities and opportunities. The Natural Resource Challenge addresses these same kinds of stewardship issues for all parks. The Ocean Park Strategy seeks to focus ongoing Natural Resource Challenge efforts on particular common needs of ocean parks to prevent the nation’s ocean heritage from being left behind.

Finally, this strategy does not advocate creating more reserves in parks. It does recommend learning from existing reserves in parks by evaluating their performance in terms of improved sustainable fishing, ecological integrity and resilience, and productivity. The strategy also recommends that the National Park Service seek a wide range of solutions with partners to reverse the resource and recreational losses of the last few decades.

Vision for Ocean Parks

The National Park System preserves unimpaired natural and cultural resources and values representative of the nation’s ocean heritage in superlative natural, historic, and recreation areas in every region.

National Park Service Ocean Stewardship Goals

1. Preserve unimpaired ocean wildlife, natural processes, wilderness, cultural resources, and recreational opportunities in the National Park System. (“Ocean,” in this context, includes all coastal waters, specifically estuaries, bays, open seas, and the Great Lakes.)
2. Restore or rehabilitate impaired ocean wildlife, natural processes, cultural resources, and recreational opportunities in the National Park System.
3. Increase National Park Service capacity



Figure 1. New Bedford Whaling National Historical Park, Massachusetts. (Photo courtesy of Dorothy A. Davis)

for stewardship of ocean natural and cultural heritage.

4. Improve National Park Service partnerships for stewardship of the nation's ocean-related natural and cultural heritage.

Purposes of this Strategy

The purpose of this strategy is to identify how the National Park Service can best achieve its ocean stewardship goals.

The critical keys to improved ocean conservation in the National Park System are partnerships to facilitate cooperation, collaboration, and communication. The National Park Service needs to increase its capacity for ocean conservation to be a credible and effective partner. The following plan presents the major issues and rec-

ommendations identified by ocean park superintendents, their partners, and professional staffs during a series of workshops, interviews, and four topical workshops at the 2003 George Wright Society Conference. Those workshops focused on marine protected-area science, political realities of ocean conservation, partnerships and public involvement in ocean conservation, and an action plan to improve coastal conservation in the National Park System.

The most effective partnerships are forged among equals. For the National Park Service to cooperate and collaborate with others engaged in ocean conservation, it must demonstrate equal commitment to excellence and shared outcomes with other agencies and organizations concerned with coastal resources. It is equally important to

recognize that simply hiring more personnel is not an acceptable or effective way to increase National Park Service capacity for this work. Other, more creative and effective ways must be found to achieve the desired outcomes with existing funds and human resources by collaborating with partners.

National Park Service Ocean Responsibilities

The United States of America is a maritime nation founded by people from diverse sea-going cultures. Most Americans live on or near the coasts. The rest visit the coast for recreation often. They all feel a strong affinity to the ocean. Reflecting this history, the National Park System contains many outstanding examples of the nation's ocean heritage, both natural and cultural. More than 70 units of the system include 35 million acres of prime coastal habitats and 3 million acres of water along 4,800 miles of ocean shoreline (Table 1). These ocean sites represent a collective multicultural history and commemorate numerous significant events and places in the nation's past. They provide common ground for recreation, understanding, and inspiration.

Ocean Parks— A Long And Diverse History

Ocean parks have been in the National Park System for more than 70 years. Place-based ocean conservation in U. S. waters began with Glacier Bay National Monument (now Park and Preserve) in 1925, Isle Royale National Park in 1931, Everglades National Park in 1934, Fort Jefferson National Monument (now Dry Tortugas National Park) in 1935, and Channel Islands National Monument (now Park) in 1938. The Antiquities Act of 1906 provided the system with additional national mon-

uments on the coast, such as Cabrillo National Monument in 1913, Buck Island Reef National Monument in 1961, and the latest at Virgin Islands Coral Reef National Monument in 2001. More than a dozen special places along the coast have been designated national seashores or lakeshores, adding Apostle Islands, Assateague Island, Canaveral, Cape Cod, Fire Island, Indiana Dunes, Padre Island and Point Reyes to the system. Tropical parks in Hawaii at Haleakala and Hawaii Volcanoes and the Virgin Islands match cool coastal preserves in Maine at Acadia, and in Alaska at Aniakchak, Bering Land Bridge, Katmai, and Wrangell-St. Elias. Americans enjoy coastal national recreation areas from New York to California at Gateway, Golden Gate, and Santa Monica Mountains. The nation's diverse maritime history is captured at national historical parks as diverse and widespread as New Bedford Whaling in Massachusetts; Castillo de San Marcos and De Soto in Florida; Ebey's Landing and Fort Point in the Pacific Northwest; Kalaupapa, Kaloko-Honokohau, Pu'uhonua o Honaunau in Hawaii; and Salt River Bay in the Virgin Islands. American Memorial in Saipan, War in the Pacific in Guam, and the U.S.S. Arizona in Hawaii all memorialize ocean connections of our more recent history. Timucuan Ecological and Historical Preserve preserves a blend of human history and ecology in north Florida's salt marshes and estuaries.

In spite of this long history, rarely do parks preserve outstanding areas of the marine environment to minimize human influence over natural processes, as they do in wilderness zones on land. The ocean parts of national parks, if considered at all, are largely treated as backcountry, but not protected as wilderness, with a few notable

exceptions in Glacier Bay National Park and Preserve and Everglades National Park.

