

National Park Service  
U.S. Department of the Interior

Biscayne National Park  
Florida



# *Biscayne National Park*

**Draft General Management Plan /  
Environmental Impact Statement**





Draft  
General Management Plan / Environmental Impact Statement  
Biscayne National Park  
Miami-Dade County, FL

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Biscayne National Monument was authorized by an act of Congress in 1968 (Public Law 90-606), expanded in 1974 (PL 93-477), and redesignated as a national park and expanded again in 1980 (PL 96-287). The last comprehensive management plan for the park was completed in 1983. Much has changed since 1983 — the population near the park has greatly increased, visitor use patterns and types have changed, and people have brought new recreational activities into the park. Each of these changes has implications for how visitors access and use the national park and the facilities needed to support those uses, how resources are managed and protected, and how the National Park Service manages its operations. A new plan is needed.

This document examines 5 alternatives for managing Biscayne National Park for the next 15 to 20 years. It also analyzes the impacts of implementing each of the alternatives. The “no-action” alternative, **alternative 1**, consists of the existing park management and trends and serves as a basis for comparison in evaluating the other alternatives. The concept for park management under **alternative 2** would be to emphasize the recreational use of the park while providing for resource protection as governed by law, policy, or resource sensitivity. This concept would be accomplished by providing a high level of services, facilities, and access to specific areas of the park. The concept for park management under **alternative 3** would be to allow all visitors a full range of visitor experiences throughout most of the park and would use a permit system to authorize a limited number of visitors to access some areas of the park. Management actions would provide strong natural and cultural resource protection and diverse visitor experiences. **Alternative 4** is the National Park Service’s preferred alternative and would emphasize strong natural and cultural resource protection while providing a diversity of visitor experiences. Some areas would be reserved for focused types of visitor use. The concept for park management under **alternative 5** would be to promote the protection of natural resources, including taking actions to optimize conditions for protection and restoration. A permit system would be used in some parts of the park. Other areas would have limited numbers of visitors, manner of access, and recreational activities to provide certain experiences.

The key impacts of implementing the no-action alternative (alternative 1) would be no new impacts on natural resources or soils; a continuation of existing impacts on visitor experience and park operations; and no adverse effects on cultural resources. The key impacts of implementing alternative 2 would be negligible to moderate adverse impacts on natural resources, no adverse effect on cultural resources, mostly beneficial visitor experience impacts, adverse park operation impacts, and beneficial economic impacts. The key impacts of implementing alternative 3 would be approximately the same as for alternative 2. The key impacts of implementing alternative 4 would be beneficial for natural resources, no adverse effect on cultural resources, beneficial and adverse impacts on visitor experience, adverse impacts on park operations, and beneficial and adverse impacts on the local economy. The key impacts of implementing alternative 5 would be beneficial for natural resources, no adverse effect on cultural resources, beneficial and adverse impacts on visitor experience, adverse impacts on park operations, and both beneficial and adverse impacts on the local economy.

This *Draft General Management Plan / Environmental Impact Statement* has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period for this document will last for 60 days after the Environmental Protection Agency’s notice of availability has been published in the *Federal Register*. Readers are encouraged to enter written comments on this draft plan on the park planning website at <http://parkplanning/nps.gov/BISC>. Please note that NPS practice is to make comments, including names and addresses of respondents, available for public review; see the following “How to Comment on this Plan” discussion for further information.

## HOW TO COMMENT ON THIS PLAN

Comments on this plan are welcome and will be accepted for 60 days after the Environmental Protection Agency's notice of availability appears in the *Federal Register*. If you wish to respond to the material in this document, you may submit your comments by any one of several methods. You may mail written comments to

Biscayne National Park GMP  
National Park Service  
M. Elmer (DSC-P)  
P.O. Box 25287  
Denver, CO 80225-0287

You may also comment via the National Park Service's planning website (<http://parkplanning.nps.gov/bisc>). You may also hand-deliver comments at public meetings to be announced in the media following release of this document. In addition, comments may be sent or hand-delivered to Biscayne National Park, 9700 SW 328 Street, Homestead, FL 33033-5634

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

We will always make submissions from organizations or businesses, and from individuals identifying themselves as representatives of or officials of organizations or businesses, available for public inspection in their entirety.

This method for public comment submittal listed above stems from court rulings concerning the release of public comments, and it is included as recommended by the Office of the Solicitor, Department of the Interior.



## SUMMARY

Biscayne National Monument was established in 1968 (Public Law 90-606), expanded in 1974 (Public Law 93-477), and redesignated as a national park and expanded again in 1980 (Public Law 96-287).

The last comprehensive planning effort (general management plan) for Biscayne National Park was completed in 1983. Much has occurred since 1983—the population near the park has greatly increased, visitor use patterns and types have changed, and people want to bring new recreational activities into the park. Each of these changes has major implications for how visitors access and use the national park and the facilities needed to support those uses, how resources are managed, and how the National Park Service (NPS) manages its operations. A new plan is needed to

- Clearly define resource conditions and visitor experiences to be achieved in Biscayne National Park.
- Provide a framework for NPS managers to use when making decisions about how to best protect national park resources, how to provide a diverse range of visitor experience opportunities, how to manage visitor use, and what kinds of facilities, if any, to develop in the national park.
- Ensure that this foundation for decision making has been developed in consultation with interested stakeholders and adopted by the NPS leadership after an adequate analysis of the benefits, impacts, and economic costs of alternative courses of action.

This *Draft General Management Plan / Environmental Impact Statement* presents five alternatives, including the National Park Service's preferred alternative, for future management of Biscayne National Park. The alternatives, which are based on the national park's purpose, significance, and special

mandates, present different ways to manage resources and visitor use and improve facilities and infrastructure at the national park. The five alternatives are the no-action alternative (continuing current management), alternative 2, alternative 3, alternative 4 (NPS preferred), and alternative 5.

### ALTERNATIVE 1 (THE NO ACTION ALTERNATIVE)

The no-action alternative consists of a continuation of existing management and trends at Biscayne National Park and provides a baseline for comparison in evaluating the changes and impacts of the other alternatives. The National Park Service would continue to manage the national park as it is currently being managed. Existing operations and visitor facilities would continue, and no new construction would be authorized other than what has already been approved and funded. Current law, policy, and plans, would continue to provide the framework of guidance.

The important impacts of continuing existing management conditions and trends would include no new impacts on natural resources, no adverse effect on cultural resources, a continuation of adverse effects on visitor experience, a continuation of adverse effects on park operations, and no new impact on the socioeconomic environment.

### ALTERNATIVE 2

The concept for park management under alternative 2 would be to emphasize the recreational use of the park while providing for resource protection as governed by law, policy, or resource sensitivity. This concept would be accomplished by providing a high level of services, facilities, and access to specific areas of the park.

## SUMMARY

The key impacts of implementing alternative 2 would be as follows:

- beneficial impacts on fisheries and submerged aquatic communities
- unlikely to adversely affect federally listed species
- negligible to minor adverse impacts on state listed species and wetlands
- no adverse effect on archeological resources, historic structures, or cultural landscapes
- both beneficial and adverse effects on visitor use and experience
- adverse impacts on the park's operations budget and beneficial impacts on the park's facilities
- beneficial impacts on the socioeconomic environment

### ALTERNATIVE 3

The concept for park management under alternative 3 would be to allow all visitors a full range of visitor experiences throughout most of the park and would use a permit system to authorize a limited number of visitors to access some areas of the park. Management actions would provide strong natural and cultural resource protection and diverse visitor experiences.

The important impacts of implementing alternative 3 would be as follows:

- beneficial impacts on fisheries and submerged aquatic communities
- unlikely to adversely affect federally listed species
- negligible to minor adverse impacts on state listed species and wetlands
- no adverse effect on archeological resources, historic structures, or cultural landscapes
- both beneficial and moderate adverse effects on visitor use and experience

- adverse impacts on the park's operations budget and beneficial impacts on the park's facilities
- beneficial impacts on the socioeconomic environment

### ALTERNATIVE 4 (NPS PREFERRED ALTERNATIVE)

Alternative 4 is the National Park Service's preferred alternative and would emphasize strong natural and cultural resource protection while providing a diversity of visitor experiences. Some areas would be reserved for limited types of visitor use.

The key impacts of implementing alternative 4 would be as follows:

- beneficial impacts on fisheries, and submerged aquatic communities
- unlikely to adversely affect federally listed species
- negligible to minor adverse impacts on state listed species and wetlands
- no adverse effect on archeological resources, historic structures, or cultural landscapes
- both beneficial and adverse effects on visitor use and experience
- minor adverse impacts on park operations
- beneficial and adverse impacts on the socioeconomic environment

### ALTERNATIVE 5

The concept for park management under alternative 5 would be to promote the protection of natural resources, including taking actions to optimize conditions for protection and restoration. A permit system would be used in some parts of the park. Other areas would have limited numbers of visitors, manner of access, and recreational activities to provide certain experiences.

The important impacts of implementing alternative 5 would be as follows:

- beneficial impacts on fisheries, and submerged aquatic communities
- unlikely to adversely affect federally listed species
- negligible adverse impacts on state listed species and wetlands
- no adverse effect on archeological resources, historic structures, or cultural landscapes
- both beneficial and adverse effects on visitor use and experience
- minor to moderate adverse impacts on park operations
- beneficial and adverse impacts on the socioeconomic environment

## THE NEXT STEPS

After the distribution of the *Draft General Management Plan / Environmental Impact*

*Statement* there will be a 60-day public review and comment period after which the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a *Final General Management Plan / Environmental Impact Statement*. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments. Following distribution of the *Final General Management Plan / Environmental Impact Statement* and a 30-day no-action period, a “Record of Decision” can be prepared for the signature of the NPS regional director of the Southeast Region. The “Record of Decision” will document the NPS selection of an alternative for implementation. With the signed “Record of Decision,” the plan can then be implemented, depending on funding and staffing. (An approved plan does not guarantee that funds and staff for implementing the plan will become available.)



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## CHAPTER 1

### Introduction





# A GUIDE TO THIS DOCUMENT

This *Draft General Management Plan / Environmental Impact Statement* is organized in accordance with the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act, the National Park Service's *Management Policies 2006*, and the National Park Service's Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision Making*.

**Chapter 1: Introduction** sets the framework for the entire document. It describes why the plan is being prepared and what needs it must address. It gives guidance for the alternatives that are being considered, which are based on the national park's purpose and the significance of its resources, special mandates and administrative commitments, servicewide mandates and policies, and other planning efforts in the area.

The chapter also details the planning opportunities and issues that were raised during public scoping meetings and initial planning team efforts; the alternatives in the next chapter address these issues and concerns to varying degrees. This chapter concludes with a statement of the scope of the environmental impact analysis — specifically what impact topics were or were not analyzed in detail.

**Chapter 2: Alternatives, Including the Preferred Alternative**, begins by describing the management zoning that will be used to manage the national park in the future. It also presents the continuation of current management and trends in the park — alternative 1, the no-action alternative, and then “action” alternatives 2 through 5. Then there is a brief discussion of alternatives or actions that were

dismissed from detailed evaluation. The mitigation measures proposed to minimize or eliminate the impacts of some proposed actions are described just before the discussion of future studies and/or implementation plans that will be needed. The cost estimates and an evaluation of the environmentally preferred alternative are followed by summary tables of the alternative actions and the environmental consequences of implementing those alternative actions (which are based on information chapter 4).

**Chapter 3: the Affected Environment** describes those areas and resources that would be affected by implementing actions in the various alternatives — natural resources, cultural resources, visitor experience, park operations, and socioeconomic environment.

**Chapter 4: Environmental Consequences** analyzes the impacts of implementing the alternatives on topics described in the “Affected Environment” chapter. Methods that were used for assessing the impacts in terms of the intensity, type, and duration of impacts are outlined at the beginning of the chapter.

**Chapter 5: Consultation and Coordination** describes the history of public and agency coordination during the planning effort and any future compliance requirements; it also lists agencies and organizations who will be receiving copies of the document.

The **Appendixes** present supporting information for the document along with references, a list of the planning team and other consultants, and an index.

# PURPOSE OF AND NEED FOR THE PLAN

## INTRODUCTION

This *Draft General Management Plan / Environmental Impact Statement* presents and analyzes five alternative future directions for the management and use of Biscayne National Park. Alternative 4 is the National Park Service's preferred alternative and alternative 5 is the environmentally preferred alternative. The potential environmental impacts of implementing all alternatives have been identified and assessed in "Chapter 4: Environmental Consequences" in this document.

The focus of this *Draft General Management Plan / Environmental Impact Statement* for Biscayne National Park is on the reasons the park was established and what resource conditions and visitor experiences should be achieved and retained over time. General management plans, required for each unit of the national park system, are intended to be long-term documents that establish and articulate a management philosophy and framework for decision making and problem solving in the parks. General management plans usually provide guidance during a 15- to 20-year period. The general management plan considers the park in its full ecological and cultural contexts — as a unit of the national park system and as a part of the surrounding ecosystem and region. The connections among various programs and management zones in the park are identified as a method of looking at the park holistically and fully considering the broader implications of specific decisions.

Actions directed by general management plans or in subsequent implementation plans are accomplished over time, which may be many years into the future when dealing with timeframes of natural and cultural processes. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities may

prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

## BRIEF DESCRIPTION OF THE PARK

Biscayne National Monument was established by Public Law 90-606 in 1968, expanded by Public Law 93-477 in 1974, and expanded again and redesignated as a national park by Public Law 96-287 in 1980 (see appendix A). It currently encompasses approximately 173,000 acres (270 square miles or 702 square kilometers).

The park is in Miami-Dade County, Florida, south of Miami. The northern boundary of the park is near the southern tip of Key Biscayne, and the park's southern boundary, about 22 miles to the south, is near Key Largo. The western boundary consists of natural areas intersected by some canals, marinas, and the park's administrative area and visitor center. The natural areas include red mangrove forests and coastal marshes. The eastern boundary extends out to sea about 14 miles to the east, and is defined by the contiguous 60-foot (10 fathoms) depth contour.

Biscayne National Park is a marine park consisting of mostly submerged land and includes coral reefs, sandy shoals, 4,825 acres of largely undeveloped mangrove shoreline, and 42 keys or islands primarily composed of limestone and coral. Emergent land represents only 5% of the total area in the park boundary. The relatively shallow waters of Biscayne Bay average 6 feet in depth with several shallow banks. The deeper more turbulent waters of Hawk Channel and the reef tract are found in the Atlantic Ocean east of Biscayne Bay and the coral keys that make up the divide between the bay and the ocean. From north to south the major keys in Biscayne National Park include Soldier Key,

Ragged Keys, Boca Chita Key, Sands Key, Elliott Key, Adams Key, Rubicon Keys, Totten Key, Old Rhodes Key, Swan Key, and the Arsenicker Keys. The only road access to the park Visitor Center at Convoy Point is via southwest 328th Street (North Canal Drive) near Homestead, Florida.

Biscayne National Park is recognized for its natural resources, which represent a complex combination of terrestrial, marine, and amphibious life in a subtropical setting of great natural beauty. In general, the park can be divided into four prominent environments—terrestrial mangrove shorelines, a shallow estuarine system (Biscayne Bay) with diverse bottom communities, barrier island keys, and a chain of coral reefs. The coral reefs, also called the reef platform, of Biscayne National Park lie due east of the keys and are part of the Florida Reef Tract that stretches through the park and beyond about 200 miles to the southwest. Much of the northern part of the Florida Reef Tract is in the park and comprises the northernmost extension of living coral reefs in the United States. Most of the shallow, protected waters of Biscayne Bay comprise the estuarine environment of the park. This estuarine environment supports seagrasses and hardbottom communities.

Natural history indicates that Biscayne Bay has not always been salt water. During earlier geologic periods of lower sea levels, most of what now comprises the bay was land or a combination of land and freshwater marshes. The terrestrial environment is represented by the narrow fringe of mangrove shoreline along the park's western boundary and the keys, which form a natural north-south barrier between Biscayne Bay and the coral reef platform. The keys contain various habitats including groups of hardwood trees known as hammocks, mangrove wetlands, sandy beaches, and rocky intertidal areas.

Biscayne National Park has a rich history of aboriginal occupation and use, Spanish exploration, pirates, smuggling, shipwrecks, marine salvaging, agriculture, and recreational

development that reflects the continual link between humans and the sea that has characterized this area for 10,000 years. Remnants of this cultural history occur throughout the park and are represented by both terrestrial and submerged cultural resources. Terrestrial cultural resources include Native American occupation sites as well as historic structures, ruins, homesteads, and farmsteads. Submerged and shoreline cultural resources include materials associated with prehistoric sites as well as historic shipwrecks, ship strandings, wharfs and piers, and the remains of other structures and materials along the water's edge. Because of the park's natural history of rising sea levels, former terrestrial sites (possibly early prehistoric ones) may now be underwater.

The primary means of access to the park is by concession boat or private boat. Visitors come to the area for recreational opportunities including snorkeling, scuba diving, paddling, bird-watching, nature viewing, boating, and recreational fishing.

Land uses adjacent to the park's western boundary include agricultural fields interspersed with residential and recreational development. The facilities of Florida Power and Light at the Turkey Point Power Plant and the Miami-Dade County solid waste landfill are visible near the Dante Fascell Visitor Center at Convoy Point. Two public marinas, operated by Miami-Dade County Park and Recreation Department, at Black Point and Homestead Bayfront are adjacent to the park boundaries and provide public access to the marine portions of the park. The urban Miami skyline is visible from the park headquarters building at Convoy Point.