The National Park System contains a wide variety of sites, established to capture the diversity of the nation's natural and cultural heritage, and every unit of the system is to be valued and treated equally. Congress directed the National Park Service to "promote and regulate the use of ... national parks ... to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Congress further declared in the General Authorities Act of 1970 "that the

areas in every region ... and that it is the purpose of this Act to include all such areas in the System" and "that these areas, though distinct in character, are united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national heritage; that, individually and collectively, these areas derive increased national dignity and recognition of their superb environmental quality through their inclusion jointly with each other in one national park system preserved and managed for the benefit and inspiration of all the people..."

Congress amended this act in 1978 to add that "the protection, management, and administration of these areas shall be conducted in light of the high public value and

integrity of the National Park System and shall not be exercised in derogation of these values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

Americans are clear that they expect their national parks to be among the most

protected, special places in the public domain. Fish and other sea life are not excluded from these expectations. Many Americans first encounter nature in ocean



Figure 2. Virgin Islands National Park, U.S. Virgin Islands. (Photo courtesy of Dorothy A. Davis)

National Park System, which began with the establishment of Yellowstone National Park in 1872, has since grown to include superlative natural, historic, and recreation

Table 1. Ocean and Great Lakes units of the National Park System.

| Unit Name | Year Established | NPS Region | State | Size (acres) ¹ | Water (acres) | Cont (miles) |
|--|------------------|------------|---------|---------------------------|---------------|--------------|
| Acadia National Park | 1916 | ME | ME | 47,400 | 11,900 | 52 |
| Ala Kahalo National Historical Trail | 2000 | PW | HI | n/a | 0 | 175 |
| American Memorial Park | 1976 | PW | CYBI | 188 | 0 | 8 |
| Aunulohi National Monument & Preserve | 1976 | AK | AK | 404,116 | 0 | 70 |
| Apothe Islands National Lakeshore | 1970 | BNV | WI | 69,872 | 27,282 | 154 |
| Ascutawag National Seashore | 1905 | SE | MD & VA | 89,727 | 31,411 | 60 |
| Beauregard-Lafayette National Preserve | 1976 | AK | AK | 2,007,808 | ? | 175 |
| Biscayne National Park | 1906 | SE | FL | 172,924 | 106,000 | 50 |
| Boston Harbor Islands National Recreation Area | 1906 | ME | MA | 1,462 | 0 | ? |
| Brook Island Reef National Monument | 1901 | SE | VI | 19,015 | 16,689 | 8 |
| Cabrillo National Monument | 1915 | PW | CA | 160 | 125 | 1 |
| Causeway National Seashore | 1975 | SE | FL | 57,002 | 39,060 | 24 |
| Cape Cod National Seashore | 1906 | ME | MA | 48,005 | 10,823 | 50 |
| Cape Hatteras National Seashore | 1937 | SE | NC | 30,321 | 3,093 | 153 |
| Cape Krusenstern National Monument | 1976 | AK | AK | 649,065 | 0 | 116 |
| Cape Lookout National Seashore | 1906 | SE | NC | 28,248 | 10,074 | 50 |
| Castillo de San Marcos National Monument | 1924 | SE | FL | 20 | 0 | 1 |
| Channel Islands National Park | 1936 | PW | CA | 249,501 | 124,299 | 170 |
| Christmsted National Historic Site | 1952 | SE | VI | 27 | 0 | 1 |
| Colonial National Historical Park | 1930 | ME | VA | 6,077 | ? | 30 |
| Cumberland Island National Seashore | 1972 | SE | GA | 30,415 | 10,292 | 30 |
| De Soto National Memorial | 1946 | SE | FL | 27 | 0 | 1 |
| Dry Tortugas National Park | 1935 | SE | FL | 64,701 | 64,601 | 4 |
| Eber's Landing National Historical Reserve | 1976 | PW | WA | 19,524 | ? | 1 |
| Everglades National Park | 1934 | SE | FL | 1,306,908 | 625,000 | 155 |
| Fiji Island National Seashore | 1904 | ME | NY | 19,579 | 4,411 | 52 |
| Fort Caroline National Memorial | 1950 | SE | FL | 138 | 0 | 0 |
| Fort Clatsop National Memorial | 1966 | PW | OR | 125 | 0 | 1 |
| Fort Frederica National Monument | 1930 | SE | GA | 241 | 0 | 1 |
| Fort Mifflin National Monument | 1924 | SE | FL | 300 | 0 | 1 |
| Fort Mifflin National Monument & Historic Shrine | 1925 | SE | MD | 45 | 0 | 1 |
| Fort Point National Historic Site | 1970 | PW | CA | 29 | 0 | 1 |
| Fort Pulaski National Monument | 1924 | SE | GA | 5,023 | ? | ? |
| Fort Raleigh National Historic Site | 1941 | SE | NC | 515 | 0 | 1 |
| Fort Sumter National Monument | 1946 | SE | SC | 200 | 125 | 1 |
| Gateway National Recreation Area | 1972 | ME | NY | 29,007 | 17,969 | ? |
| Glacier Bay National Park & Preserve | 1925 | AK | AK | 5,224,640 | 601,000 | 1,165 |
| Golden Gate National Recreation Area | 1972 | PW | CA | 74,810 | 3,657 | 26 |
| Grand Portage National Monument | 1951 | BNV | MI | 710 | 0 | 1 |
| Gulf Islands National Seashore | 1971 | SE | FL & MS | 157,991 | 115,189 | 70 |
| Haleakala National Park | 1916 | PW | HI | 29,094 | 0 | 1 |
| Hawaii Volcanoes National Park | 1916 | PW | HI | 525,451 | 0 | 43 |
| Ludlow Dunes National Lakeshore | 1906 | BNV | IN | 15,000 | 450 | 25 |
| Isle Royale National Park | 1931 | BNV | MI | 571,790 | 498,009 | 336 |