## **PURPOSE OF THE PLAN**

The approved general management plan will be the basic document for managing Biscayne National Park for the next 20 or more years. The purposes of this general management plan are as follows:



- Confirm the purpose, significance, and special mandates of Biscayne National Park.
- Clearly define resource conditions and visitor uses and experiences to be achieved in the national park.
- Provide a framework for national park managers to use when making decisions about how to best protect national park resources; how to provide quality visitor uses and experiences; how to manage visitor use; and what kinds of facilities, if any, to develop in/near the national park.
- Ensure that this foundation for decision making has been developed in consultation with interested stakeholders and adopted by the National Park Service leadership after an adequate analysis of the benefits, impacts, and economic costs of alternative courses of action.

Legislation establishing the National Park Service (NPS) as an agency and governing its management provides the fundamental direction for the administration of Biscayne National Park (and other units and programs of the national park system). This general management plan will build on these laws and the legislation that established Biscayne National Park to provide a vision for the park's future. The later "Servicewide Mandates and Policies" section calls the reader's attention to topics that are important to understanding the management direction at the national park. Appendix B gives more detail on the law or policy directing management actions. The alternatives in this general management plan address the desired conditions that are not mandated by law and policy and must be determined through a planning process.

## NEED FOR THE PLAN

Biscayne National Park is currently operating under a Government Performance and Results Act Strategic Plan (2005) and a 1983 *General Management Plan*. This new general management plan for Biscayne National Park is needed because much has occurred since 1983—the population near the park has

greatly increased and visitor use patterns, types and recreational interests have also changed. Each of these changes has major implications. The park's 1983 *General Management Plan* needs to be updated to reflect current values and strategies for making management decisions regarding natural and cultural resources and providing for visitors.

A general management plan also is needed to meet the requirements of the National Parks and Recreation Act of 1978 and NPS policy, which mandate development of a general management plan for each unit in the national park system.

## THE NEXT STEPS

After the distribution of the *Draft General Management Plan / Environmental Impact Statement*, there will be a 60-day public review and comment period. After that comment period, the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a *Final General Management Plan / Environmental Impact Statement*. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments. Following distribution of the *Final General Management Plan / Environmental Impact Statement* and a 30-day no-action period, a "Record of Decision" approving a final plan will be prepared for the signature of the director of the NPS Southeast Region. The "Record of Decision" will document the NPS selection of an alternative for implementation. With the signing of the "Record of Decision," the plan can then be implemented.

## IMPLEMENTATION OF THE PLAN

The implementation of the approved plan will depend on future funding. The approval of a plan does not guarantee that the funding and staffing needed to implement the plan will be

forthcoming. Full implementation of the approved plan could be many years in the future.

The implementation of the approved plan also could be affected by other factors. Once the general management plan has been approved, additional required feasibility studies and more detailed planning and environmental documentation would be completed before any proposed actions can be carried out, as follows:

- Appropriate permits would be obtained before implementing actions that would impact wetlands.
- Appropriate federal and state agencies would be consulted concerning actions

that could affect threatened and endangered species.

- Native American tribes and the state historic preservation office would be consulted.

The general management plan does not describe how particular programs or projects should be prioritized or implemented. Those decisions will be addressed during the more detailed planning associated with strategic plans, implementation, plans, etc. All of those future more detailed plans will tier from the approved general management plan and will be based on the goals, future conditions, and appropriate types of activities established in the approved general management plan. Future plans will follow NPS planning guidelines.

# GUIDANCE FOR THE PLANNING EFFORT

## PURPOSE AND SIGNIFICANCE OF THE PARK

### Purpose

Purpose statements are based on the national park's legislation and legislative history and NPS policies. The statements reaffirm the reason(s) for which the national park was set aside as a unit of the national park system and provide the foundation for park management and use. The reasons for which the park was established provide the most fundamental criterion for determining actions proposed in the general management plan. The following park purpose was identified in the 1968 and 1980 enabling legislation (see appendix A for the complete text of the legislation):

*To preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty.*

### Significance

Significance statements capture the essence of the national park's importance to our country's natural and cultural heritage and capture what attributes make the park resources and values important enough to be included in the national park system.

Significance statements do not inventory national park resources; rather, they describe the park's distinctiveness and help to place the park within its regional, national, and international contexts. Significance statements answer questions such as "What is special about Biscayne National Park's resources? What do they contribute to our natural and cultural heritage?" Defining the national park's significance helps managers make decisions that preserve the resources and values necessary to accomplish the national park's purpose.

Biscayne National Park is a significant resource to the American public because of the following:

- The park's coral reefs and keys, estuarine bay, and mangrove coast is a significant and integral portion of the South Florida ecosystem within the wider Caribbean community where diverse, temperate, and tropical species mingle.
- Visitors enjoy opportunities for a multitude of recreational activities near one of the country's major metropolitan centers, and find inspiration in Biscayne's tranquility, solitude, scenic vistas, underwater environment, and the diverse sounds of nature.
- The park encompasses much of the northernmost extent of the fragile Florida Reef Tract and associated coastal systems, which are characterized by numerous transitions in the physical and biological environment.
- Biscayne National Park preserves a largely undisturbed gene pool of tropical and subtropical flora.
- Biscayne National Park provides a rare opportunity to experience largely undeveloped Florida Keys with forest and shoreline vegetation and wildlife surrounded by clear tropical waters and fresh sea breezes.
- Biscayne National Park preserves unique marine habitat and nursery environments that sustain diverse and abundant native fisheries.
- The park's submerged and terrestrial resources represent a sequence of rich history encompassing early settlement, agricultural and maritime activities, development of the islands, and the melding of diverse cultures.

- The park offers outstanding opportunities for education and scientific research because of the diversity and complexity and interrelatedness of its natural and cultural resources, and the park provides a dynamic place to study marine and terrestrial ecosystems near a large urban area.

## **INTERPRETIVE THEMES**

Interpretive themes describe those ideas, concepts, or messages about Biscayne National Park that are important for all of our visitors to understand. Based on the area's purpose and significance, themes provide guidelines for making decisions concerning which interpretive stories would be told to visitors and what interpretive facilities and activities will be required to tell those stories. Themes do not include everything that may be interpreted, but they include those ideas that are critical to understanding the significance of the park. All interpretive efforts (both media and personal services) should relate to the theme or subtheme.

Park interpreters link these themes to the National Park Service's national themes for cultural and natural history to develop compelling stories for presentation to visitors through interpretive activities.

Following are the primary interpretive themes for Biscayne National Park.

### **Biological Uniqueness**

As part of the wider Caribbean biological community, Biscayne's four primary ecosystems (mangrove shoreline, subtropical estuarine bay, Florida Keys, and coral reef) are home to numerous tropical/subtropical animals and plants found nowhere in the U.S. but South Florida.

### **Biological Diversity**

Because of its location between tropical and temperate regions and its major marine ecosystems, Biscayne is home to an incredible

diversity of animals and plants, more than most U.S. national parks. The world's coral reefs are considered the second most biologically diverse ecosystem in the world.

### **Cultural Significance**

Biscayne's unique geography and climate, and the presence of major marine resources within its boundaries, have set the stage for a significant cultural history, including a rich Native American heritage, Spanish exploration, sea-faring commerce, pirates, wreckers, sponge and sea turtle fishermen, island homesteaders, wealthy businessmen and entrepreneurs, presidents and politicians, and a lengthy grassroots environmental battle to preserve the area.

### **Endangered National Park**

The natural processes responsible for the creation of the resources found in Biscayne National Park have been and continue to be altered by human interaction on a regional and global level. Altered water delivery systems, reduced water quality, marine debris, damage to marine communities from vessel groundings, fishing pressure, pollution, rapid population growth, adjacent land development, increased water temperatures, and projected sea level rise and global climate change all threaten the sustainability of these rich resources (IHDP 2008).

### **Opportunities to Connect to an Urban National Park**

Located between the Greater Miami urban area and the Florida Keys, Biscayne offers park neighbors and visitors from around the world opportunities to connect to the natural and cultural heritage preserved within the park. As the largest marine park in the national park system and one of the nation's southernmost national parks, Biscayne is an ideal place to connect with, learn from, and enjoy a variety of educational and recreational activities year round.

## SPECIAL MANDATES AND ADMINISTRATIVE COMMITMENTS

Special mandates and administrative commitments refer to park-specific requirements. These formal agreements are often established concurrently with the creation of a unit of the national park system. Biscayne National Park has several mandates and commitments that impact daily activities. A key legal requirement of the park is to consult with the state of Florida on fishing management (described below). The park manages several right-of-way easements with other entities according to state and federal property laws, such as Florida Power and Light, the Florida Inland Navigation District, and the Air Force Sea Survival School.

### Fishing

Section 4 of Public Law 90-606 (October 18, 1968), which established Biscayne National Monument, provided that the waters within the national monument

*shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary [of the Interior], after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited or otherwise regulated in the interest of sound conservation or in order to achieve the purposes for which the national monument is established.*

Section 103(a) of Public Law 96-287 (June 28, 1980), which established Biscayne National Park and added areas to the park north of Boca Chita Key, reiterated much the same language regarding fishing. This section stated that

*... waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary [of the Interior], after consultation with appropriate officials of said State, designates species for which,*

*areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which the park is established: Provided, That with respect to lands donated by the State after the effective date of this Act, fishing shall be in conformance with State law.*

Congress therefore directed the National Park Service to “manage this area in a positive and scientific way to protect the area’s natural resource integrity.” Also, and in accordance with *U.S. Code* Title 16, Congress directed that “the waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida” (16 USC Section 410 gg-2).

While BISC’s enabling legislation establishes that fishing will continue to occur in BISC waters in accordance with State regulations, BISC must also manage its fishery resources according to Park and NPS mandates and legislation. For example, Congress directed that the Secretary of the Interior, after consultation with appropriate officials of the State, may designate species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which BISC was established (16 USC Sect. 410 gg-2). Thus, even though fishing regulations in BISC waters should conform to State regulations, the Secretary of the Interior has the ability to establish additional fishing regulations pertaining strictly to BISC. Complicating this issue, however, is the provision that expansion areas donated by the State after the Act’s effective date must be in conformance with State law. In terms of management, Biscayne National Park can therefore be divided into two zones: a) the original monument zone, in which fishing regulations follow State regulations, with the opportunity for the Secretary of the Interior to enforce additional regulations as deemed necessary, and b) the expansion zone, in which State regulations are enforced, and in which the Secretary of the Interior cannot



institute additional regulations (see 16 USC Sect. 410gg-2)

Regulatory responsibility of the state of Florida with respect to fishing on additional lands conveyed to the national park after the effective date of Public Law 96-287 was set forth in a Board of Trustees of the Internal Improvement Trust Fund Dedication dated December 13, 1985, which contained the following special reservation: “All rights to fish on the waters shall be retained and not transferred to the United States and fishing on the waters shall be subject to the laws of the State of Florida.” To avoid a confusing array of different fishing regulations within park boundaries, the National Park Service has long used state fishing regulations throughout the park. NPS law enforcement rangers

enforce State of Florida fishing regulations in the park. State of Florida law enforcement officers with the Florida Fish and Wildlife Conservation Commission have jurisdiction within the park as well. In the last few decades several studies have indicated that the park's fishery resources are in decline.

Subsequently, a “Memorandum of Understanding between the State of Florida, Fish and Wildlife Conservation Commission and the National Park Service, Biscayne National Park” was executed on October 10, 2002, to facilitate management, protection, and scientific study of fish and aquatic resources within the national park. In the memorandum, the two parties agreed to manage fisheries within the national park and Biscayne Bay



FIGURE 1: ORIGINAL MONUMENT BOUNDARY AND NATIONAL PARK BOUNDARY

“according to applicable Federal and State laws, and in a manner that promotes healthy, self-sustaining fish populations and recognizes the biological characteristics and reproductive potential of individual species.” The two parties also agreed to develop “a comprehensive fishery management plan” for the “long-term management of fish and aquatic resources” within the national park. The plan will (1) summarize existing information and ongoing activities; (2) clarify agency jurisdiction, roles, and responsibilities; (3) identify additional opportunities for cooperative management; (4) list key issues; (5) establish management goals and objectives; (6) describe desired future conditions, indicators, performance measures, and management triggers; and (7) develop a list of prioritized project statements. A *Final Environmental Impact Statement* for the fishery management plan has been prepared and will be presented to the public in 2011.

The Memorandum of Understanding also acknowledges that the Florida Fish and Wildlife Conservation Commission believes that marine reserves are overly restrictive and that less restrictive fishery management tools should be implemented to achieve fishery management goals, and marine reserves would be used as a fishery management tool only when absolutely necessary. In this General Management Plan, a marine reserve is being proposed for purposes other than sound fishery management, which the Memorandum of Understanding also acknowledges that the NPS can do in accordance with existing authorities, policies, and executive orders.

### **Submerged Cultural Resources**

Managers at Biscayne National Park and the Florida Keys National Marine Sanctuary signed a memorandum of agreement in November 2006 that will facilitate the protection and preservation of shipwrecks and other submerged cultural resources. The memorandum addresses ways in which the two agencies can partner to enhance social science research, resource protection, and public information and education surrounding submerged archeological sites, objects,

and associated records. Although similar agreements exist between the two agencies for protecting seagrasses, coral, and other natural resources, this agreement for shipwreck preservation is unique. Hundreds of shipwrecks and many other submerged archeological sites are scattered across the park and the marine sanctuary, with dozens located along the 30 miles of shared jurisdictional boundary.

### **Personal Watercraft**

Motorized personal watercraft (PWC) use is prohibited in units of the national park system except in designated areas. On March 21, 2000, the National Park Service designated units of the national park system where PWC use may be allowed using the criteria and procedures listed in 36 CFR 1.5, “Closures and Public Use Limits” and 36 CFR 1.7, “Public Notice.” Biscayne National Park was not listed as one of the units of the national park system where PWC use could be designated. Therefore PWC use is not allowed in the park.

### **Easements**

The U.S. Department of Defense holds an easement for the Air Force Sea Survival School to conduct activities in an area comprising 4 nautical square miles of surface area near the seaward end of the Turkey Point Channel entrance marker. The school was moved to Key West after the destruction of its facilities by Hurricane Andrew in 1992. This easement should be reviewed for possible elimination.

The Miami-Dade County Park and Recreation Department operates two county parks and public marinas with navigational easements through Biscayne National Park—Black Point and Homestead Bayfront. Both easements were granted by the state in 1970. These county easements are preserved through (1) a 1974 “Memorandum of Agreement” between the county and the National Park Service, and (2) a 1979 deed transferring submerged lands to the U.S. government from the state. Both the Black Point and Homestead Bayfront channel easements extend from county parks

to or toward the Intracoastal Waterway with specified dimensions of 31,000 feet in length and 150 feet in width.

Two other easements are held by Florida Power and Light, one of which is for its Turkey Point Channel.

The other was established east of the Military Canal when a large refinery was proposed for the area around the canal during the late 1960s. That proposal called for a channel to be dredged between the Military Canal and Lewis Cut and then across the coral reef platform. Controversy over this proposal was a primary reason for establishment of Biscayne National Park.

There are six channel easements in the park reserved by the state. These reservations, which were affected by resolution (Dade County Resolution No. 280-69, March 12, 1969, and State of Florida Resolution, May 20, 1969) and in the agreement on the Offer to Sell Real Property (May 20, 1969) executed by the United States with the state of Florida, consist of six 150-foot wide navigation channels in the submerged lands in Biscayne Bay. Three of these channels—Turkey Point Oil Barge Channel, Goulds and Black Creek canals (Black Point Marina), and Homestead Bayfront Park—are currently in use. The remaining three easements—which are unnamed—are totally undeveloped. Any proposed alteration to the existing conditions would require an environmental study and NPS approval.

## **Jurisdiction**

Lands in park boundaries are administered under concurrent jurisdiction with local law enforcement agencies meaning that any commissioned law enforcement officer may enforce state and federal laws within the park.

The **Intracoastal Waterway** bisects the national park. The Florida Inland Water Department was established by the U.S. Congress and mandated to maintain the waterway to a depth of 7 feet throughout its length in the park. This mandate affects two

areas in the park—the Feather Bed Bank in the central portion of Biscayne Bay and Cutter Bank on the park's southern boundary. The remainder of the waterway in the park has a greater depth than 10 feet, 3 feet deeper than the minimum depth established by congressional mandate (Intracoastal Waterway 2002).

The City of Islandia, within the national park boundaries on Ragged Key No. 3, is a legal jurisdiction established under Florida state law. Currently, there are five residences in the city—four ranger residences and one private home. The city can be dissolved formally by vote of its current residents or by resolution of the Miami-Dade County Board of County Commissioners.

## **Special Use Permits**

Biscayne National Park issues one-year research permits to researchers via the NPS Research Permit and Reporting System. There are national general conditions and general conditions specific to the park associated with these permits. A review team consisting of the park's research permit coordinator and subject-matter experts review the plan, propose permit-specific conditions, and recommend approval or disapproval of the permit to the superintendent. Researchers could request to perform their studies in any zone in any of the alternatives proposed in this plan; the review team would continue to determine appropriateness as per environmental sensitivity and NPS standards for each research proposal.

One-time special use permits are also issued by Biscayne National Park for special events such as weddings, picnics, and scout camporees.