Table 1. Ocean and Great Lakes units of the National Park System (continued).

| Unit Name | Year Established | NPS Region | State | Size (acres) ¹ | Water (acres) | Count (mille-) |
|---|------------------|------------|------------|---------------------------|---------------|----------------|
| Jean-Lafitte National Historical Park & Preserve, Burienia Preserve | 1976 | SE | LA | 20,005 | 150 | 16 |
| Kalaupapa National Historical Park | 1980 | PW | HI | 10,779 | 2,000 | 1 |
| Kaloko-Honohoum National Historical Park | 1976 | PW | HI | 1,161 | 597 | 2 |
| Katmai National Park & Preserve | 1916 | AK | AK | 4,093,229 | 672,000 | 497 |
| Kenai Fjords National Park | 1976 | AK | AK | 609,963 | 0 | 406 |
| Khouchik Gold Rush National Historical Park | 1976 | AK | AK | 15,191 | 0 | 1 |
| Lake Clark National Park & Preserve | 1976 | AK | AK | 4,050,025 | 0 | 127 |
| National Park of American Samoa | 1986 | PW | AS | 9,500 | 3,200 | 33 |
| New Bedford Whaling National Historical Park | 1990 | NE | MA | 94 | 0 | 0 |
| Olympic National Park | 1936 | PW | WA | 922,651 | 15,160 | 57 |
| Padre Island National Seashore | 1992 | IBL | TX | 150,434 | 32,500 | 66 |
| Perry's Victory & International Peace Memorial | 1936 | BI | OH | 25 | 0 | 1 |
| Pictured Rocks National Lakeshore | 1960 | BRW | MI | 73,230 | 9,770 | 47 |
| Point Reyes National Seashore | 1992 | PW | CA | 71,066 | 17,162 | 160 |
| Puuhouua o Honaunua National Historical Park | 1955 | PW | HI | 419 | 0 | 1 |
| Punalohā Heiau National Historic Site | 1972 | PW | HI | 60 | 4 | 1 |
| Redwood National Park | 1966 | PW | CA | 112,512 | 5,939 | 36 |
| Salem Maritime National Historic Site | 1936 | NE | MA | 9 | 0 | 0 |
| Salt River Bay National Historical Park & Ecological Preserve | 1992 | SE | VI | 978 | 600 | 1 |
| San Francisco Maritime National Historical Park | 1986 | PW | CA | 50 | 0 | 0 |
| San Juan Island National Historical Park | 1900 | PW | WA | 1,732 | 0 | 1 |
| Sierra Blanca Mountains National Recreation Area | 1976 | PW | CA | 154,095 | 0 | 41 |
| Sitka National Historical Park | 1910 | AK | AK | 115 | 50 | 1 |
| Sleeping Bear Dunes National Lakeshore | 1970 | BRW | MI | 71,190 | 12,000 | 47 |
| Timpanui Ecological & Historical Preserve | 1986 | SE | FL | 40,267 | 36,000 | 1 |
| U.S.S. Arizona Memorial | 1960 | PW | HI | 11 | 0 | 1 |
| Virgin Islands Coral Reef National Monument | 2001 | SE | VI | 15,693 | 13,693 | 3 |
| Virgin Islands National Park | 1950 | SE | VI | 14,069 | 5,050 | 22 |
| War in the Pacific National Historical Park | 1976 | PW | GU | 2,057 | 1,000 | 4 |
| Wauveil-St. Elias National Park & Preserve | 1976 | AK | AK | 13,175,901 | 0 | 129 |
| Total Units 74 | | | Total Area | 54,168,777 | 3,173,366 | 5,112 |

¹ National Park Service, U. S. Department of the Interior, *Statistical Abstract 2003*, pp. 51-67.

park near their urban and suburban homes. These parks provide them with their first connection to wild things—untamed, untrammled, and unimpaired. Fishing and other recreational activities in these special places bond people to nature in deeply emotional ways and have become

an important part of park experiences. These experiences are in jeopardy.

Ocean Park Stewardship Issues

The National Park Service seeks to preserve unimpaired the natural and cultural resources and values of the National Park

System for the enjoyment, education, and inspiration of this and future generations. The National Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world. Paradoxically, this mission currently does not extend effectively into the ocean, much to the surprise and concern of many citizens and partners of the National Park Service (Table 2).