Public Law 105-391, Section 418 authorizes the National Park Service to issue commercial use authorizations (CUAs) for any visitor services activity by an individual or group for commercial gain (boat tours, tow boats, etc). A commercial visitor service activity is defined as any or all goods, activities, services, agreements, or anything offered to park visitors and/or the general public for

recreational purposes, which uses park resources, is undertaken for or results in compensation, monetary gain, benefit or profit to an individual, organization, or corporation, whether or not such entity is organized for purposes recognized as nonprofit under local, state, or federal law. A commercial use authorization may overlap the operations undertaken by a concessioner that operates under a concessions contract.

Public Law 106-206 requires that all commercial filming activities undertaken in any national park system unit must be accomplished under the authority of a commercial filming permit. Any filming (video or sound recording) production intended for a commercial market will require the advance issue of a commercial filming permit from the park. Commercial still photography requires a commercial filming permit only when the activity will occur in areas normally closed to the public, when the photographer will use props or models not normally associated with the national park system unit, or when management of the activity is required to ensure safety or resource protection.

## SERVICEWIDE LAWS AND POLICIES

This section identifies what must be done at Biscayne National Park to comply with federal laws and NPS policies. Many park management directives are specified in laws and policies guiding the National Park Service and are therefore not subject to alternative approaches. For example, there are laws and policies about managing environmental quality (such as the Clean Air Act, the Endangered Species Act, and Executive Order 11990 “Protection of Wetlands”); laws governing the preservation of cultural resources (such as the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act); and laws about providing public services (such as the Americans with Disabilities Act)—to name only a few. In other words, a general management plan is not needed to decide that it is appropriate to protect endangered species, control exotic species, protect

archeological sites, conserve artifacts, or provide for handicap access. Laws and policies have already decided those and many other issues for us. Although attaining some of these conditions set forth in these laws and policies may have been temporarily deferred in the park because of funding or staffing limitations, the park staff will continue to strive to implement these requirements with or without a new general management plan.

Some laws and executive orders are applicable solely or primarily to units of the national park system. These include the 1916 Organic Act that created the National Park Service, the General Authorities Act of 1970, the act of March 27, 1978, relating to the management of the national park system, the Park System Resource Protection Act, and the National Parks Omnibus Management Act (1998). Other laws and executive orders have much broader application, such as the Endangered Species Act, the National Historic Preservation Act, and Executive Order 11990 that address the protection of wetlands.

The NPS Organic Act (16 USC Section 1) provides the fundamental management direction for all units of the national park system:

*[P]romote and regulate the use of the Federal areas known as national parks, monuments, and reservations . . . by such means and measure as conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife 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.*

The National Park System General Authorities Act (16 USC Section 1a-1 et seq.) affirms that while all national park system units remain “distinct in character,” they are “united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national

heritage.” The act makes it clear that the NPS Organic Act and other protective mandates apply equally to all units of the system. Further, amendments state that NPS management of park units should not “derogate . . . the purposes and values for which these various areas have been established.”

The National Park Service also has established policies for all units under its stewardship. These are identified and explained in a guidance manual entitled *NPS Management Policies 2006*. The alternatives considered in this document incorporate and comply with the provisions of these mandates and policies (NPS 2006).

To truly understand the implications of an alternative, it is important to combine the servicewide mandates and policies (see appendix B) with the management actions described in each alternative.

The alternatives in this general management plan address the desired future conditions that are not mandated by law and policy and must be determined through a planning process.

## Impairment of National Park Resources

In addition to determining the environmental consequences of implementing the preferred and other alternatives, *NPS Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would impair a park’s resources and values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the

purposes of the park. That discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The impairment is an impact that, in the professional judgment of a responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (*NPS Management Policies 2006*). An adverse impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park’s general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

An evaluation of impairment is not required for some impact topics, including visitor experience (unless the impact is resource based), NPS operations, or the socioeconomic environment. When it is determined that an action(s) would have a moderate to major adverse effect, the National Park Service makes a finding of nonimpairment. Impacts of only negligible or minor intensity would, by definition, not result in impairment. The determination of impairment for the preferred alternative is found in appendix C.

# RELATIONSHIP OF OTHER PLANNING EFFORTS TO THIS GENERAL MANAGEMENT PLAN

Other plans and planning projects have influenced or would be influenced by the approved *Final General Management Plan / Final Environmental Impact Statement* for Biscayne National Park. These plans have been prepared (or are being prepared) by the National Park Service and other federal, regional, state, and local agencies and organizations. Those most directly related to this general management plan or are potentially affected by it are described below.

## NPS PLANS / PLANNING EFFORTS

### Overall Management Plans

#### *Fishery Management Plan*

The *Fishery Management Plan* is a long-term plan to manage fish and shellfish stocks in the national park to ensure that the tradition of fishing can continue for generations to come.

The purpose of the plan is to guide sustainable use of the park's fishery-related resources, because recent studies suggest that many of the park's fishery resources are in decline. The plan is a cooperative effort by the park staff and the Florida Fish and Wildlife Conservation Commission, with input from members of government agencies, area universities, and the public. Due to this ongoing planning process, the GMP will not address fisheries management in its alternatives.

The planning effort began with public meetings in May 2002 and a working group, formed by the Sanctuary Advisory Council of the Florida Keys National Marine Sanctuary in cooperation with the park and Florida Fish and Wildlife Conservation Commission. Consisting of recreational and commercial fishers, divers, scientists, and members of the conservation community, this group developed recommendations.

In October 2004, the working group finalized its recommendations, which were endorsed and forwarded to the Florida Fish and Wildlife Conservation Commission and Biscayne National Park. Many of the recommendations were used in the development of the Fishery Management Plan, which underwent public review in 2010. The *Final Environmental Impact Statement* is currently being reviewed by the NPS regional and national offices. The goals of the *Fishery Management Plan* support the broader vision for park management described in this general management plan.

#### *Mooring Buoy and Marker Plan*

Biscayne National Park is currently developing a mooring buoy and marker plan that will identify buoy and marker locations and criteria for selecting new Maritime Heritage Trail locations. The plan will also address environmental monitoring protocol, visitor crowding, maintenance, and educational issues associated with the buoys. This plan will include an adaptive management framework for mooring buoys and markers that will apply to this general management plan. The Draft *Environmental Impact Statement* was published in 2011 and currently being reviewed.

### Other NPS Plans

In addition to the overall vision and management plans described above, the National Park Service carries out other planning efforts and studies to cover topics such as natural and cultural resource restoration and preservation, visitor use, transportation, and park operations. The following studies and plans guide important aspects of park management but do not directly relate to the alternatives or other components of this general management plan.

### ***Adjacent Lands Protection Plan***

The existing plan, dated January 1991, is being updated by park staff for future review and approval by the Southeast Region.

### ***Collections Management Plan***

This 2005 plan presents guidance for the management and care of museum objects for five South Florida national parks including Biscayne. Actions proposed in this general management plan comply with the interpark “Collections Management Plan.”

### ***Coral Reef Restoration Plan***

Biscayne National Park has nearly completed a plan on how to manage the restoration of coral reefs that have been damaged by vessel groundings. In 1998 the president issued the Coral Reef Protection Executive Order 13089. The order established the United States Coral Reef Task Force, which includes the major federal agencies involved in coral reef protection, including the National Park Service. As part of this task force, the National Park Service is working to strengthen and fill the gaps in existing efforts to conserve and sustainably manage coral reefs and related ecosystems (seagrass beds and mangrove forests) in U.S. waters.

### ***Fire Management Plan***

The park's *Fire Management Plan* was approved on April 23, 2004. The plan was designed to meet the park's specific resource management needs while also ensuring that public and firefighter safety is not compromised. The plan addresses both wildland fires (human-caused or naturally ignited by sources such as lightning strikes) and debris burning (small-scale burning of debris piles resulting from maintenance or resource management activities). Fire management to protect resources and visitors is supported by all aspects of the general management plan.

### ***Exotic Plant Management Plan***

Exotic plants are ecologically harmful, frequently displacing or otherwise impairing the function of native plant communities. They

can also alter historic landscapes, damage cultural resources, and interfere with visitor use and enjoyment. Management of exotic plants relates to all aspects of the general management plan and is supported by NPS policy on invasive species.

Everglades, Dry Tortugas, and Biscayne national parks; Big Cypress National Preserve; and five other South Florida and Caribbean units in the national park system have prepared a *South Florida and Caribbean Parks Exotic Plant Management Plan / Environmental Impact Statement*. Other parks included in the planning effort are Canaveral National Seashore, Buck Island Reef National Monument, Christiansted National Historic Site, Salt River Bay National Historic Park and Ecological Preserve, and Virgin Islands National Park.

The *Exotic Plant Management Plan* analyzes three alternatives for establishing guidelines to determine when and how to manage nonnative plants. This includes the use of mechanical, physical, chemical, and biological control methods and criteria for considering the use of passive or active restoration for treated areas.

### ***General Management Plan Amendment: Stiltsville Management Plan.***

A 2003 decision placed the management of the remaining Stiltsville houses (see the discussion of Stiltsville in chapter 2 under “Actions Common to All Alternatives) under the care of the nonprofit Stiltsville Trust.

### ***Homestead-Biscayne Buffer Area Report***

A 1997 NPS study found that land uses providing open space and agricultural space near Biscayne National Park are essential to protect the significant resources and values of the park.

### ***Miami Circle Special Resource Study***

A 2008 decision found that the Miami Circle archeological site in Miami does not meet the legislated purpose of Biscayne National Park, and encouraged collaborative management by other organizations.

### ***Virginia Key Beach Park Special Resource Study***

A 2008 decision found that the site is not nationally significant or suitable for inclusion in the national park system.

### **Manatee Protection Plans**

Manatee protection plans have been developed in Florida because of two parallel efforts. First, the Florida Manatee Recovery Team, an interagency group of manatee experts, developed a *Florida Manatee Recovery Plan*, which was approved by the U.S. Fish and Wildlife Service in 1989 and updated in 1996. In addition, Florida's Fish and Wildlife Conservation Commission approved a *Dade County Manatee Protection Plan* in November 1995. Although these plans were not led by the National Park Service, they are applicable to the general management plan because of the NPS obligation to protect the Manatee, a federally listed endangered species. In 2009 and 2010, the superintendent participated in a review of the county plan.

### **PLANNING EFFORTS BEYOND THE NATIONAL PARK SERVICE**

Biscayne National Park staff work collaboratively with other agencies, partners, and neighbors on the following planning efforts. To the extent possible, all proposals in the general management plan are in accordance with these other planning processes.

### **Other Federal Plans**

Biscayne Bay Coastal Wetlands Plan

Comprehensive Everglades Restoration Plan

Department of Interior Science Plan

Marine Sanctuary Management Plan

United States Coral Reef Initiative

Homestead Air Force Base Cleanup

### **State and Regional Plans**

Biscayne Bay Surface Water Improvement and Management Plan Planning Document

Lower East Coast Regional Water Supply Plan

Biscayne Bay Partnership Initiative

Southeast Florida Coral Reef Initiative

### **City and Local Plans**

South Miami-Dade Watershed Study and Plan

Turkey Point Power Plants Units 6 and 7 (expansion)

Miami-Dade County Comprehensive Development Master Plan

Miami-Dade County's Urban Development Boundary Issue

Biscayne Bay Strategic Access Plan

Local greenway and blueway plans

Waste Water Reuse Agreement



# PLANNING ISSUES/CONCERNS

## INTRODUCTION

The general public; NPS staff with their knowledge about past planning efforts; representatives from other county, state, and federal agencies; and representatives from various organizations identified various issues and concerns during scoping (early information gathering) for this general management plan. An issue is defined as an opportunity, conflict, or problem regarding the use or management of public lands. Comments were solicited at public meetings, through planning newsletters, and on the National Park Service's planning website (see the "Consultation and Coordination" chapter).

Comments received during scoping demonstrated that there is much that the public likes about the national park—its resources, management, use, and facilities. The issues and concerns generally involve determining the appropriate visitor use and the types and levels of facilities, services, and activities while remaining compatible with desired resource conditions. The general management plan alternatives provide strategies for addressing the issues within the context of the national park's purpose, significance, and special mandates.

## ISSUES ADDRESSED IN THIS PLAN

In general, these issues focus on concerns about the long-term health of the park's resources and providing the visiting public with enjoyable and quality experiences.

### Natural Resources

- The coral reefs of Biscayne National Park have the attention of national and global reef conservation initiatives. Coral reefs are in serious decline globally, especially those near shallow shelves and dense populations. In the Florida Keys, because of nearby dense populations of

people and the effects of hurricanes, vessel groundings, disease, overfishing, and a proliferation of algae, there has been a 37% decline in live coral cover in just five years, according to a 2002 report by the National Oceanic and Atmospheric Administration (NOAA 2002). In addition to the impacts on the coral, fish populations, and coastal protection, the decline could affect tourism because more than 4 million tourists visit the Florida Keys annually and the Florida Keys are the number one dive destination in the world. Some members of the public have voiced the desire to see reserves established; others noted that many people's livelihoods depend on fishing. The possibility of including a no-take marine reserve in Biscayne National Park has both proponents and opponents in the park's user community and beyond, including commercial and recreational anglers, divers and snorkelers, boat enthusiasts, and environmental advocates.

### Visitor Experience

- The park's proximity to Miami/Dade County and its growing metropolitan population are increasing pressures on the park to accommodate local recreational demand. Recreational activities occasionally result in visitor conflicts, accidents, and resource damage. Vessel groundings cause long-term scarring of the bay floor and damage to coral. Boat anchors damage coral. Propellers can injure manatees, seagrass beds, and corals. Debris from fishing activities has damaged historic underwater resources and coral reefs. Also, conflicts between different recreational groups occur. Wakes from larger, faster boats swamp smaller, slower boats. The noise of motorboats or "partying" groups diminishes efforts of

canoeists and kayakers to experience quieter environments. The challenge to park management is finding and managing for a user capacity that enables visitors to have a quality experience while protecting park resources for future generations.

- The only mainland based park visitor center is 35 miles south of Miami, frequently a 1½ to 2-hour drive for Miami residents and nonlocal visitors arriving at the airport or Port of Miami. Due to its remote location, this visitor contact center receives less than 10% of the total park visitation. This situation makes it very difficult for the park to determine the type and level of visitor use it receives. It also makes it difficult to provide important information on park rules, regulations, navigational information, events, and activities to park users and visitors.

## Park Operation

- Visitors have uncontrolled access to and from open waters of the bay and ocean, including the Intracoastal Waterway. Access points at developed areas include county and state parks and private and commercial developments in the Miami, Key Biscayne, and Key Largo areas. Because of the impracticality of marking the marine park's entire 50 mile water boundary, many park users are unaware of the fact that they are in a national park.
- The northern part of the park, including historic Stiltsville, receives little law enforcement coverage and the park's ability to protect resources and respond to emergencies is limited by the hour-long boat ride from park headquarters.

## Climate Change

- Climate change refers to any substantial changes in average climatic conditions (such as average temperature, precipitation, or wind) or climatic variability (such as seasonality or storm frequencies)

lasting for an extended period of time (decades or longer). Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change (IPCC 2007) provide clear evidence that climate change is occurring and will likely accelerate in the coming decades. The effects of climate change on national park system units are beginning to emerge as both science and impacts become clearer; however, it is difficult to predict the full extent of the changes that are expected under an altered climate regime. Predicted effects in South Florida in the next century include temperature increases of about 3°F and a sea level rise of about half a meter (19 inches) (IPCC 2007). Increased intensity and frequency of major storms, reduced precipitation, and saltwater intrusion into critical freshwater habitats are also likely in this region (NRC 2008; NPS 2009c).

The National Park Service recognizes that the major drivers of climate change are outside the control of the agency. Climate change, however, is a phenomenon whose impacts throughout the national park system cannot be discounted. Some of these impacts are already occurring or are expected in Biscayne National Park in the time frame of this management plan.

Other factors driving environmental change include population growth in the area (subsidence of water table, increased visitation, pollution), shifts in visitor use patterns, and land use change and development around the park.

Therefore, climate change is included as an issue in this document to recognize its role in the changing environment of the park and to provide an understanding of its impact.

Although climate change is a global phenomenon, it manifests differently depending on regional and local factors (IHDP 2008). Climate change is expected

to result in many changes to the Atlantic Coast of the eastern United States, including warming ocean waters, hotter summer temperatures and fewer winter freezes, sea level rise, and higher storm surges. In addition to these likely wide-spread effects, specific impacts on Biscayne National Park could include shifting shorelines because of coastal erosion, saltwater intrusion into soils and vegetation, ocean acidification, and changes in the output of the watersheds feeding into the park. This dynamic environment is expected to affect the natural and cultural resources in the park, as well as visitor use patterns.

There are two different issues to consider with respect to climate change and general management planning: (1) what is the contribution of the proposed project to climate change, such as greenhouse gas emissions and the carbon footprint? and (2) what are the anticipated effects of climate change on the park resources and visitors that are affected by the management alternatives? Because the contribution to climate change is negligible under any alternative, the former issue has not been carried forward for consideration in this plan. The latter issue, a discussion of the anticipated effects of climate change on park resources, has been carried forward.

### **ISSUES AND CONCERNS NOT ADDRESSED IN THE GENERAL MANAGEMENT PLAN**

Not all of the issues or concerns raised by the public are included in this general management plan. Other issues raised by the public were not considered because they

- are already prescribed by law, regulation, or policy (see the “Servicewide Mandates and Policies” section);
- would be in violation of laws, regulations, or policies; or
- were at a level that was too detailed for a general management plan and are more

appropriately addressed in other planning documents (outside the scope of a GMP).

Many topics, such as fishery management, everglades restoration, and coral reef interagency management, are addressed in other park planning or in interagency planning and so are not specifically addressed in this general management plan but are included by reference.

Overfishing, both recreational and commercial, was identified as a concern by many because of its potential to deplete fish stocks, damage the coral reef, and destroy other species through accidental capture. Preliminary research data indicates that some fish populations have declined. The state manages fishing activities in the park. The park and the state are finalizing a fishery management plan for the park’s aquatic resources so this issue will not be addressed in this general management plan. The issue of overfishing is addressed in the park’s Fishery Management Plan.”

The long-term health of park resources is heavily dependent on outside influences, such as air and freshwater quality, quantity, and timing. Especially critical are the amount, flow rate, and quality of freshwater that enters the park from adjacent lands. Marshes adjacent to the park have been extensively drained, and all natural overland flow of water is now controlled and delivered to the coast through an extensive network of canals. Flood control gates at the mouth of each of these canals regulate the flow of water into the park. A multibillion dollar restoration project is underway in South Florida, the Comprehensive Everglades Restoration Plan (CERP). This plan is part of regional ecosystem restoration that includes projects to address the issues of freshwater availability, delivery, quality and structure operations for Everglades and Biscayne national parks and the greater South Florida ecosystem. Another area of importance is the “Model Lands,” an area of more than 55,000 acres. This area is the last large expanse of unprotected

undeveloped land in the area and forms a land corridor between Biscayne and Everglades National Park. This area is the headwaters for Barnes and Card sounds, which directly feed Biscayne Bay in Biscayne National Park. One of the projects associated with the Comprehensive Everglades Restoration Plan is the Biscayne Bay Coastal Wetlands, which if implemented would partially restore freshwater flow to coastal wetlands within and outside the park's western boundary. The National Park Service will continue to collaborate with entities beyond park boundaries to address water quality and many other concerns. These partnerships include those with federal, state, and local agencies; community groups; commercial organizations; and individuals.

- The park has long identified a need to facilitate entry to and education about park resources and appropriate types of recreational activities and to provide added resource and visitor protection in northern Biscayne Bay. This is addressed in the park's Moorin Buoy and Marker Plan.
- The park's cultural history is often forgotten or overlooked by the public, but there are both submerged and terrestrial cultural resources that help to tell various stories of maritime and South

Florida history. The eroding effect of natural processes on cultural resources creates a constant challenge to park management in protecting, preserving, and interpreting these windows to the past. This is addressed in the park's Mooring and Bouy plan.

Public access to the park and to locations inside the park is difficult for many. There is no public transportation to the park from Miami or Homestead. Once inside the park, unless visitors have their own boat, it is difficult to access places other than Convoy Point. The concessioner can provide rides to the islands for a fee, but this is not a regular or consistent service and usually requires a reservation. Visitors without personal boats find that they are unable to simply arrive at the park and visit the keys.

Part of the visitor experience at Biscayne is being able to see the land and seascape of bay, keys, ocean, and mangrove shoreline with minimal competition by man-made structures. As development moves south near the shoreline, there are increasing chances of these views being modified. Because this is occurring outside the park's boundaries, it is beyond the scope of an NPS plan.

## IMPACT TOPICS – RESOURCES AND VALUES AT STAKE IN THE PLANNING PROCESS

An important part of planning is seeking to understand the consequences of making one decision over another. To this end, this GMP is accompanied by an environmental impact statement. Environmental impact statements identify the anticipated impacts of possible actions on resources and on park visitors and neighbors. Impacts are organized by topic, such as “impacts on the visitor experience” or “impacts on vegetation and soils.” Impact topics serve to focus the environmental analysis and to ensure the relevance of impact evaluation. The impact topics identified for this general management plan are outlined in this section; they were identified based on federal laws and other legal requirements, Council on Environmental Quality (CEQ) guidelines, NPS management policies, staff subject-matter expertise, and issues and concerns expressed by the public and other agencies early in the planning process (see previous section). Also included is a discussion of some impact topics that are commonly addressed but that are not addressed in this plan for the reasons given.

### IMPACT TOPICS TO BE CONSIDERED

#### Natural Resources

**Fisheries.** The restoration of healthy fish populations and fish habitat is important to the ecology of bay and reef habitats, the health and persistence of regional fish stocks, and the enjoyment of the recreating public. Though fisheries management is being addressed separately via the Fisheries Management Plan, alternatives presented in this plan could affect fisheries, so this topic is retained for analysis.

**Threatened and Endangered Species.** The Endangered Species Act requires federal

agencies to ensure that their activities would not jeopardize existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Consultation with the U.S. Fish and Wildlife Service, NOAA Fisheries Service and the Florida Fish and Wildlife Conservation Commission identified a number of threatened, endangered, or species of concern that warrants the inclusion of this topic in this General Management Plan / Environmental Impact Statement. Some species on this list were dismissed from detailed analysis because they do not exist in the park or would not be affected by any proposed actions. Table 7 (in chapter 3) provides a summary of the federally listed species; those that are retained for further analysis are the Manatee, several sea turtle species, the American crocodile, the Schaus swallowtail butterfly, and acroporid corals. The state-listed bald eagle and Miami blue butterfly are also retained for further analysis. Actions proposed could affect listed species so this topic is retained for these species.

**Special Status Species, including State-Listed Species.** Above the water line, birds are perhaps the most conspicuous part of the park’s wildlife. Many species of birds are permanent residents of the park, other species migrate through the area, and still others are exclusively winter or summer residents. The park has coastal and inland areas where a variety of migratory and nonmigratory birds roost, forage, nest, and/or loaf. Bird rookeries occur on the mainland in the mangrove shoreline and on several islands. The Arsenicker Keys in the southwest corner of the park are used heavily by roosting herons, pelicans, and cormorants. Soldier Key, Ragged Island #5,

and a small area within Jones Lagoon are used heavily by double-crested cormorants.

NPS scientists monitoring and studying bird populations in the park report that birds using areas that receive high visitation are not affected by the presence or activities of people. Under all action alternatives, Arsenicker Key and West Arsenicker Key would be identified as Sensitive Resource Zones because of their importance of providing nesting, roosting, foraging, and/or loafing habitat for numerous bird species. Consequently, visitor activities would not occur on these islands and no visitor facilities would be constructed. In other areas of the park, proposed actions would incorporate mitigation measures to reduce potential impacts on birds in the park. These measures include, but are not limited to, enforcing coastal set-back distances (following published recommendations) to minimize impacts on birds using coastal habitats and timing construction and other potentially disruptive activities so that they do not correspond with breeding and nesting seasons. With mitigation, the potential impact of the proposed alternatives in this plan on birds in the park would be short- and long-term, localized, and negligible. However, the National Park Service has a Memorandum of Understanding with the U.S. Fish and Wildlife Service regarding the conservation of migratory birds (DOI 2010), the National Park Service manages all state listed species the same as federally listed species, and many birds are special status state-listed species (described fully in chapter 3); therefore these species in particular are retained for analysis in chapter 4.

**Terrestrial Vegetation.** The Organic Act and NPS *Management Policies 2006* both require the protection and conservation of soil and vegetation resources that could be affected by actions that would change human use and development patterns in the park. The alternatives contain actions that could affect vegetation resources so this topic is retained for analysis.

**Submerged Aquatic Communities.** The Organic Act and NPS *Management Policies 2006* both require the National Park Service to protect and conserve native populations that could be affected by visitors, managers, and external sources. The park's aquatic communities are an important park resource and one of the attractions that add to the quality of visitor experiences in the park. Changes in marine habitat or in populations of organisms would be of concern to visitors, the public, and park managers. Actions contained in the alternatives could affect submerged aquatic communities so this topic is retained.

**Wetlands.** The water resources in the park, including wetlands, are protected and managed in accordance with NPS *Management Policies 2006* (4.6.5), Executive Order 11990 "Protection of Wetlands," and NPS Director's Order 77-1. This guidance requires the National Park Service to protect and enhance natural wetland values and to examine the impacts of park activities on wetlands. Actions proposed in the alternatives could adversely affect wetlands so this topic is retained.

## Soundscapes

Both the National Park Service Organic Act (as amended) and NPS *Management Policies 2006* identify natural sound environments or soundscapes as a park resource and value worthy of protection. NPS *Management Policies 2006* (4.9) describe soundscapes as follows. Park natural soundscape resources encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. Natural sounds occur within and beyond the range of sounds that humans can perceive, and they can be transmitted through air, water, or solid materials. Some examples of natural sounds include sounds produced by birds, frogs, or katydids to define territories or help attract mates, sounds produced by bats or porpoises to locate prey or navigate, sounds received by mice or deer to detect

and avoid predators, sounds produced by physical processes, such as wind in the trees, claps or thunder, or falling water. The management policies specifically state that the National Park Service “will preserve, to the greatest extent possible, the natural soundscapes of parks.” The policies further state that NPS staff will restore degraded soundscapes to the natural condition whenever possible, and will protect natural soundscapes from degradation due to noise (undesirable human-caused sound). Noise can adversely affect, directly and indirectly, the natural soundscape and other park resources. Noise can also adversely impact the visitor experience.

Visitors to Biscayne National Park have opportunities to experience tranquility in an environment of natural sounds in many parts of the park. Actions in the alternatives that could potentially increase noise levels in parts of the park, such as enhanced development of visitor destination points and increasing the level of visitor services, facilities, and access, could be of concern to some visitors, the general public, and NPS managers. Therefore, this topic is retained.

## Cultural Resources

The National Park Service categorizes cultural resources as archeological resources, cultural landscapes, historic structures, museum collections, and ethnographic resources. Cultural resource impact topics were selected on the basis of fundamental resources and values identified in the park’s enabling legislation; major values identified during the plan’s scoping process; and applicable laws, executive orders, and regulations as well as NPS management policies and guidelines. The National Historic Preservation Act, Archeological Resources Protection Act, Native American Graves Protection and Repatriation Act, National Environmental Policy Act, and other legislation require that the effects of any federal undertakings on cultural resources be examined and analyzed. Also, NPS *Management Policies 2006* and NPS 28: *Cultural Resource Management Guidelines*

call for consideration of the effects of planning proposals on cultural resources. Actions proposed in this plan could affect archeological resources, historic structures, and cultural landscapes. The rationale for dismissing museum collections and ethnographic resources from further consideration is found in the next section on “Impact Topics Dismissed from further Consideration.”

## Visitor Use and Experience

The planning team identified visitor experience as an important issue that could be appreciably affected under the alternatives. The Organic Act and NPS *Management Policies 2006* direct the National Park Service to provide enjoyment opportunities for visitors that are uniquely suited and appropriate to the resources found in the park. Different aspects of visitation and enjoyment are evaluated by alternative: visitor uses, recreational opportunities, access to information and interpretation, visitor facilities, and visitor access.

## NPS Operations

**NPS Operations and Facilities.** The alternatives proposed in this plan could affect park operations and facilities. Topics include staffing, maintenance, facilities, ability to protect park values and visitors, employee and visitor health and safety, management of natural and cultural resources, and administrative access.

**Concessions.** Actions proposed in the alternatives could adversely or beneficially affect the park’s concessioners. For example, establishing user capacity, establishing zones that limit types of use, or other requirements on concessioners could affect concessioners. This in turn could affect the experience of clients and other visitors in the park.

## Socioeconomic Environment

The National Environmental Policy Act requires an examination of social and economic impacts caused by federal actions. Biscayne National Park affects the socio-

economics of nearby communities such as Homestead and southeastern portions of the Greater Miami metropolis. Accordingly, residents and tourism-related businesses (e.g., restaurants and hotels) in the region are concerned about changes in the management of the park that might affect their lives and socioeconomic environment and opportunities. Impact topics include the effects that park operations and visitation have on the regional economy.

## **IMPACT TOPICS DISMISSED FROM FURTHER CONSIDERATION**

Some impact topics that commonly are considered during the planning process were not relevant to the development of this general management plan for Biscayne National Park because of the following: (a) implementing the alternatives would have no effect or a negligible effect on the topic or resource or (b) the resource does not occur in the national park. These topics are as follows, with an explanation of why they were not considered in detail.

### **Natural Resources**

#### ***Prime and Unique Agricultural Lands***

According to the Natural Resource Conservation Service, U.S. Department of Agriculture, there are no prime or unique agricultural soils in Biscayne National Park, so this topic is dismissed from further analysis.

#### ***Floodplains***

NPS management policies and Executive Order 11988 “Floodplain Management” require addressing impacts on and development in natural floodplains. The entire park is within the regulatory 100-year floodplain. Some of the alternatives propose new development in the floodplain. This development includes dock improvements, construction of boardwalks, and in alternatives 2-4 hardening portions of trails on Elliott Key. The dock improvements and boardwalks would not impact floodplain

processes, nor would they increase the potential for erosion after construction. Hardening the trail on Elliott Key would add an impervious surface area on the highest point of the island. However because the trees surrounding the trail would remain to stabilize surrounding soil, the trail is unlikely to increase the potential for erosion or to substantially modify the drainage pattern on the island. Short-term impacts would be adverse but negligible. Long-term impacts, after construction, would also be adverse but would continue to be negligible. Because no impacts are anticipated to be greater than negligible, this topic is dismissed.

#### ***Air Quality***

Biscayne National Park is in a Class II air shed in accordance with the Clean Air Act. Activities in the park that could contribute to air pollution in the region include boat traffic in the bay, park vehicles, and private vehicles. These activities would not be expected to increase as part of this plan. Some proposed actions in the park could decrease local air quality in the short term. These actions include development of visitor facilities on the keys, particularly in alternatives 2 and 3—in particular, there could be an increase in dust and other particulate matter during construction. These impacts could be reduced through use of best management practices to reduce the impacts of proposed development on air quality. With these mitigation measures, the alternatives being considered in this document would result in negligible effects on air quality in both the short and long term. Therefore, air quality was dismissed from further analysis.

#### ***Wilderness and Wild and Scenic Rivers***

Wilderness and wild and scenic rivers are congressional designations designed to protect undeveloped areas and free-flowing rivers. There are no designated wild and scenic rivers and no designated wilderness in Biscayne National Park. No actions proposed in this plan would adversely impact future designation of any rivers or areas that might be suitable for such designations



within the region. Therefore, wilderness and wild and scenic rivers will not be analyzed in this document.

### **Water Resources**

**Water Quality in the Bay.** The park's water quality issues result from human-caused influences and the proximity to the more than 2 million people in the Biscayne Bay watershed. Water quality issues for the park are primarily: water clarity; nutrient loading and enrichment, bacterial enrichment due to sewage input, unregulated classes of chemical compounds derived from both sewage and industrial uses that are commonly called environmental pollutants of concern (EPOCs) or microconstituents, pesticides, and more traditional industrial and stormwater pollutants (BBPI 2000; Miami-Dade Government/WASD Website; Lietz and Meyer 2006; Ecology and Environment 2007). Input of these compounds generally occurs through groundwater seepage, canal inflow, surface runoff, or direct release by boats (Alleman et al. 1995; BBPI 2000).

The hydrogeology of Miami-Dade County results in the rapid movement of groundwater with direct subsurface connection to the bay and canals through the unconfined Biscayne Aquifer (Klein and Hull 1978; Lietz 1999). Stormwater and surface water runoff are routed to canals as overland flow or via subsurface infiltration and can move directly into the bay or indirectly as inflow to groundwater with storm-driven flow carrying the most diverse collection of compounds, including fecal coliform bacteria, nutrients, pesticides, herbicides, petroleum byproducts, chlorinated solvents, metals, wastewater compounds, and sediment (Migliaccio and Castro 2009; Alleman et al. 1995; BBPI 2000; Caccia and Boyer 2005, 2007). In addition to terrestrial sources, the large number of private boaters using the bay and ocean waters has the potential to discharge sewage and bilge water directly to the park, which includes oil, grease, fuel, hydrocarbon contaminants, and sewage from marine

heads (bathrooms). The overall impact from direct marine discharge may be minimal on a loading basis because of volume, however because of the mobile nature of the source, it will be determined and concentrated by boater use patterns and the ability to reach normally isolated areas.

During an extensive review of issues affecting Biscayne Bay a multiagency, multistakeholder team, The Biscayne Bay Partnership Initiative reviewed issues affecting water quality and resulted in the following findings:

“Canal inflow is the primary mechanism for pollutant delivery to the bay. Groundwater nutrient inputs to the bay are more prevalent in the Southern Bay. An increase in nutrient loading is correlated to an increase in population density (Caccia and Boyer 2007). Pollutant loading to the bay can increase substantially during storm events (Briceno et al. 2010; Migliaccio and Castro 2009). In addition, nutrient loading to the bay appears to be affected by climatic cycles with an observed increase in loading rates in wetter years and lower loading rates in drier years (Caccia and Boyer 2007). Sustained increases in fecal coliform levels have been observed in the Southern Bay (Migliaccio and Carey 2008). Whereas, chlorophyll-a concentrations have demonstrated an increasing trend throughout the entire bay (Migliaccio and Carey 2008).”