The ocean portions of parks are stressed by fragmentation of habitats, invasions of alien species, and by pollution and disturbance in watersheds. In addition, legal fishing removes hundreds of thousands of tons of fish, shellfish, and plants from parks every year. Consequently, living resources in many ocean parks are significantly impaired and declining rapidly. For example, in Channel Islands National Park, California, abalone that once produced the state's most valuable sport and commercial fisheries were so depleted by fishing that fisheries were closed indefinitely in the 1990s to protected remnant brood stocks,

and one species was federally listed as endangered in 2001. Since 1980, when Channel Islands was redesignated as a national park, cow cod, lingcod, bocaccio, and other groundfish populations also collapsed and their fisheries were closed. At the same time, 80% of the park's extensive giant kelp forests disappeared, except in a small reserve at Anacapa Island that has retained its ecological integrity in the absence of fishing. Recently in Virgin Islands National Park, it took eight weeks of fish surveys to find a single grouper, on coral reefs where grouper were once common. At Biscayne National Park, near Miami, Florida, it took 68 survey dives to find the first grouper on reefs once dominated by these long-lived, resident, key predators. As human-driven global forces change climate and sea level, the concept of unimpaired ocean parks becomes evermore complex, and may already be an anachronism. Shifting baselines continue to degrade people's expectations of the ocean and ocean parks. Consequently, restoration goals are set too low and are still not

Table 2. Ocean issues for the National Park System.

- The National Park Service has significant ocean responsibilities: 35 million acres of coastal habitats, more than 70 ocean parks, over 3 million acres of submerged lands and waters, and over 4,800 miles of coastline.
- Many ocean park fisheries have collapsed—diminishing park fishing opportunities.
- Some ocean species in parks are endangered, and others are declining rapidly.
- Ecological cascades in ocean parks caused by fishing, pollution, and damaged watersheds impair ecosystems and reduce recreational opportunities.
- Water diversion, sound and chemical contamination, and invasive alien species further stress coastal ecosystems.
- Place-based conservation offers best hope for restoration of intact, resilient ocean ecosystems, yet the nation lacks ocean wilderness or a sea ethic to support it.
- Public interest in ocean conservation is increasing and the National Park Service has more potential partners in ocean conservation than ever before.

achieved because they conflict with short-term economic interests.

Some ocean species are even threatened by extinction from fishing, a development most people thought impossible just a few years ago. Recreational opportunities to enjoy these resources are equally threatened and have been substantially diminished. Fisheries and coastal management strategies largely failed to sustain either fishing or nature along American shores in the 20th century. Hunting or egg collection nearly eliminated sea turtles and marine mammals from coastal waters. Fisheries for fin and shellfish have collapsed throughout the country and beyond. The social and economic consequences of these failures are evident in injured coastal communities from New England to the Caribbean, Alaska to California, and across the Pacific Islands. A new ecosystem-based management paradigm is emerging to sustain both sea life and fishing. If managed differently, the National Park System could be a central feature in that new paradigm.

Unfortunately, ocean resources in national parks are rarely managed differently than those in surrounding state waters. In some parks, legislation compels consistency with state rules, while in others state rules were adopted by default. It is as though all terrestrial national parks had adopted general state hunting, trapping, and timber harvest laws and regulations rather than protecting park trees, wildlife, and furbearers. As ocean fisheries fail generally, recreational opportunities and the ecosystems that support them in ocean parks are also being lost at an alarming rate. Parks currently have little to offer visitors in the way of unimpaired resources or recreational opportunities that are different than those along the rest of the coast.

Less than one thousandth (<0.1%) of the nation's coastal waters are held in reserve to sustain nature in the absence of fishing. With the notable exception of three or four parks, most coastal parks afford only controls on watershed development and limit wildlife disturbance. (Buck Island Reef National Monument, Virgin Islands Coral Reef National Monument, and Channel Islands National Park all include substantial marine reserves recently created to restore impaired resources. Dry Tortugas National Park has designated a research natural area that will significantly reduce fishing effects when it is implemented.) Fishing has been an important part of national park experiences for more than a century. National Park Service policy clearly indicates that fishing shall remain an important part of park experiences. It is important to be clear that stewardship that produces "fish forever" is a primary goal of the National Park Service and one that is required to support fishing forever.

The National Park Service has an opportunity to contribute significantly to national efforts to rebuild depleted fish populations, to restore lost integrity and resilience to wild ocean ecosystems, and to provide opportunities for Americans to fish forever and to enjoy nature on the coast as did former generations. The issues are complex and cross park, regional, and national borders. Solutions will likely involve formal partnerships and shared authorities with state and other federal agencies. Greater knowledge of how coastal ecosystems work is needed in order to reduce the uncertainty of decisions and to connect people to coastal parks in new ways, but enough is known today to begin to change the roles that coastal parks can play in ocean conservation.

The most pressing issues are (1) loss of recreational opportunities as fisheries continue to collapse, and (2) the imminent extirpation and extinction of ocean species in parks. Recreational opportunities to view and enjoy coral reefs, kelp forests, and other submarine communities in parks were lost as unintended consequences of fishing cascaded through food webs along ecological chains of cause and consequence. Just as forest and mountain ecosystems lose species and resilience without natural fire and wolves, coral reefs and kelp forests cannot persist without large groupers, snappers, rockfish, lobsters, and abalone (Dayton et al. 2002). For example, when fishing removed the large predators (rockfish and lobsters) and grazers (abalone and red sea urchins) from kelp forests in Channel Islands National Park, it left unfished sea urchin and brittle star populations uncontrolled. Now they carpet the bottom, overgrazing and preventing other species from settling. Since the redesignation of Channel Islands as a national park in 1980, nearly 80% of the park's kelp forests have been lost as a result of this ecological cascade. Healthy Channel Islands kelp forests sheltered nearly 1,000 species of plants and animals, while the urchin barrens that have replaced them support fewer than 100. Similar events have occurred from coral reefs to Alaskan waters and New England cod grounds.