“Mowry Canal and Princeton Canal represent the largest source of nitrate loading to Biscayne Bay and have the highest flow-weighted mean concentrations of all canals discharging into Biscayne Bay (Caccia and Boyer 2005). Mowry Canal and Princeton Canal discharges have led to nutrient enrichment imbalances that have resulted in flora and fauna disturbances in Biscayne Bay, in the vicinity of these canals (Graves et al. 2005; Szmant 1987). Likewise, Arch Creek, Miami

Canal, and Tamiami Canals have exhibited a decline in water quality due to elevated nutrient concentrations (Lietz 1999). In addition, many Miami-Dade canals are determined to be impaired as per the FDEP's 303(d) list, including Military Canal, which drains the Homestead Air Reserve Base (an USEPA superfund site) (FDEP, 2010a)."

Biscayne Bay is affected by atmospheric conditions and there are seasonal changes in rainfall, temperature, and salinity. Seasonal salinity patterns in the bay highlight three broad regions with respect to magnitude and variability of salinity. The first region is in the eastern bay adjacent to the Atlantic Ocean and is characterized by near oceanic salinities that vary little throughout the year. The mid-basin region shows variability during the wet and dry seasons, having somewhat lower average salinities during the peak wet season because of increased freshwater inflow (July–September). The third broad area is on the western side of the bay, which is a lower salinity region with high variability caused by the freshwater discharges from drainage canals (Ault et al. 2001).

Biscayne Bay's water quality has been the subject of monitoring and study for many decades. In the late 1970s, the Miami-Dade Department of Environmental Resources Management, with the support of the state, established a network of surface water monitoring stations in the bay. Florida International University, the U.S. Geological Survey, the National Oceanographic and Atmospheric Administration, and the National Park Service are also conducting additional monitoring. Sediment chemistry studies have also been conducted by various entities during the past 20 years.

The state has designated the bay and its natural tributaries as "Outstanding Florida Waters," and as such the bay receives the highest level of protection from degradation. During the past 40 years water quality in the bay has improved substantially. Water

quality generally meets federal, state, and local standards for recreational uses and propagation of fish and wildlife. However, portions of the bay have been substantially affected by past development and water management practices. Loss of coastal wetlands and seagrass communities has contributed to changes in the physical and ecological water quality characteristics.

Some actions proposed under this plan would have adverse impacts on water quality in the bay, such as construction of boardwalks and dock improvements and changing the level of boating access to certain marine areas. The impacts on water quality from construction activities would primarily result from disturbances to the sediment, which increases turbidity in the water column. The impact of increased turbidity on resources in the bay, such as the seagrass beds, would be mitigated by undertaking construction activities in the winter months when the seagrass beds are the least productive. These impacts would be localized, limited to the construction period, negligible to minor, and adverse.

Because most effects on water quality originate outside NPS control and there would be no impacts of moderate or greater intensity from any action in this general management plan, water quality in the bay will not be analyzed further in this document.

**Surface Water Flow.** Surface water (freshwater) inflow is a primary factor that determines species community structure, distribution, and composition in Biscayne Bay. Historically water entered the bay as it flowed over the land, entering the bay over most of the shoreline. Biscayne Bay has undergone dramatic changes in environmental conditions because of human alteration of natural hydrologic conditions in southern Florida (Ault et al. 2001). Water flow into the western portion of the bay has been heavily altered by the construction of 19 water management canals that drained wetlands and released water in pulses to prevent flooding and to facilitate drainage.

The alterations in the amount, timing, and distribution of fresh water flowing into coastal marine waters has changed the temperature, salinity, and nutrient regimes and degraded estuarine and nearshore marine habitats (Serafy et al. 1997; South Florida Water Management District 1995).

For example, the canals create unnatural freshwater discharge points into the bay. After storms, large amounts of fresh water move into the western portion of the bay from these 19 discharge points. Fish kills, benthic community die-offs, and turbidity plumes are associated with these large pulses of freshwater following major storms. The alteration of increased salinity along the western edge of the bay has been attributed to the reduction in the number of some mollusk species, including *Melonga*, *Neritina*, and *Melampas* (NPS 1993).

No proposed action in this plan would alter the surface water flow regime in into the waters of Biscayne Bay because surface water sources originate outside park boundaries and they are managed by other entities. Therefore surface water will not be further analyzed as part of this plan. The National Park Service is working with the South Florida Water Management District and Miami-Dade County to determine if wastewater reuse can be treated to levels that would be clean enough to hydrate the park's coastal wetlands.

**Groundwater.** The source of the groundwater flow into the bay is the Biscayne Bay Aquifer, which underlies lower southeastern Florida and extends beneath Biscayne Bay. Water quality in the aquifer is threatened by both terrestrial sources and salt water intrusion that results from changes in water flow characteristics. Data from the Biscayne National Park Hydrographic Project shows that groundwater is seeping into offshore coral reefs on a tidal cycle. Terrestrial sources of pollution could then impact marine reef systems because of the groundwater connection. Historically freshwater springs were located on the shoreline of Biscayne Bay. As a result of

hydrological changes in South Florida, these springs generally no longer flow. This presents a particular water quality management challenge because this aquifer provides the only source of drinking water from Boca Raton to the Keys. The park has concerns related to groundwater quality and its impact on park resources.

The park will continue to work with management entities to improve the quality of groundwater flow entering the park. None of the actions proposed in this plan would increase the potential for groundwater contamination from terrestrial sources or salt water intrusion. These potential sources of groundwater contamination originate outside the park, and no actions proposed in this management plan would affect these sources. For this reason groundwater has been dismissed as an impact topic for this plan.

### **Wildlife**

Most wildlife species found in the park are associated with the ocean or shoreline habitats. These include mammals, birds, reptiles, and invertebrates.

**Mammals.** There are 28 species of mammals in the park. Most of these species are small rodents although bobcat, raccoon, and striped skunk are also found within the park. The population of all mammals within the park appears to be stable, with the exception of bobcats because sightings of bobcats have declined. Some actions in this plan could have an adverse impact on resident mammals in the park, particularly those that live on the keys. These proposed actions include development of visitor facilities, which could attract some animals because of the potential availability of food. If individual animals become habituated to eating food associated with park facilities, this could be a hazard for both the animals and visitors. The park will implement measures to reduce the amount of food available to animals in the park from human sources. These measures could include, but are not limited to, timely removal of trash

from the park as well as installation of rodent-proof trash receptacles. With mitigation, the impacts of this plan on resident terrestrial mammal population would be negligible. Therefore the potential impacts on these species will not be analyzed in this document.

**Marine Wildlife.** Three Marine mammals species reside in the park. Manatees, river otters and Atlantic bottlenose dolphins are full-time residents in the park. Occasionally, park staff have observed whales outside the boundaries, but the water in the park is too shallow for whales to inhabit the park.

A large diversity of crustaceans occur in the park, although only a limited number of shrimp, lobster, and crab species are managed as fishery-targeted species.

Management of the above species is governed by state and federal laws. None of the proposed alternatives in this plan would alter management actions or obligations of the U. S. government or the National Park Service relative to these species in the park. Therefore this topic will not be analyzed in the plan.

The manatee, a federally listed endangered species, is also found in the park. The impacts of this plan on manatees in the park and their habitat are analyzed in the section on threatened and endangered species.

## Cultural Resources

### *Ethnographic Resources*

Ethnographic resources are defined by the National Park Service as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS 28, *Cultural Resource Management Guideline*, 181). Ethnographic resources was dismissed as an impact topic because to date no ethnographic resources or ethnographic landscapes have been identified in Biscayne

National Park, and no traditional cultural properties in the park have been listed or been determined eligible for listing, in the National Register of Historic Places.

The “Biscayne National Park Ethnographic Overview and Assessment” (Downs et al. 2003) provided an overview of groups shown to have traditional associations with Biscayne National Park. These groups included recreational and commercial fishers, the boating community, recreational divers, people with connections to Stiltsville, tow boat operators, environmentalists, contemporary Seminole and Miccosukee Indians, South Florida African-Americans, and descendants of families of homesteaders and other former island residents and landowners.

While no specific ethnographic landscapes were identified in the overview and assessment, there are specific places in the park that are important to members of these groups. Some of these include Stiltsville, the Parson Jones Homesite on Porgy Key and associated farmstead on Totten Key, and prehistoric Native American archeological sites. All of these resources are protected by existing policies, law, and regulations and the National Park Service will strive through ongoing consultations to develop and accomplish park programs in a way that respects the beliefs, traditions, and other cultural values all the identified groups who have ancestral or traditional ties to the park lands.

### *Museum Collections*

As of October 4, 2009, Biscayne National Park’s museum collections consist of 855,409 objects. These include archeological (32,379) and ethnological (1) objects that were systematically recovered in the park’s boundaries and associated field records; natural history (2,362 biological) specimens related to the ecosystems represented in the park; and historic (427) objects and archival documents (815,784) related to the park’s history.

Currently, Biscayne National Park's museum collections are located in several repositories, including the NPS Southeast Archeological Center (primarily archeological objects) in Tallahassee, Florida; the South Florida Collections Management Center (primarily natural history or biological specimens) in Everglades National Park; and several buildings in the headquarters complex (primarily archival documents) at Biscayne National Park. In addition, underwater archeological project archives associated with Biscayne National Park are at the NPS Submerged Resources Center in Denver, Colorado.

The South Florida Collections Management Center manages the museum collections for Biscayne National Park, De Soto National Memorial, Dry Tortugas National Park, Everglades National Park, and other NPS areas in South Florida and the Caribbean. It provides high-quality, professional museum collection management services, ensuring that the park's museum collections are accessioned and cataloged, preserved, protected, and made available for access and use according to NPS standards and guidelines.

Museum collections (prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens) was dismissed as an impact topic because Biscayne National Park does not maintain its museum collections (with the exception of archival documents), and none of the alternatives considered in this plan would affect the collections.

### ***Indian Trust Resources***

Secretarial Order 3175 requires that any anticipated impacts on Indian trust resources from a proposed project or action by agencies of the Department of the Interior be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it

represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

According to the NPS American Indian Liaison Office's list of "National Parks, Tribal Trust Land, and Indian Reservations," there are no Indian trust resources in Biscayne National Park. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians because of their status as Indians. Therefore, Indian trust resources were dismissed as an impact topic.

### **Other Topics**

#### ***Natural or Depletable Resource Requirements and Conservation Potential***

None of the alternatives being considered would result in the extraction of resources (with the exception of fish) from the park. Under all of the alternatives, ecological principles would be applied to ensure that the park's natural resources were maintained and not impaired. Therefore this topic has been dismissed from further consideration in this plan.

#### ***Energy Requirements and Conservation Potential***

The action alternatives would result in a negligible change in energy consumption compared to current conditions. The National Park Service would pursue sustainable practices whenever possible in all decisions regarding park operations, facilities management, and development in Biscayne National Park. Whenever possible, the Park Service would use energy conservation technologies and renewable energy sources. Because the change in energy consumption at the park under any proposed alternative would be negligible, this topic will not be analyzed in this document.

#### ***Public Health and Safety***

The proposed developments and actions in the alternatives would not result in any

identifiable adverse impacts on human health or safety. The alternatives were designed to take these factors into consideration and to remove them wherever possible. This topic will not be analyzed further.

### *Environmental Justice*

On February 11, 1994, President Clinton signed Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” This order requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs/policies on minorities and low-income populations and communities. The Secretary of the Interior established Department of the Interior policy under this order in an August 17, 1994, memorandum. This memorandum directs all bureau and office heads to consider the impacts of their actions and inactions on minority and low-income populations and communities; to consider the equity of the distribution of benefits and risks of those decisions; and to ensure meaningful participation by minority and low-income populations in the department’s wide range of activities where health and safety are involved.

For fulfilling Executive Order 12898, in the context of the National Environmental Policy Act, the planning team assessed the alternatives presented in this plan during the planning process. The team determined that none of these alternatives would result in substantial direct or indirect negative effects on any minority or low-income population or community as defined in the Environmental Protection Agency’s *Environmental Justice Guidance* (1998).

The following information contributed to this conclusion.

- The developments and actions in the alternatives would not result in any identifiable human health effects.

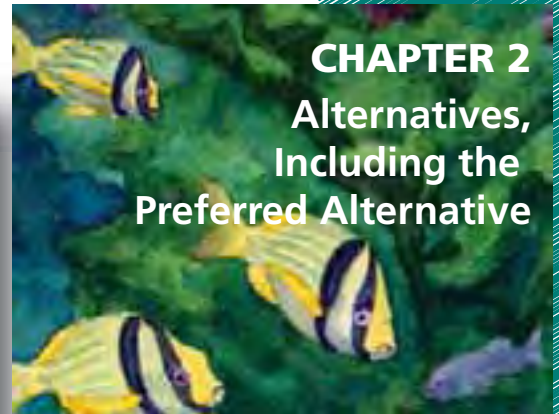
Therefore, there would be no direct or indirect effects on human health within any minority or low-income population or community.

- The impacts on the natural and physical environment that would occur because of any actions proposed in the alternatives would not disproportionately adversely affect any minority or low-income population or community, or be specific to such populations or communities.
- The proposed alternative actions would not result in any identified effects that would be specific to any minority or low-income community.
- The park staff has consulted and worked with the affected Native American tribes in cooperative efforts to manage the recreational potential of the park and its resources effectively and will continue to do so. No adverse effects were identified that disproportionately affect the tribes.

The National Park Service has dismissed Environmental Justice as an impact topic in this document.

### *Relationships between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity*

Under any alternative, the National Park Service would continue to maintain natural ecological processes and native biological communities wherever feasible. Under alternatives 2, 3, and 4, there would be a slight increase in the park’s development footprint from the construction or upgrade of new trails and facilities. This footprint change would be so small (1 to 3 acres total) that it would not result in a substantial loss of long-term productivity. Natural resource management actions to increase ecosystem health would continue or be enhanced in all action alternatives, which would increase long-term productivity. Because there would be no substantial change in the relationship between short-term uses of the environment and long-term productivity, this topic is dismissed from further analysis.



## CHAPTER 2

### Alternatives, Including the Preferred Alternative







# INTRODUCTION

Many aspects of the desired future condition of Biscayne National Park are defined in the establishing legislation, the national park's purpose and significance statements, and the servicewide mandates and policies that were briefly described earlier and are detailed in appendix B. Within these parameters, the National Park Service solicited input during scoping sessions from the public, NPS staff, government agencies, tribal officials, and other organizations regarding issues and desired conditions for the national park. Planning team members gathered information about existing visitor use and the condition of the national park's facilities and resources. They considered which areas of the national park attract visitors, and which areas have sensitive resources.

Using the above information the planning team developed a set of nine management zones and five alternatives to reflect the range of ideas proposed during scoping sessions.

This chapter describes the management zones and the alternatives for managing the national park for the next 20 to 30 years. It includes tables that summarize the key differences between the alternatives and the key differences in the impacts that are expected from implementing each alternative. (The summary of impacts table is based on the analysis in Chapter 4, "Environmental Consequences.") This chapter also describes mitigative measures that would be used to lessen or avoid impacts, the future studies that would be needed, and the environmentally preferred alternative.

## USER CAPACITY

General management plans for national park system units, including Biscayne National Park, must address user capacity management. The National Park Service defines user capacity as the type and extent of visitor use

that can be accommodated while sustaining the quality of a park unit's resources and visitor experiences consistent with the park unit's purpose.

Managing user capacity in national parks is inherently complex and depends not only on the number of visitors, but also on where they go, what they do, and the "footprints" they leave behind. In managing for user capacity, park staff relies on a variety of management tools and strategies, rather than relying solely on regulating the number of people in a park. The ever-changing nature of visitor use in parks requires a deliberate and adaptive approach to user capacity management.

The foundations for making user capacity decisions in this general management plan are the park's purpose, significance, special mandates, and management zones. The purpose, significance, and special mandates define why the park was established and identify its most important resources and values, including visitor experience opportunities that should be protected and/or provided. The management zones qualitatively describe the desired resource conditions and visitor experiences, including appropriate recreation activities, for different locations throughout the park. These elements of the framework are the most important to long-term user capacity management because they direct the National Park Service on how to best protect resources and visitor experiences while offering a diversity of visitor opportunities.

Based on the desired conditions, indicators and standards are identified. An indicator is a measurable variable that can be used to track changes in resource and social conditions related to human activity so that existing conditions can be compared to desired conditions. A standard is the minimum acceptable condition for an indicator. The indicators and standards help translate the

broader qualitative descriptions of desired conditions in the management zones into measurable conditions. As a result, park managers can track changes in resource conditions and visitor experiences and provide a basis for determining whether desired conditions are being met. Monitoring the indicators and standards also helps NPS staff evaluate the effectiveness of management actions and provides a basis for informed management of visitor use.

For each indicator and standard, a range of relevant management actions are described that could be taken to maintain or restore desired conditions. For example, management actions may include providing information about low-impact recreational use and the principles of “Leave No Trace”; directing visitors to designated facilities or areas; adding or altering facilities (e.g., trails, campsites) for containment of use to designated areas; directing visitors to lesser-used areas or off-peak times; restricting the types of recreation activities permitted; and/or reducing the amount of visitor use in certain areas.

User capacity decision making is a continuous process; decisions are adjusted based on monitoring the indicators and standards. Management actions are taken to minimize impacts when needed. Once indicators and standards are identified, they should generally not change in the future. However, as monitoring of the park’s conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and social conditions. Information on NPS monitoring efforts, related visitor use management actions, and any changes to the indicators and standards would be available to the public.

Biscayne National Park is a popular, highly visited national park with extensive and diverse visitor opportunities. In addition, the park contains unique natural and cultural resources including coral reefs, seagrass, and submerged shipwrecks that are highly vulnerable to visitor use impacts. Further, visitor use opportunities largely occur over an extensive water resource that is without many

designated visitor facilities and use areas that make regulating use levels, activities, and patterns difficult. Managing user capacity in this unique setting is highly challenging.

Given these challenges and limited staff and budgets, user capacity management must use funds and staff time efficiently, focus on areas of most concern within the park, and develop creative approaches with monitoring and management strategies.

This management plan will provide guidance for a long-term, comprehensive strategy to manage user capacity. This information will help guide the strategic use of limited park staff and funding regarding future user capacity management. This guidance includes the following components.

- The management zones, described later in this chapter in Table 2, provide the basis for managing user capacity. Each zone prescribes desired resource conditions, visitor experiences, and recreational opportunities for different areas of the park. The zones also prescribe the types and levels of developments necessary to support these conditions, experiences, and opportunities.
- The park’s most pressing use-related resource and visitor experience concerns, given the park’s purpose, desired conditions, and the vulnerability of specific resources and values, will be identified. This helps NPS managers focus limited resources on the most important issues and related indicators.
- User capacity indicators and standards, assigned by zone, will be monitored in the future to determine if desired conditions are being met.
- A general description of related monitoring strategies will be provided.
- Representative examples of management strategies that could be used to avoid or minimize unacceptable impacts from visitor use will be identified.

Table 1 describes the user capacity indicators, standards, monitoring, and management strategies for Biscayne National Park. This information was developed after careful consideration of key aspects of desired resource conditions and visitor experiences, public scoping information, relevant research studies, staff management experience, and other park data sources. The planning team considered many potential issues and related indicators that would identify impacts of concern, and those described in the table were considered the most salient given the importance and vulnerability of the resource or visitor experience affected by visitor use.

The priority resource indicators selected for Biscayne are associated with the issues of disturbance of viable fish populations, damage to seagrass and coral reefs, impacts on submerged and land-based cultural resources, and visitor experience/use conflicts. The conditions of these resources are already being monitored in various forms, but the indicators identified in the table will help the park's staff track specific impacts on these resources resulting from visitor use.

Impacts on viable fish populations from fishing activities can include overharvesting, violations of fishing regulations, and marine debris. These types of impacts can have substantial effects on the abundance and diversity of targeted fish species, and they can also reduce the quality of fishing opportunities. Visitor use impacts on seagrass are mostly associated with anchor damage, vessel groundings, and intentional vessel beachings. These impacts can cause substantial loss of seagrass, which is a critical link in the proper functioning of the marine ecosystem. Impacts on coral reefs, such as broken, scoured, or displaced/ stolen corals, are often a result of snorkeling and diving activities, anchor damage, and vessel groundings. These impacts can affect the health of specific coral communities as well as having more far-reaching effects on the structure and diversity of coral species within the park. These impacts can also diminish the quality of snorkeling and diving opportunities.

Visitor use impacts on land-based cultural resources include general wear on historic structures and some occurrences of looting and vandalism. Cultural resources are nonrenewable, so harmful impacts must be minimized to the extent possible. Submerged cultural resources are affected by many of the same issues as coral reefs in terms of snorkeling and diving activities, anchor damage, vessel groundings, and theft/looting. These impacts can disturb important features of these resources as well as the protective layers of natural material concretion on the sites, both of which may cause a loss of site integrity over time.

The priority social indicators selected for Biscayne National Park are associated with the issue of use conflicts. This includes both water- and land-based concerns such as crowding, noise, competition for sites/ facilities, and violations of regulations. The visitor activities near the degraded seagrass beds in the park are a focal area of concern related to some of these issues. These problems may affect visitors' abilities to experience high quality recreational opportunities and could also affect visitor health and safety. Many of these concerns are already tracked to some degree through law enforcement incident reporting and recording of visitor complaints.

Many of the problems just noted, such as impacts on coral reefs and seagrass, are also highly influenced by regional and worldwide threats such as pollution, disease, and climate change. Isolating visitor use impacts on these resources is not easy and may seem less important than these other serious threats. However, managing visitor use impacts is still essential given that water-based recreation is increasingly popular in southeast Florida and throughout the country, so protecting desired conditions will only be more challenging in the future. Further, there are visitor management actions that can help minimize these impacts and provide tangible resource and social benefits (Sorice et al. 2007).

The standards selected for each indicator were based on best professional management

judgment and the general management plan's desired conditions, the park's baseline conditions for each indicator, relevant park-specific and national research studies, and NPS guidelines and standards.

The monitoring and management strategies included in table 1 provide a general description of the range of considerations for future monitoring and visitor management related to each indicator. The implementation of any specific management actions that affect visitor use will comply with the National Environmental Policy Act, the National Historic Preservation Act, and other relevant laws, regulations and policies.

The park would continue general monitoring of use levels and patterns. In addition, the park would monitor these user capacity indicators. The rigor of monitoring the indicators (e.g., frequency of monitoring cycles, amount of geographic area monitored) may vary considerably depending on how close existing conditions are to the standards. If the existing conditions are far from exceeding the standard, the rigor of monitoring may be less than if the existing conditions are close to or trending towards the standards.

In addition, the initial phases of monitoring for the indicators/standards defined in table 1 would help park staff identify if any revisions are needed. The initial testing of the indicators and standards would determine if the indicators are accurately measuring the conditions of concern and that the standards truly represent the minimally acceptable condition of the indicator. Park staff may decide to modify the indicators or standards and revise the monitoring program if better ways are found to measure changes caused by visitor use. Most of these types of changes should be made within the first several years of initiating monitoring. After this initial testing period of monitoring indicators and standards, adjustments should not occur unless there is a compelling reason. Finally, if use levels and patterns change appreciably, the park might need to initiate additional monitoring of new indicators to ensure that desired conditions are protected. This iterative learning and refining process is the strength of the NPS user capacity management program because it can be adapted and improved as knowledge grows.

**TABLE 1: USER CAPACITY INDICATORS AND STANDARDS**

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
<b>Topic: Viable Fish Populations</b>				
<p>Multiuse Zone (water)</p> <p>Slow Speed Zone</p> <p>Access-by-Permit Zone</p> <p>Sensitive Underwater Archeological Zone</p>	<p>Harvest of regulated fish species</p> <p>Abundance and density of targeted fish species (Those fish that are specifically sought, such as species in the snapper/grouper group)</p> <p>Fisher satisfaction rate</p>	<p>Harvest of regulated fish species is within legal regulations no less than 70% of the time</p> <p>Abundance and density of targeted fish species maintains or exceeds baseline values when GMP was implemented</p> <p>The fisher satisfaction survey indicates at least 70% satisfaction</p>	<p>Periodic visual fish surveys and harvest monitoring</p> <p>Visitor satisfaction survey questions pertaining to fish</p> <p>Survey of fisher satisfaction</p>	<p>Increased awareness of the fishing education course</p> <p>Greater enforcement of fishing regulations</p> <p>Greater efforts towards public education and awareness regarding fishing relations (e.g., recruit volunteers to assist; Spanish language efforts)</p>
<p>Marine Reserve</p>	<p>Average size of targeted fish species</p> <p>Species diversity</p> <p>Abundance and density of targeted fish species</p>	<p>Average size of targeted fish species maintains or exceeds baseline values when reserve was implemented</p> <p>Species diversity maintains or exceeds baseline values when reserve was implemented</p> <p>Abundance and density of targeted fish species maintains or exceeds baseline values when reserve was implemented</p>	<p>Periodic visual fish surveys</p> <p>Visitor satisfaction survey questions pertaining to fish</p>	<p>Greater enforcement of no-fishing zones</p> <p>Greater efforts towards public education and awareness (e.g., recruit volunteers to assist; Spanish language efforts)</p> <p>Better marking of the Marine Reserve Zone</p>

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
Noncombustion Engine Use Zone	Harvest of regulated fish species Abundance and density of targeted fish species Fisher satisfaction rate	Harvest of regulated fish species is within legal regulations no less than 70% of the time Abundance and density of targeted fish species maintains or exceeds baseline values when GMP was implemented The fisher satisfaction survey indicates at least 70% satisfaction	Periodic seining fish surveys Visitor satisfaction survey questions pertaining to fish Survey of fisher satisfaction	Increased awareness of the fishing education course Greater enforcement of fishing regulations Greater efforts towards public education and awareness regarding fishing relations (e.g., recruit volunteers to assist; Spanish language efforts)
<b>Topic: Seagrass</b>				
Multiuse Zone (water) Slow Speed Zone Access-by-Permit Zone Sensitive Underwater Archeological Zone Noncombustion Engine Use Zone Marine Reserve Zone	Average number of new groundings per year Areal extent of seagrass beds	Average number of new groundings per year in seagrass beds does not exceed baseline values when reserve was implemented Areal extent of seagrass beds maintains or exceeds baseline values when reserve was implemented	Assess damage from reported and unreported groundings Look for unreported grounding sites Monitor restored sites Monitor visitor use (e.g. trailer counts, registered boater stats, etc.)	Better marking of shallows Greater efforts towards public education and awareness (e.g., recruit volunteers to assist; Spanish language efforts; participate in marine fairs) Greater enforcement of violations and increased ranger response to groundings Monitor natural recovery Active restoration and monitoring (bird stakes, substrate restoration, seagrass transplanting)
<b>Topic: Coral Reefs</b>				
Multiuse Zone (water) Sensitive Underwater Archeological Zone Marine Reserve	Number of new reported and unreported reef groundings per year Areal extent of new reef groundings per year Fishing debris volume and	Number of new reported and unreported reef groundings per year does not exceed baseline values when reserve was implemented Areal extent of new reef	Damage assessment of groundings Visitor satisfaction survey questions pertaining to reef health Overflights to do boat	Installation of mooring buoys Greater efforts towards public education and awareness (e.g., recruit volunteers to assist; Spanish language efforts) Reef restoration techniques as

Table 1: User Capacity Indicators and Standards

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
<i>Note: There are no coral reefs in the other water-based zones</i>	coverage on coral reefs, seagrass beds, and submerged archeological sites	groundings per year does not exceed baseline values when reserve was implemented Fishing debris volume and/or coverage does not exceed baseline values when reserve is implemented	counts Periodic assessments of fishing debris (e.g. during visual fish surveys)	outlined in the park's <i>Coral Reef Restoration Programmatic Environmental Impact Statement</i> (in progress) Volunteer clean-up events for marine debris Marine debris removal as mitigation (e.g., derelict trap removal)
Marine Reserve	Visitor damage at sites within 1,000 feet of mooring buoys (damage includes broken coral, garbage associated with divers and snorkelers, and damage to submerged cultural resources)	No more than 5% increase in broken coral or garbage relative to initial assessment when mooring buoy was first installed; no damage to submerged cultural resources	Periodic monitoring by park staff and volunteer observations of selected sites	Greater efforts towards public education and awareness (e.g., recruit volunteers to assist; Spanish language efforts) Enforcement of violations and increased ranger presence Relocate mooring buoys to allow active or passive restoration of corals Add mooring buoys to displace or diffuse impacts Document submerged cultural resources and consult with state historic preservation officer
<b>Topic: Cultural Resources</b>				
Multiuse Zone (land)  Administrative Zone	Change in facility condition as a result of visitor use (using the Facility Condition Index) Evidence of missing historical artifacts, defacement, or damage	No more than a FCI change of 1% from established base line of all structures when GMP was implemented No missing historical artifacts, defacement, or damage	Annual condition assessments and regular inspections by maintenance personnel with work orders created to track deferred maintenance	Greater efforts towards public education and awareness regarding resource sensitivities and the need for appropriate behaviors Enforcement of violations and increased ranger presence Modify regulations to reduce visitor conflicts.

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
Multiuse Zone (water)	Number of shipwreck cleanups required to maintain sites	No more than two cleanups per assessment period	Regular monitoring by annual condition assessments	Greater efforts towards public education to encourage voluntary redistribution of use
Nature Observation Zone	Percent increase in the debris field as a result of visitor use	No more than a 5% increase in the debris field relative to the annual assessment when the GMP was implemented	Periodic monitoring by park staff and volunteer observations of selected sites	Enforcement of violations and increased ranger presence
Sensitive Underwater Archeological Zone	Evidence of missing historical artifacts, defacement, or damage	No missing archeological artifacts, defacement, or damage	Reinspection after storms to start new baseline for reference of visitor impact	Regulate use levels and patterns (e.g., institute a permitting or reservation system, limit group sizes)
Multiuse Zone (land)	Percent increase in the debris field as a result of visitor use	No more than a 5% increase of the debris field relative to the annual assessment when the GMP was implemented	Regular monitoring by annual condition assessments	Greater efforts towards public education and awareness regarding resource sensitivities and the need for appropriate behaviors
Nature Observation Zone	Evidence of missing historical artifacts, defacement, or damage	No missing archeological artifacts, defacement, or damage	Periodic monitoring by park staff and volunteer observations of selected sites	Enforcement of violations and increased ranger presence
			Reinspection after storms to start new baseline for reference of visitor impact	Regulate use levels and patterns (e.g., institute a permitting system, designate single-use permits)
				Site closure
Marine Reserve	Visitor damage at sites within 1,000 feet of mooring buoys (damage includes broken coral, garbage associated with divers and snorkelers, damaged submerged cultural resources)	No more than 5% increase in broken coral or garbage relative to initial assessment when mooring buoy was first installed; no damage to submerged cultural resources	Periodic monitoring by park staff and volunteer observations of selected sites	Greater efforts towards public education and awareness (e.g., recruit volunteers to assist; Spanish language efforts);
				Enforcement of violations and increased ranger presence
				Relocate mooring buoys to allow active or passive restoration of corals
				Add mooring buoys to displace or diffuse impacts
				Document submerged cultural resources and consult with state



Table 1: User Capacity Indicators and Standards

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
				historic preservation officer
<b>Topic: Visitor Experience/Use Conflicts</b>				
All zones	Number of incidents of user conflicts requiring law enforcement attention or intervention resulting in a case incident report/warning/citation	No more than five law enforcement incidents per day and an average of two per day, on an annual basis	Continue existing tracking of case incidents	Greater efforts towards public education and awareness regarding visitor use etiquette and park regulations Greater enforcement of existing visitor use regulations and increased ranger presence Modify regulation as necessary to reduce visitor conflicts
Visitor Services/ Administrative Zone	Number of times visitor center parking lot has exceeded its physical capacity	Allowable once a month or during special events	Regular monitoring by park staff at the entrance gate	Greater efforts towards public education to encourage voluntary redistribution of use Explore ways to increase parking lot capacity through striping and parking time limitations Encourage carpooling to site via press releases/website Develop overflow parking area and use when needed Develop and use alternative parking areas (e.g., adjacent to the park)

CHAPTER 2: ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
Visitor Services/ Administrative Zone	In the Boca Chita boat basin and the Elliott Key docks, number of times improper mooring occurs as a result of island marinas reaching capacity	No tolerance as per "Superintendent's Compendium"	Periodic monitoring by park staff and volunteer observations of selected sites	Greater efforts towards public education to encourage voluntary redistribution of use Greater efforts toward public education regarding pertinent park regulations Greater enforcement of existing visitor use regulations Increased number of signs and information related to proper mooring locations and regulations
Visitor Services/ Administrative Zone	Number of times group camping exceeds limits	No more than once per month	Periodic monitoring by park staff and volunteer observations of selected sites	Greater efforts towards public education to encourage voluntary redistribution of use Greater enforcement of existing visitor use regulations and increased ranger presence
Visitor Services/ Administrative Zone	Number of times individual campsites are seen outside of the designated camping area	No more than once per week	Periodic monitoring by park staff and volunteer observations of selected sites	Greater efforts towards public education to encourage voluntary redistribution of use Greater efforts towards public education on camping policies Better delineation of existing campsites Greater enforcement of existing visitor use regulations and increased ranger presence

Table 1: User Capacity Indicators and Standards

Assigned Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
All areas with mooring buoys	Number of complaints received that mooring buoy capacity is met and boats are unable to moor in their desired location	No more than 10 complaints per day	Continue existing tracking of complaints	<p>Greater efforts towards public education to encourage voluntary redistribution of use</p> <p>Change the number and location of mooring buoys consistent with the Mooring Buoy and Marker Plan</p> <p>Greater enforcement of existing visitor use regulations</p> <p>Implement adaptive management strategies from the Mooring Buoy and Marker Plan</p>

## BOUNDARY MODIFICATION

The National Park Service is required to analyze the need for possible modifications to a park's external boundaries in all general management plans.

Biscayne National Monument was authorized by an act of Congress in 1968, expanded in 1974, and redesignated as a national park and expanded again in 1980. The current boundary is considered adequate to protect and manage the park's fundamental resources with the following exception.

The park boundary could be expanded westward, northward, and/or southward to assist in providing continued visitor services and park operations with the predicted sea level rise related to climate change. If lands meeting NPS needs/requirements become available in the future, a boundary assessment would be completed. The boundary could then be modified as authorized by Section 101 of PL 96-287. These actions would be carried out by the NPS land acquisition office in Naples, Florida.

## MANAGEMENT ZONES AND ALTERNATIVES

The building blocks for reaching an approved plan for managing a national park system unit are the management zones and the alternatives. All are developed within the scope of the park's purpose, significance, mandates, and legislation.