Solutions to these issues are complex and will require ecosystem-based approaches. The traditional collection of species-based fishing regulations have failed to sustain sea life and fisheries in parks, in spite of repeated efforts to improve and refine them with better science and practice. Recently created reserves in parks reduced conflicts among users, and have the

potential to allow areas to recover and regain lost ecological integrity. These marine recovery areas in ocean parks follow the same concept that created national parks on land in the 19th century. The scientific community is virtually unanimous that such marine reserves, areas free of fishing impacts, represent the best strategy for rebuilding depleted fishing stocks, restoring productivity and diversity to the coastal ocean, and providing examples of nature for recreation, study, and inspiration. What remain unknown are the optimum sizes, shapes, and distributions of reserves to achieve the desired conservation goals in various types of ecosystems. Public interest and concern regarding the ocean are increasing as ocean resources are depleted below critical levels. The National Park Service needs to explore ways to better protect marine resources in parks to achieve its mission, and how to better partner with others to assure that the nation's ocean heritage is adequately protected and represented in the National Park System.

How to Improve Ocean Park Stewardship

To achieve its mission the National Park Service needs to better protect marine resources in parks. The critical keys to improved ocean conservation in the National Park System, are partnerships to facilitate cooperation, collaboration and communication. The National Park Service needs to better partner with others to assure that the nation's ocean heritage is adequately protected and represented in the National Park System, and to assure that the National Park System is an integral part of the nation's ocean conservation policies.

In order to be a credible and effective partner, the National Park Service also

needs to increase its capacity for ocean conservation. To improve both stewardship efficacy and partnerships, the National Park Service needs to address the top ten impediments identified in Table 3.

Park stewards must know and understand the parks; restore impaired resources and sustain them once restored; protect parks and mitigate threats to them; and connect people to parks deeply. The four pillars of park stewardship—*Know, Restore, Protect* and *Connect*—provide a framework for identifying and organizing actions needed to improve National Park Service ocean stewardship.

Know and Understand Ocean Park Ecosystems and Cultural Resources

The National Park Service needs to inventory, assess, monitor, and better understand ocean wildlife, coastal features, natural processes, and cultural resources in the National Park System to increase understanding of their dynamics, status, and trends. Research is needed to understand ecosystem mechanics to address the cascade effects of pollution and fishing. Parks also need to know and understand the people who are integral parts of ocean ecosystems and to assess the social influences of ocean parks.

Complete basic inventories of ocean park resources. Recently completed basic inventories of ocean parks generally did not extend onto the submerged lands. The following items need to be acquired for the 40 ocean parks with submerged lands:

- *Benthic habitat maps* with resolution <10 m (set mapping standards equivalent to terrestrial vegetation and surficial geology maps);
- Locations and descriptions of *sub-*

merged cultural resources;

- Species lists and status of *invertebrates and non-vascular plants* (in ocean ecosystems such as coral reefs and kelp forests, these organisms are more dominant and influential than the terrestrial vertebrates and vascular plants recently inventoried in all parks);
- *Sediment or substrate maps* (equivalent to terrestrial soils maps); and
- *Oceanographic* environmental condition maps, ocean currents, upwelling sites (equivalent to meteorological data).

Ongoing park inventory efforts could be extended to meet these special ocean park needs with existing NPS inventory and monitoring funds and new partnerships with the U.S. Geological Survey (USGS) and NOAA ocean mapping and analysis centers and with Cooperative Ecosystems Studies Units (CESUs).

Monitor ocean park ecological vital signs. Determine how ocean ecosystems work and respond to stresses. Include ocean parameters in park vital signs monitoring, particularly demographic information of selected taxa following prototype programs at Channel Islands National Park and Virgin Islands National Park, including ocean water quality and biological indicators of resource conditions. Partners include USGS, NOAA, and CESU scientists to help design and evaluate monitoring protocols. Emulate the Minerals Management Service-led southern California Multi-Agency Rocky Intertidal Network program (MARINe) or the Partnership for Interdisciplinary Study of Coastal Oceans (PISCO) as models of cooperative, collaborative monitoring organization working across political boundaries within coastal ecosystems.

Table 3. Top ten impediments to effective ocean stewardship in the National Park System.

When asked why ocean park resources were not better protected, park superintendents and their professional staffs identified a common set of major impediments, both perceptual and substantial, that they believe need to be overcome to achieve the National Park Service mission.

1. **Denial** by the public and park professionals that changes or additional conservation actions are needed, based on ignorance or misperceptions about the ocean, such as:
 - Oceans are too big for people to affect;
 - Fish wander so they can't be protected in a place;
 - Resources are "out of sight—out of mind";
 - Existing parks, sanctuaries, and reserves already protect most of the ocean;
 - Global environmental cycles overwhelm effects of fishing on the ocean; and
 - Current fishery management would be effective if properly applied.
2. **Multiple jurisdictions** in the sea lead to competition and conflict among governing bodies and uncertainty about accountability (and credit for success), e.g. treaty and states' rights. Uncertainty regarding ownership, authority, and jurisdiction leads to unclear policy and direction from NPS leadership to on-site managers. Threats to ocean parks, such as watershed alterations and contaminants from ocean currents, are thought to be beyond the control of park managers. Ownership of submerged lands in parks is often shared or held by others, and managers lack sufficient knowledge of legal and other remedies available to resolve conflicts and prevent damage from transboundary issues.
3. **Burden of proof** regarding environmental damage is reversed in the sea, i.e., activities in the sea are presumed benign until irreparable damage is documented; only then are activities curtailed. In contrast, on land people must show that proposed activities have acceptable minimal environmental impacts before they may proceed.
4. **Shifting baseline syndrome**—many ocean resources are so impaired that it is difficult to inspire their conservation. Each generation of people believes that what they first personally experience in the sea is normal, even though conditions are already seriously impaired, so they each set progressively lower standards and expectations until the resources are exhausted and beyond recovery. Increasingly diverse and rapidly growing human populations on the U.S. coast increase and diversify demands on ocean resources.
5. **A land-based agency**, the National Park Service lacks inclination and capacity for ocean stewardship, and is overwhelmed by demands for visitor services, which leads to neglect of stewardship responsibilities until crises occur. Site managers want more guidance regarding ocean policy.
6. **Ecological restoration** is more difficult, expensive, and uncertain in the sea than on land; consequently it is often considered a lower priority.
7. **Ocean issues are often contentious** and controversial, especially regarding fishing, where a vocal minority passionately resists changes in stewardship while the general public remains apathetic.
8. **Inconsistent park legislation** often contains conflicting directions to both preserve parks unimpaired and to allow traditional and customary exploitation, such as fishing, that impairs resources.
9. **Lack of knowledge** about the nature and extent of human effects on the sea, especially the cascading ecological consequences of fishing.
10. **Last frontier unfenced**—National Park Service control over ocean resources perceived as a threat to freedom to fish.

Describe ocean park boundaries and jurisdictions. Identify and describe all relevant jurisdictions and park ocean boundaries in cooperation with USGS and NOAA, using modern technologies, i.e., GPS/GIS, with seamless land-sea interfaces (common datum). Ocean parks need help making inventories of spatially explicit, geo-referenced boundaries and zones of various jurisdictions and authorities in the parks. This is a mapping issue of describing who's in charge where, not a legal question of authority (see below for legal issues).

Assess ocean park watersheds. Identify and describe coastal watersheds and nearshore receiving waters of ocean parks, and analyze their ecosystem conditions. This assessment should include historic land and water use practices and zoning, rates of sediment transport and deposition, contaminants, eutrophication potential, upstream channelization, jetties, and other human-made structures.

Improve National Park Service technical capacity to explore ocean parks. Assist ocean parks to develop proposals that improve NPS technical capacity to explore ocean realms in parks for both cultural and natural resources. Parks need better access to remotely operated vehicles (ROVs), submersibles, and adequate ocean-going vessels best acquired through cooperative agreements with NOAA, USGS, universities, and private vendors. Develop an agreement with the NOAA National Undersea Research Program (NURP), similar to the one recently executed by NOAA Sanctuaries and NURP. Reinvigorate the once robust and pioneering NPS scientific and public safety diving program.

Participate in the national MPA inventory. Cooperate with NOAA and oth-

ers to analyze the national marine managed areas inventory, as directed in Executive Order 13158, in order to determine how national parks relate to other MPAs and what role parks play in national ocean conservation strategy and policy.

Increase NPS peer-reviewed publications on ocean conservation. Park professionals need to document findings and results of monitoring, restoration, and protection activities in professional media to assure validity, quality, and persistence of personal knowledge and experiences.

Restore Impaired Ocean Park Resources

Explore marine reserves and other tools to restore or rehabilitate impaired ocean wildlife, estuaries, salt marshes, beaches, reefs, barrier islands, natural processes, cultural resources, and recreational opportunities in the National Park System.

Assess conservation efficacy of existing ocean park reserves. Measure efficacy of new reserves at Channel Islands National Park, Virgin Islands National Park and Coral Reef National Monument, Buck Island Reef National Monument, and Dry Tortugas National Park to determine ecological and social performance and their potential for use as models for future reserve designs. Include social science measures to describe and evaluate personal experiences with new reserves by science and conservation professionals, fishing interests, and the general public.

Develop joint fishery management plans with states. Cooperate with states to restore impaired ocean wildlife at Biscayne National Park, Glacier Bay National Park and Preserve, Isle Royale National Park, and others by developing joint fishery man-

agement plans based on sound systems ecology. Work with partners to identify how living ocean resources in parks can be different than those in surrounding waters, and address management measures that can achieve the desired outcomes with mutual benefits.

Prevent extirpation and extinction of endangered ocean species in parks, and remove alien species. Develop strategies, methods, protocols, and tools to prevent extinction of endangered ocean species (e.g., white abalone) and to restore impaired populations and communities (e.g., reef-building corals, kelp forests, seagrasses, estuaries, and intertidal wetlands). Reduce and prevent damage to marine habitats and native species by removing aquatic invasive species. Expand collaborations with NOAA, states, and universities to track occurrences of invasives and build on successful programs, including the Exotic Plant Management Teams.

Assess vulnerability of coastal parks to extreme events and human disturbances. Assess vulnerability of ocean parks to extreme events, such as storm surges, El Niño, hurricanes, and rising sea level to inform planning decisions for development and resource protection (e.g., historic buildings, middens, and burial sites). Continue to work with USGS on coastal hazard analyses.