Management zoning is a set of descriptions of desired conditions for park resources and visitor experiences in different areas of the park. The management zone descriptions identify the widest range of potential appropriate resource conditions, visitor experiences, and facilities for the park that fall within the scope of the park's purpose, significance, and special mandates. Nine management prescriptions have been identified for Biscayne National Park (see later description of these zones). It may help to think of the management zones as the colors

an artist has in front of him with which to paint a picture.

Each of the alternatives has an overall management concept and a description of how different areas of the national park would be managed (management zones and related actions). The concept for each alternative gives the artist (or in this case the planners) the idea for what the picture (alternative) is going to look like. For example, perhaps one management zone is called "backcountry" and another zone is called "frontcountry recreation." An alternative whose concept is to keep most of the park in an undeveloped and natural/wild condition would have more of the "backcountry" zone than the frontcountry recreation zone. Both zones might also be larger or smaller and in different locations in different alternatives, depending on the overall concept for each alternative.

This *Draft General Management Plan / Environmental Impact Statement* presents five alternatives, including the National Park Service's preferred alternative, for future management of Biscayne National Park. Alternative 1, the "no-action" alternative that presents a continuation of existing management direction, is included as a baseline for comparing the consequences of implementing each alternative. The action alternatives (alternatives 2 through 5) present different ways to manage resources and visitor use and improve facilities and infrastructure at the national park. These alternatives embody the range of what the public and the National Park Service want to see accomplished with regard to natural resource conditions, cultural resource conditions, visitor use and experience, park operations, and the socioeconomic environment at Biscayne National Park. The actual configurations for each action alternative were developed by overlaying the management zones (described later) on a map of the park.

As noted above in the "Guidance for Planning" section, the National Park Service would continue to follow servicewide mandates, laws, and policies regardless of the alternatives considered in this plan. These

mandates and policies are not repeated in this chapter. However, other proposed actions *do* differ among the alternatives. These alternative actions are discussed in this chapter.

## IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The alternatives were considered from a number of different perspectives, including comments received on the alternatives newsletter and during public and stakeholder workshops and a preliminary analysis of potential impacts. With these and other elements in mind, the preferred alternative was chosen by the National Park Service through a process called Choosing by Advantages (CBA). This process is a logical, traceable, decision-making process that allows evaluation of the relationship between results and costs to identify the alternative with the greatest value in accomplishing NPS functional goals and objectives. Developed for use in the public agency decision-making environment, the CBA process focuses on the advantages between alternatives and determines the importance of those advantages based on the park's purpose and related public interest. In using the CBA process, the National Park Service asks

- What are the advantages of each alternative proposed for consideration?
- How important are these advantages?

- Are those advantages worth their associated cost?

Through the CBA process, the planning team identified and compared the relative advantages of each alternative according to a set of factors. The benefits or advantages of each alternative were compared for each of the following CBA factors:

- improve, protect, and restore cultural and natural resources
- provide for and improve visitor experience opportunities
- improve efficiency of park operations

The relationships between the advantages and costs of each alternative were established. This information was used to determine which of the alternatives has the greatest value.

Using the CBA process, the planning team determined that alternative 4 had the highest cumulative score when all three factors were combined. Alternative 4 gives the National Park Service the greatest overall advantage for the factors listed above for the cost (the greatest value). Alternative 4 would provide an overall high level of protecting and restoring cultural and natural resources, provide for and improve visitor experience opportunities, park operational efficiency. Alternative 4 will also benefit the local socioeconomic environment. Therefore, alternative 4 is the NPS preferred alternative.

## MANAGEMENT ZONES

Management zones define specific resource conditions and visitor experiences to be achieved and maintained in each particular area of the national park under each of the action alternatives (the no-action alternative does not have zoning). Each zone description includes the types of activities and facilities that are appropriate in that zone.

In formulating the alternatives, the management zones were placed in different locations or configurations on a map of the park according to the overall intent (concept) of each of the alternatives. That is, the action alternatives represent different ways to apply

the management zones to the national park. The management zones were first presented to the public in *Biscayne National Park General Management Plan Newsletter #3* and were modified in response to public and agency comments.

The nine management zones for Biscayne National Park are presented in table 2. Resource conditions, visitor experiences, and appropriate management actions and facilities are described for each zone. These zoning schemes are part of each alternative (described later).

**TABLE 2: BISCAYNE NATIONAL PARK MANAGEMENT ZONES, ALTERNATIVES 2 THROUGH 5**

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Visitor Services/Park Administration Zone (Concentrated use)	<p>This zone would provide for a high level of visitor activity and administrative operations. The zone would be modified for visitor access and park operations in a way that aesthetically blends with the natural and cultural environment.</p> <ol style="list-style-type: none"> <li>1. Elements of the natural and cultural environment would remain.</li> <li>2. Sights and sounds of human activity would frequently supplant the sights and sounds of nature.</li> <li>3. There would be tolerance for moderate resource impacts to accommodate visitor services and park operations.</li> <li>4. New development of park administrative facilities would occur only on previously disturbed sites. Some development for visitor access and activities might occur. The zone would not be near sensitive natural or cultural resources if such resources could not be adequately protected.</li> <li>5. The significance and vulnerability of cultural resources would be evaluated, and appropriate management actions would be determined. Cultural resources might be stabilized and hardened (protecting archeological values from unauthorized artifact removal or other destructive activities) to permit visitor access or considered for adaptive reuse.</li> </ol>	<p>Visitors would have opportunities to receive orientation and information, interact with park staff, and experience and learn about park resources.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include sightseeing, walking, swimming, recreational fishing, boating, camping, participating in educational activities, and interacting with resources.</li> <li>2. Visitors would see native flora and fauna and might see cultural resources.</li> <li>3. Interpretive and educational opportunities would be greatest in this zone. Visitor activities might be self-directed and/or visitors might use interpretive services to plan their activities. Visitor education could be self-directed or structured.</li> <li>4. Interpretive services would be offered in multiple languages.</li> <li>5. Special events could be allowed in this zone with appropriate permits.</li> <li>6. The probability of encountering others would be high. Visitors would experience a modified environment that accommodates high levels of use and minimizes further resource impacts.</li> <li>7. Facilities and services would enhance opportunities to experience and understand park resources and provide an orientation to the park.</li> <li>8. Visitor activities might be highly regulated to preserve elements of the natural and cultural environment, allow access to cultural resources, prevent visitor conflicts, and enhance public safety.</li> <li>9. Vessel type, size, and speed might be regulated to enhance resource protection and preserve the desired visitor experience.</li> <li>10. Commercial visitor services and facilities would be appropriate in this zone.</li> </ol>	<p>Management actions would focus on managing the higher levels of visitor use within the zone and providing administrative services. Management actions could include</p> <ol style="list-style-type: none"> <li>1. administering daily parkwide operations</li> <li>2. providing maintenance activities</li> <li>3. providing interpretive and enforcement services</li> <li>4. providing emergency services</li> <li>5. implementing resource stewardship</li> <li>6. prioritizing, overseeing, and managing research projects</li> <li>7. defining additional compatible uses</li> <li>8. limiting public access to certain parts of this zone (housing, maintenance, and administration)</li> <li>9. regulating visitor activities and vessel type, size, and speed</li> <li>10. authorizing commercial services</li> <li>11. managing recreational fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations.</li> </ol> <p>Facilities would be appropriate in size and scale, blending with the natural and cultural landscape. Extent, size, and layout would be the minimum needed to accommodate the intended purposes. Existing and new visitor facilities or improvements would be analyzed for ongoing need, usefulness, and impacts on resources. New administrative facilities could be located outside park boundaries.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor facilities could include visitor centers, kiosks, wayside exhibits, educational spaces, observation boardwalks, include roads, parking areas, docks, restrooms, picnic areas, campgrounds, navigational aids, mooring buoys and trails improved and maintained as necessary for handicapped accessibility.</li> <li>2. Appropriate park administrative facilities could include maintenance, storage, offices, and staff housing.</li> </ol>

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
<b>Dredged Navigation Channels Zone (Boat transit in dredged channels)</b>	<p>The purpose of this zone is to allow transportation routes for vessels in existing channels including the Intracoastal Waterway and the Black Point, Homestead Bayfront, and Turkey Point channels.</p> <ol style="list-style-type: none"> <li>1. Natural conditions and processes could be impacted by transportation use of the zone.</li> <li>2. Unnatural sounds might be prevalent.</li> <li>3. Resources within the dredged navigation channels would continue to be impacted by activities that maintain existing channels. Within the channels, moderate impacts on natural conditions would be tolerated. Impacts on resources outside the channels would be kept to an absolute minimum.</li> <li>4. There could be a high level of human use and activity.</li> <li>5. The existing depth, configuration, and alignment of navigational channels would not be expanded, and no new channels would be created. Channels would not exceed the following existing depths within the park: <ul style="list-style-type: none"> <li>Intracoastal Waterway: 7 feet</li> <li>Black Point Channel: 4.5 feet</li> <li>Homestead Bayfront Channel: 4.5 feet</li> <li>Turkey Point Channel: 7.5 feet</li> </ul> </li> <li>6. Channels would be marked with signs and navigational aids to protect resources and enhance public safety.</li> <li>7. The significance and vulnerability of cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>The visitor experience would involve moving along a marked navigational channel by water vessel and would be perceived as linear or sequential in nature.</p> <ol style="list-style-type: none"> <li>1. Appropriate activities would be the use of channels for traveling through the park and/or gaining access into other park areas.</li> <li>2. Visitor activity would be self-directed travel through or within the park at varying speeds, Recreational and commercial fishing that does not impede vessel traffic could be allowed.</li> <li>3. Opportunities for discovery, challenge, and adventure could be low. Visitors would need to be self-reliant and possess navigational skills.</li> <li>4. Visitors would benefit from learning about this zone and how to navigate safely within it.</li> <li>5. Special events would not generally be allowed in this zone.</li> <li>6. There could be a high probability of encountering other people in the zone. Visitors could expect to hear unnatural sounds.</li> <li>7. Because of congested vessel traffic at times, conditions in the navigational channels could be dangerous. Visitors might encounter commercial ships and would need to exercise caution. Visitors would navigate through a well-marked channel of a specified depth. Use could be intensively managed and regulated to ensure safe passage and resource protection.</li> <li>8. Vessel size would generally not be regulated except by conditions of the channel. Speed of vessels in the Intracoastal Waterway would be at a pace that is appropriate to conditions and skill levels.</li> <li>9. Commercial traffic could be allowed in this zone without the requirement of a permit.</li> </ol>	<p>Management activities would focus on resource protection and navigational aids to facilitate safe travel through and within the park. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. regulating visitor activities</li> <li>2. providing law enforcement services</li> <li>3. monitoring resource impacts</li> <li>4. managing these zones for transportation and public safety (there might be overlapping jurisdiction with other agencies; coordination and cooperation with other agencies would occur)</li> <li>5. taking measures to prevent human-caused impacts</li> <li>6. managing recreational and commercial fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations</li> <li>7. dredging (proposed dredging would need a site-specific environmental study and NPS approval)</li> </ol> <p>Facilities appropriate in these zones would include navigational aids and signs for resource protection and enhancing visitor safety.</p>



Table 2: Biscayne National Park Management Zones, Alternatives 2 through 5

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Multiuse Zone (land and water) (Full range of recreational opportunities)	<p>This zone would provide opportunities for visitors to recreate in natural or cultural settings. Natural and cultural scenes would remain largely intact.</p> <ol style="list-style-type: none"> <li>1. Natural conditions and processes would predominate. The environment might be adapted for human use.</li> <li>2. Sounds and sights of human activity might be apparent.</li> <li>3. There would be tolerance for minimal resource impacts.</li> <li>4. Additions to the landscape, including signs, buoys, and markers, might be used to enhance visitor experience and public safety and to protect resources.</li> <li>5. The significance and vulnerability of cultural resources would be evaluated, and appropriate management actions would be determined. To permit visitor access, cultural resources might be stabilized and hardened (protecting archeological values from unauthorized artifact removal or other destructive activities).</li> </ol>	<p>Visitors would experience a natural or cultural setting, whether they are on the water, under the water, or on land. Providing opportunities for people to interact with the resources in this zone would be important. Visitor use of this zone would be resource-based recreation and education that is consistent with park purpose and significance.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include sightseeing, boating, scuba diving, snorkeling, swimming, sport fishing, nature-watching, hiking, picnicking, camping, and visiting cultural resources. Commercial fishing could be allowed.</li> <li>2. There would be opportunities for challenge, adventure, and discovery. Visitors might need to use outdoor skills and be self-reliant.</li> <li>3. Visitor activities might be self-directed, or visitors might use interpretive services to plan their activities.</li> <li>4. Special events could be allowed in this zone with the appropriate permit.</li> <li>5. The probability of seeing or encountering others would range from low to moderate most of the time.</li> <li>6. Occasional special events might result in high levels of visitor encounters for short periods.</li> <li>7. Visitor activities might be limited to protect resources and enhance public safety. Limitations might be short or long term.</li> <li>8. Vessel type, size, and speed could be regulated to enhance resource protection and public safety and preserve the desired visitor experience.</li> <li>9. Commercial fishing would follow the permitting procedures as outlined in the Fishery Management Plan.</li> </ol>	<p>Management actions would focus on enhancing visitor experience and safety, protecting resources, minimizing impacts from visitor and commercial use, and restoring disturbed areas. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. determining types and levels of use by considering the desired visitor experience and resource vulnerability to impact</li> <li>2. managing access based on the determined user capacity</li> <li>3. inventorying and monitoring resources</li> <li>4. providing interpretation and enforcement services</li> <li>5. conducting research and restoring and stabilizing resources</li> <li>6. minimizing and mitigating impacts from visitor and commercial use</li> <li>7. defining additional compatible uses</li> <li>8. managing fishing in consultation with the state</li> <li>9. developing permit systems for various activities</li> <li>10. regulating vessel type, size, and speed</li> <li>11. managing recreational and commercial fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations.</li> </ol> <p>Facilities in this zone would be small, unobtrusive, and dispersed. Facilities would provide basic visitor services, enhance visitor safety, and be compatible with resource protection goals. Facilities could include</p> <ol style="list-style-type: none"> <li>1. primitive trails</li> <li>2. signs, mooring buoys, and navigation markers</li> <li>3. interpretive exhibits</li> <li>4. Restrooms, primitive camping and picnicking sites</li> <li>5. research equipment</li> </ol>

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Slow Speed Zone (Shallow Water Habitat Protection and Visitor Experience)	<p>The preservation of shallow water habitats, restoration of degraded and impacted resources, and continuation of natural processes would be the resource goals in this zone.</p> <ol style="list-style-type: none"> <li>1. Protection and continuation of natural processes .</li> <li>2. Minor impact to Panoramic viewsheds.</li> <li>3. There would be tolerance for minor resource impacts, including noise levels.</li> <li>4. Evidence of human impact would be minimal or part of a cultural scene.</li> <li>5. The significance and vulnerability of the cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Visitors would have opportunities to experience nature.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities would include boating (motorized or non-motorized), sightseeing, recreational fishing, swimming, snorkeling, and nature observation. Commercial fishing would be allowed with hours, engine use, trap type, tackle and location as specified in the <i>Fishery Management Plan</i> or other document.</li> <li>2. Boats with motors could be used when propelled at slow (wakeless) speeds to reduce user conflicts and ensure visitor safety.</li> <li>3. Visitor activities would be mostly self-directed and have minor resource impacts.</li> <li>4. Limited commercial services might provide appropriate visitor recreational activities if compatible with resource protection goals and desired visitor experience</li> </ol>	<p>Management actions would focus on protecting visitors and water-based resources, restoring disturbed areas, minimizing impacts from visitor use, and reducing conflicts between different types of users. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. determining types of use (user capacity) considering the desired visitor experience and the vulnerability of the resources to impacts</li> <li>2. inventorying and monitoring resources</li> <li>3. providing interpretation and enforcement services</li> <li>4. conducting research and restoring and stabilizing resources</li> <li>5. taking measures to prevent human-caused impacts</li> <li>6. defining additional compatible uses</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs and other navigational aids</li> <li>2. research and monitoring apparatus that is minimal and unobtrusive</li> <li>3. mooring buoys and informational markers such as hazard markers</li> </ol>