Develop ocean damage assessment teams. Establish teams of National Park Service and partner experts (e.g., Submerged Cultural Resources Center, CESUs, Minerals Management Service, and NOAA) to assess effects of extreme natural events (e.g., storms and El Niño) and human-caused events (e.g., ship groundings and oil spills).

Develop a *Restore Impaired Ocean*

Park Resources initiative. Develop a *Restore Impaired Ocean Park Resources* initiative that sets national goals for repairing damage to resources and values of ocean parks. Identify specific actions that people can take to help resolve issues. This initiative should identify specific problems, goals, and partnerships and actually restore resources on the ground or underwater.

For example, this initiative would provide resources to locate and remove ghost fishing gear and other marine debris, rebuild depleted populations, mitigate threats from nearby aquaculture ventures, rehabilitate watersheds, and restore submarine soundscapes.

Protect Ocean Parks and Mitigate Threats

Protect and sustain ocean wildlife, coastal features, natural processes, wild ecosystems, recreational opportunities, and historic shipwrecks and other cultural resources in the National Park System.

Analyze efficacy of National Park Service authorities. Review and assess the capacity of NPS authorities and mandates to conserve ocean wildlife and cultural resources (park-level and general regulations), examine apparent inconsistencies with park enabling legislation and other statutes, and recommend a resolution strategy. Explore the application of the Wilderness Act to ocean parks. Ocean parks need legal research and policy guidance to understand the limitations and opportunities in existing statutes to improve ocean conservation in parks. Ocean park managers also need legal and policy advice on potential remedies where statutes conflict or where they lack requisite authority and guidance to achieve the NPS mission and goals.

Mark ocean boundaries with modern technology. Modern technology can be used to save the expense and difficulty of installing and maintaining buoys and other physical structures to mark ocean boundaries—the Federal Aviation Administration and Fishery Management Council regulations may serve as models. The NOAA Coastal Services Center Geographic Information Systems group in Charleston, South Carolina, recently completed a legally defensible, robust system for electronically marking national marine sanctuary boundaries. They are interested in partnering with five coastal parks to do a pilot project.

Improve cooperative law enforcement. Continue to build on the June 2001, formal agreement between the NOAA National Marine Sanctuary Program and National Park Service for law enforcement, education, and monitoring. Improve cooperative law enforcement, especially with NOAA Sanctuaries and states, by establishing a national general agreement, with specific sub-agreements for individual sites or states. Increase National Park Service capacity for ocean patrol, surveillance, and education.

Zone ocean park uses. Employ zoning as a management tool in ocean environments to enhance visitor experiences, to preserve sensitive ocean habitats and features (e.g., sea turtle and avian nesting sites, coral reefs, kelp forests, shipwrecks), and to avoid or reduce conflicts among users.

Designate ocean parks as sensitive areas. Work with the International Maritime Organization (IMO) to establish parks as sensitive areas to be avoided by shipping. Explore voluntary ship routing and reporting schemes with IMO for additional park protection. Improve relationships with the

U. S. Army Corps of Engineers regarding regional sediment management to assure parks are not damaged and dredge spoil is effectively used.

Sustain an NPS diving program that complies with Occupational Safety and Health Administration (OSHA) regulations. Revitalize the NPS diving program by offering annual training and other activities necessary to maintain American Academy of Underwater Sciences (AAUS) standards for scientific diving and public safety. Initiate and maintain AAUS organizational membership.

Promulgate regulations to enforce the Dry Tortugas National Park Research Natural Area. NOAA Sanctuaries, National Park Service, NOAA Fisheries, both federal Fishery Management Councils (South Atlantic and Gulf of Mexico), the state of Florida, and community stakeholders recommended a network of three reserves be set aside to begin recovery of the region's ocean resources. Regulations for the two reserves in the sanctuary have been in place since 2001, but the one in the park is still not in effect.

Connect People to Ocean Parks

Increase awareness of ocean resource conditions and lack of protection in the National Park System.

Establish an ocean park task force. Establish a national ocean park task force to lead and guide implementation of this strategy, and to raise visibility of coastal park issues. The task force needs to be multidisciplinary, and include interpreters as professional communicators and partners (e.g., NOAA). It should help resolve misperceptions about the ocean, improve communication among ocean professionals and the public, engage mass-media artists in ocean



Figure 3. Assateague Island National Seashore, Maryland and Virginia. (Photo courtesy of Dorothy A. Davis)

parks, and raise awareness of National Park Service ocean responsibilities. Raising visibility of ocean issues and showing how parks can help resolve them will encourage more National Park Service staff to feel a sense of “ownership” in ocean park issues and motivate them to seek solutions.

The ocean park task force should also develop and apply performance measures to assess the efficacy of the strategy. They should work with existing organizational structures and assign responsibilities for various tasks.

The ocean park task force could also negotiate and serve as an advocate on behalf of ocean parks to consolidate needs and form partnerships that transcend state and regional boundaries. For example, the

ocean park task force could seek commitments to conduct invertebrate and algal inventories and submarine habitat maps for all ocean parks from the National Park Service Inventory and Monitoring Program.

Resolve misperceptions about ocean parks. Avoid overwhelming people with apparently insurmountable global ocean concerns. Give people hope that the issues are tractable and that they can make a difference as individuals and collectively. Develop and engage communication strategies to resolve misperceptions about the ocean and place-based conservation in the sea to overcome denial that changes in ocean stewardship are needed. Use the four-step process developed by National

Park Service Natural Resources Information Division (Mike Whatley):

- Develop message (five points, e.g. a seamless system of ocean parks, sanctuaries, and refuges, identify the benefits of ocean protected areas for people and wildlife “fish forever”);
- Identify audiences (e.g., internal NPS, other agencies, various publics);
- Select media (e.g., print, web, personal, mass media, K-12 curricula, volunteers); and
- Match audiences and media for effective delivery (traveling exhibit and learning trunk—a packaged program on oceans for use by other parks).

Improve communication among ocean conservation professionals. Create an intranet site for ocean park issues. Encourage ocean park superintendents to join their colleagues to help lead professional coastal zone management organizations, and participate in national and international coastal zone management conferences (e.g., the Coastal Society conference in Newport, Rhode Island, in May 2004, and Coastal Zone '05 in New Orleans, Louisiana) and to seek leadership roles in professional societies such as the Coastal Society (www.coastalsociety.org).

Engage mass-media artists and writers to explicate ocean parks. Develop stories and images with artists and writers. Explore mass-media outlets to deliver messages with better, realistic portrayals, such as the University of Southern California film school’s *Ocean Shifting Baseline* project and *In Camera*’s high-definition image library project for ocean parks and sanctuaries.

Raise public awareness of ocean

parks. Inform the public of the tremendous diversity and breadth of coastal resources in the NPS System. Themes could include (a) beauty, (b) connections (c) values (natural, cultural, economic), and (d) threats to those values. Add outreach components to all NPS marine studies and research projects. Improve ocean park profiles on Capitol Hill and inform elected officials of ocean park status and trends. Develop interpretive tools (e.g., *Exploring the Real Thing* by the NPS Northeast and National Capital regions), formal and informal education programs for marine educators working with National Science Teachers Association, National Marine Educators Association, Professional Association of Diving Instructors, and non-governmental organizations.

Engage more volunteers in ocean parks. Utilize more volunteers for resource monitoring and outreach programs. Cooperate with NOAA Sanctuaries and the Reef Environmental Education Foundation (REEF) to engage local diving communities in the Great Annual Fish Count (GAFC) using volunteer diver protocols. Collaborate with REEF to enter park GAFC data into REEF’s established web-based data management system to make information about fish populations in ocean parks available to the public.

Establish ocean park Research Learning Centers. Establish coastal parks and Research Learning Centers as magnet sites where visitors, students, and scientists engage in high-quality marine education and protected area research. Construct and operate joint park-sanctuary visitor centers where public interests coincide.

Establish an ocean park fellowship program. Establish an intake program, like the NOAA Sea Grant fellowships, to hire

graduate students on one-year term appointments. Make the National Park Fellow program competitive, show them parks and issues firsthand, and grow some in-house talent. NPS would provide a few weeks of training on policy and resource stewardship at National Conservation Training Center (NCTC) before assigning them to an ocean park. The National Park Fellows could work with monitoring, education, and outreach programs. With 12 National Park Fellows a year rotated among ocean parks, each coastal park would get the benefit of one every few years. Hold a yearly ocean park meeting in the winter where the twelve National Park Fellows would present results of their year's work, and then discuss future options.

Raise NPS awareness of ocean park responsibilities and opportunities. Raise National Park Service leadership awareness of the agency's responsibilities and opportunities with ocean conservation issues and practices through cooperative NOAA–Department of the Interior (DOI) courses, workshops, sabbaticals, and topical seminars (DOI–NCTC, Shepherdstown, West Virginia; NOAA MPA Training and Technical Assistance Center in Charleston, South Carolina; and Science Institute, Santa Cruz, California).

Continue to organize an ocean parks section of the annual National Park Service *Natural Resource Year in Review*. Expand ocean park seasonal interpretive and volunteer training to include small business owners adjacent to parkland, university professors, and museum professionals.

Provide an ocean parks “Who’s who” of successful education and outreach programs to serve as models and mentors. For example:

- Glacier Bay National Park and Preserve—cruise ship industry and Native American outreach programs.
- Acadia National Park—education, public radio, and research learning center programs with distressed fishing communities.
- Channel Islands National Park—education, outreach, live underwater video, and monitoring programs with university museum, and K–12 school partners.
- Cape Cod and Point Reyes national seashores—compare and contrast these two parks (sister parks?) from the point of view of their habitat-based research and education programs with volunteer and student involvement.
- Encourage curriculum-based education guides for ocean parks, such as those done for Virginia and Massachusetts by the NPS Northeast and National Capital regions.

Conclusion

The National Park System contains substantial ocean resources. However, they are impaired, declining, and rapidly approaching critical levels, beyond which recovery may not be possible. As species are extirpated and ecosystems lose resilience and degrade into simplified states, opportunities for restoration fade.

The National Park Service appears to have the authority and policies in place to arrest most of the declines and impairment, but needs to develop public understanding of key issues to engender fierce support to enforce existing laws and policies. Additional and strengthened partnerships with states, federal agencies, and others could resolve many critical issues.

As a premier place-based conservation organization, the National Park Service can

rebuild ecosystems to repair impaired resources and restore damaged recreational opportunities. The opportunity to exercise this option may exist for only a decade or less while native species on the brink of

extinction continue to survive and major ecosystem functions remain viable. America's ocean grandeur can be restored and the National Park System is the place to start.

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