Table 2: Biscayne National Park Management Zones, Alternatives 2 through 5

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Noncombustion Engine Use Zone (Shallow water habitat and natural sounds protection)	<p>The preservation of natural sounds, near-shore nursery areas and shallow water habitats, restoration of degraded and impacted resources, and continuation of natural processes would be the dominant resource goals in this zone.</p> <ol style="list-style-type: none"> <li>1. Natural processes would predominate.</li> <li>2. Natural sounds, sights, and vistas would prevail. Panoramic viewsheds would remain unaltered.</li> <li>3. There would be tolerance for minor resource impacts.</li> <li>4. Evidence of human impact would be minimal or part of a cultural scene.</li> <li>5. Human-caused intrusions, including visual obstructions, would be kept to an absolute minimum, except for resource protection and visitor safety purposes.</li> <li>6. The significance and vulnerability of the cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Visitors would be immersed in nature with opportunities to experience natural sounds, tranquility, and closeness to nature.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include noncombustion engine boating (paddling, poling, or trolling), sightseeing, recreational fishing, swimming, snorkeling, and nature observation. Commercial fishing could be allowed with hours, engine use, trap type, tackle and location as specified in the <i>Fishery Management Plan</i> or other document.</li> <li>2. Boats equipped with combustion engines could be used when propelled by push-pole or electric trolling motor, with outboard engine tilted up.</li> <li>3. Visitors would be self-reliant and have maximum opportunities to experience a sense of discovery and adventure. Application of outdoor skills would be essential.</li> <li>4. The sights and sounds of nature would be more prevalent than those of human activities. Visitor activities would be mostly self-directed and have minor resource impacts.</li> <li>5. There would be some opportunities for interpretive activities.</li> <li>6. Special events would not be allowed.</li> <li>7. Visitor activities in these zones could be limited in the interest of protecting resources and enhancing public safety. Limitations might be short or long term.</li> <li>8. Use of combustion engines would generally not be allowed. However, in designated areas between 3 feet to 5 feet in depth, the use of combustion engines would be allowed at slow speeds in channels.</li> <li>9. Limited commercial services might provide appropriate visitor recreational activities if compatible with resource protection goals and desired visitor experience.</li> </ol>	<p>Management actions would focus on protecting water-based resources, restoring disturbed areas, minimizing impacts from visitor use, and providing visitors with educational opportunities that encourage resource protection. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. inventorying and monitoring resources</li> <li>2. determining types and levels of use considering the desired visitor experience and the vulnerability of the resources to impacts</li> <li>3. providing interpretation and enforcement services</li> <li>4. conducting research and restoring and stabilizing resources</li> <li>5. taking measures to prevent human-caused impacts</li> <li>6. defining additional compatible uses</li> <li>7. developing a permit system for various activities</li> <li>8. managing recreational and commercial fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations.</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs and other navigational aids</li> <li>2. research equipment — if installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in this zone.</li> <li>3. mooring buoys.</li> </ol>

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
<b>Access-by-Permit Zone</b> <b>(Full range of recreational opportunities; uncrowded, permit system)</b>	<p>The access-by-permit zone would provide opportunities for visitors to recreate in natural or cultural settings where natural processes occur with minor evidence of disturbance from human use. The zone would provide protection for resources such as fish nursery areas and coral reefs.</p> <ol style="list-style-type: none"> <li>1. Natural processes would predominate. This management zones would perpetuate a full complement of native species.</li> <li>2. Natural sounds, sights, and vistas would prevail.</li> <li>3. There would be tolerance for minor resource impacts.</li> <li>4. Evidence of human impact would be minimal or part of a cultural scene.</li> <li>5. Human-caused intrusions, including visual obstructions, would be kept to an absolute minimum, except for resource protection and visitor safety purposes.</li> <li>6. The significance and vulnerability of cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Visitors would be immersed in nature. Visitor activities and access to these zones would be managed through a permit system to provide visitors with opportunities to experience natural sounds, tranquility, closeness to nature and a sense of relative remoteness. Limited numbers of visitors would enjoy a full range of resource-based recreational opportunities.</p> <ol style="list-style-type: none"> <li>1. Appropriate activities could include sightseeing, boating, swimming, snorkeling, scuba diving, and participating in recreational and commercial fishing.</li> <li>2. Visitor activities would usually be self-directed, which would require self-reliance and provide maximum opportunities to experience a sense of discovery and adventure. Application of outdoor skills would be essential.</li> <li>3. Visitors would receive orientation and information, interact with park staff and experience and learn about park resources before and after entering the park. Interpretive and educational opportunities would enable visitors to plan their trip into the park in advance through the permitting system.</li> <li>4. Special events would not be allowed.</li> <li>5. The probability of encountering others would be low. There would be only occasional encounters with others outside of one's social group.</li> <li>6. Vessel type, size, and speed might be regulated to enhance resource protection and preserve the desired visitor experience.</li> <li>7. Visitor activities could be structured through the use of commercial services with groups of limited size.</li> </ol>	<p>Management actions would focus on protecting resources, ensuring visitors have an uncrowded experience, minimizing impacts from visitor use, and providing visitors with educational opportunities that encourage resource protection. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. determining types and levels of use considering the desired visitor experience and the vulnerability of the resources to impacts</li> <li>2. managing and limiting access through a permit system</li> <li>3. providing interpretation and enforcement services</li> <li>4. taking measures to prevent human-caused impacts</li> <li>5. regulating visitor activities and vessel type, size, and speed</li> <li>6. authorizing commercial services</li> <li>7. conducting research and monitoring resource conditions; restoring and stabilizing resources</li> <li>8. managing recreational and commercial fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations.</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs and other navigational aids</li> <li>2. limited mooring buoys</li> <li>3. primitive trails</li> <li>4. research equipment—if installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the access-by-permit zone.</li> </ol>

Table 2: Biscayne National Park Management Zones, Alternatives 2 through 5

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Nature Observation Zone (Intact ecosystem preservation)	<p>The preservation of natural and cultural resources, restoration of degraded and impacted resources, and continuation of natural processes would be the dominant goals in this zone. The nature observation zone would provide a sustainable ecosystem, including fully functioning communities, with natural complexity structure, and diversity of organisms.</p> <ol style="list-style-type: none"> <li>1. Natural processes would predominate. Nature observation areas would preserve and/or restore a full complement of native species.</li> <li>2. Natural sounds, sights, and vistas would prevail. Panoramic viewsheds would remain unaltered.</li> <li>3. There would be tolerance for minor resource impacts.</li> <li>4. Evidence of human impact would be minimal or part of a cultural scene.</li> <li>5. Human-caused intrusions, including visual obstructions, would be kept to an absolute minimum, except for resource protection and visitor safety purposes.</li> <li>6. The significance and vulnerability of the cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Visitors would be immersed in nature with opportunities to experience natural sounds, tranquility, solitude, and closeness to nature. Visitors would have opportunities to experience and gain in-depth knowledge about sustainable ecosystems with fully functioning interdependent communities of organisms.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include sightseeing, nature observation, and recreational fishing from the land.</li> <li>2. Visitors would be self-reliant and have maximum opportunities to experience a sense of discovery and adventure. Application of outdoor skills would be essential.</li> <li>3. Interaction with nature would predominate, with only occasional encounters with others. There would be a sense of relative remoteness. The sights and sounds of nature would be more prevalent than those of human activities. Visitor activities would be mostly self-directed and have minor resource impacts.</li> <li>4. There would be opportunities for interpretive activities emphasizing sustainable ecosystems.</li> <li>5. Special events would not be allowed.</li> <li>6. Visitor activities in these zones could be limited in the interest of protecting resources and enhancing public safety. Limitations might be short or long term.</li> <li>7. Limited commercial services that provide appropriate visitor recreational activities might be appropriate if compatible with resource protection goals and desired visitor experience.</li> </ol>	<p>Management actions would focus on protecting resources, restoring disturbed areas, minimizing impacts from visitor use, and providing visitors with opportunities that encourage understanding of the natural functioning of resources within a sustainable ecosystem. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. determining types and levels of use considering the desired visitor experience and the vulnerability of the resources to impacts</li> <li>2. intense inventorying and monitoring of resources</li> <li>3. providing interpretation and enforcement services</li> <li>4. conducting research and restoring and stabilizing resources</li> <li>5. taking measures to prevent human-caused impacts</li> <li>6. defining additional compatible uses</li> <li>7. developing permit systems for various activities</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs and other navigational aids</li> <li>2. primitive trails</li> <li>3. research equipment—if installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the nature observation zone.</li> </ol>

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
<b>Marine Reserve Zone</b> <b>(ecosystem preservation; non-extractive; visitor experience)</b>	<p>The Marine Reserve Zone would provide a high level of protection from direct human-caused impacts for water-based ecosystems, habitats, and processes while allowing visitors to experience the zone. Natural processes occur with negligible disturbance from human use. This zone would protect natural resources such as marine nursery areas and coral reefs. The Marine Reserve Zone would provide the opportunity to compare the resource status of an area with no extractive uses to other areas allowing removal of resources.</p> <ol style="list-style-type: none"> <li>1. Natural processes would predominate.</li> <li>2. Resource impacts would be reduced.</li> <li>3. Most lasting signs of human use would not be apparent. Evidence of human impact would be restricted to cultural resources such as historic shipwrecks.</li> <li>4. Intervention and restoration could occur to mitigate and stabilize human-caused disruption or for resource management purposes. Otherwise alterations to natural resources would not occur.</li> <li>5. The significance and vulnerability of cultural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Visitors would be immersed in nature with opportunities to experience natural sounds, tranquility, solitude, and closeness to nature. Visitors would have opportunities to observe and learn about the differences and benefits to resources of a non-extractive use area compared to areas allowing removal of resources. Research activities might be allowed under a permit.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include boating, sightseeing, nature-watching, mooring, swimming, snorkeling, or diving. Commercial and recreational fishing would not be appropriate activities. Anchoring would not be allowed.</li> <li>2. Visitors would be self-reliant and have maximum opportunities to experience a sense of discovery and adventure. Application of outdoor skills would be essential.</li> <li>3. Interaction with nature would predominate, with only occasional encounters with others. There would be a sense of relative remoteness. The sights and sounds of nature would be more prevalent than those of human activities. Visitor activities would be mostly self-directed and have negligible resource impacts.</li> <li>4. Special events, with the exception of cleanup events or citizen science, would generally not be allowed.</li> <li>5. Visitors would benefit from the research by learning about protected resources.</li> <li>6. Limited commercial services that provide appropriate visitor recreational activities might be allowed if compatible with resource protection goals and desired visitor experiences.</li> </ol>	<p>Management actions would focus on the preservation and protection of water-based ecosystems, habitats, and processes. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. determining types and levels of use considering the desired visitor experience and the vulnerability of the resources to impacts</li> <li>2. intervening and restoring natural resources to mitigate and stabilize human-caused disruption</li> <li>3. conducting research aimed at monitoring resource conditions and understanding natural processes</li> <li>4. prioritizing, overseeing, and managing research projects</li> <li>5. taking measures to prevent human-caused impacts</li> <li>6. defining additional compatible uses</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs, mooring buoys, and navigational aids</li> <li>2. research equipment — if installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the marine reserve zone.</li> </ol>



Table 2: Biscayne National Park Management Zones, Alternatives 2 through 5

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
<b>Sensitive Underwater Archeological Zone (Visitors not allowed in water)</b>	<p>The Sensitive Underwater Archeological Zone would provide protection for significant and vulnerable underwater cultural sites. Research activities could occur.</p> <ol style="list-style-type: none"> <li>1. Natural sea and soundscapes would be maintained as much as possible.</li> <li>2. Human-caused cultural resource degradation would not be tolerated. Intervention to natural processes would be allowed if necessary to protect cultural site integrity.</li> <li>3. Preservation and stabilization actions might occur.</li> </ol>	<p>Visitors would view protected resources from within vessels on the surface of the water. Research activities might be allowed under permit.</p> <ol style="list-style-type: none"> <li>1. Appropriate visitor activities could include sightseeing, nature-watching, recreational hook and line fishing, and transit through the zone. Apparatus other than hook and line fishing gear would not be allowed in the water below the lowest point of the vessel. Commercial fishing and trapping would not be appropriate. Anchoring would not be allowed.</li> <li>2. Visitors must remain in their boats, and access to the water for activities including swimming, snorkeling or diving would not be allowed.</li> <li>3. Researchers and other cooperating personnel could enter the zone for authorized purposes. Any impacts on cultural resources would be negligible.</li> <li>4. Visitors would benefit from the research by learning about significant and vulnerable resources as well as how they are studied and preserved.</li> <li>5. Commercial services would only transit through the zone.</li> <li>6. Underwater viewing devices including but not limited to face masks, glass-bottom vessels, glass-bottom buckets, and/or underwater cameras of any kind would not be allowed.</li> </ol>	<p>Management actions would focus on preservation and protection of underwater cultural sites. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. mitigating, stabilizing, and restoring resources and collecting artifacts in imminent danger of destruction or loss</li> <li>2. conducting research aimed at monitoring resource conditions and understanding the cultural context</li> <li>3. prioritizing, overseeing, and managing research projects</li> <li>4. taking measures to prevent human-caused impacts</li> <li>5. defining additional compatible uses</li> <li>6. managing recreational fishing in the interest of sound conservation to protect and preserve marine resources for the education, inspiration, recreation, and enjoyment of present and future generations.</li> <li>7. entering into agreements aimed at resource protection</li> </ol> <p>Facilities generally would not be appropriate, except when determined that they would enhance resource protection or public safety. Facilities could include</p> <ol style="list-style-type: none"> <li>1. signs and other navigational aids</li> <li>2. research equipment — if installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the Sensitive Underwater Archeological Zone.</li> </ol>

	RESOURCE CONDITION	VISITOR EXPERIENCE	MANAGEMENT ACTIONS AND FACILITIES
Sensitive Resource Zone (Complete protection of exceptional & critical resources)	<p>Natural Resources: The Sensitive Resource Zone would provide complete protection for exceptional and critical ecosystems, habitats, and processes and for sensitive nesting and nursery areas. Natural processes occur with negligible disturbance from human use. This zone would be closed to visitor access to permit natural processes to proceed. Research or actions aimed at monitoring natural conditions could occur.</p> <ol style="list-style-type: none"> <li>1. Natural processes would predominate.</li> <li>2. Natural land, sea, and soundscapes would predominate within the zone.</li> <li>3. There would be no tolerance for resource impacts.</li> <li>4. Lasting signs of human use would not be apparent.</li> <li>5. Intervention and restoration could occur to mitigate and stabilize human-caused destruction. Otherwise, alterations to natural resources would not occur.</li> <li>6. The significance and vulnerability of natural resources would be evaluated, and appropriate management actions would be determined.</li> </ol>	<p>Natural Resources: Sensitive Resource Zones would not be managed for visitor access, and use would be highly restricted.</p> <ol style="list-style-type: none"> <li>1. Visitors would not be allowed into the zone. Research activities might be allowed under a permit.</li> <li>2. Researchers and other cooperating personnel might enter the zone for authorized purposes. Any impacts on natural processes would not be tolerated.</li> <li>3. Visitors would benefit by learning about sensitive and vulnerable resources as well as how they are studied and preserved.</li> <li>4. Vessels and vehicles would be restricted from the zone except for administrative, emergency, or research purposes.</li> <li>5. Commercial activity would not be allowed.</li> </ol>	<p>Natural Resources: Management actions would focus on the preservation and protection of ecosystems, habitats, and processes unique to this zone. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. intervening and restoring resources to mitigate and stabilize human-caused destruction</li> <li>2. conducting research aimed at monitoring resource conditions and understanding natural processes</li> <li>3. prioritizing, overseeing, and managing research projects</li> <li>4. taking measures to prevent human-caused impacts</li> <li>5. defining additional compatible uses</li> <li>6. providing interpretive and enforcement services.</li> </ol> <p>Facilities would not be allowed. If installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the Sensitive Resource Zone.</p>
	<p>Cultural Resources: The Sensitive Resource Zone would provide complete protection for exceptional and sensitive cultural sites and landscapes. This zone would be closed to visitor access to protect site integrity. Research activities could occur.</p> <ol style="list-style-type: none"> <li>1. Natural land, sea, and soundscapes would be maintained as much as possible.</li> <li>2. Cultural resource degradation would not be tolerated. Intervention of natural processes might occur to protect cultural site integrity.</li> <li>3. Evidence of historic human use that contributes to the site's cultural value would be apparent.</li> <li>4. Preservation and stabilization actions might occur.</li> </ol>	<p>Cultural Resources: This zone would not be managed for visitor access, and use would be highly restricted.</p> <ol style="list-style-type: none"> <li>1. Visitors would not be allowed into the zone. Research activities might be allowed under a permit.</li> <li>2. Researchers and other cooperating personnel could enter the zone for authorized purposes. Any impacts on cultural resources would not be tolerated.</li> <li>3. Visitors would benefit by learning about sensitive and vulnerable resources as well as how they are studied and preserved.</li> <li>4. Vessels and vehicles would be restricted from the zone except for administrative, emergency, or research purposes.</li> <li>5. Commercial activity would not be allowed.</li> </ol>	<p>Cultural Resources: Management actions would focus on preservation and protection of cultural sites and landscapes. Appropriate management actions could include</p> <ol style="list-style-type: none"> <li>1. mitigating, stabilizing, and restoring resources and collecting artifacts in imminent danger of destruction or loss</li> <li>2. conducting research aimed at monitoring resource conditions and understanding the cultural context</li> <li>3. prioritizing, overseeing, and managing research projects</li> <li>4. taking measures to prevent human-caused impacts</li> <li>5. defining additional compatible uses</li> <li>6. providing interpretive and enforcement services.</li> </ol> <p>Facilities would not be allowed in this zone. If installed, research apparatus would be minimal and unobtrusive. If research could be accomplished in another management zone, it would not occur in the Sensitive Resource Zone.</p>



## FORMULATION OF THE ALTERNATIVES

The National Park Service prepares management alternatives to explore different approaches of managing the national park. Each alternative must be in the bounds of laws, policies, and the park's purpose. They also present different ways to achieve the desired future conditions of the park.

The alternatives focus on *what* resource conditions and visitor uses and experiences/opportunities should be at the national park rather than on details of *how* these conditions and uses/experiences should be achieved. Thus, the alternatives do not include many

details on resource or visitor use management.

More detailed plans or studies will be required before most conditions proposed in the alternatives are achieved. The implementation of any alternative also depends on future funding and environmental compliance. This plan does not guarantee that that money will be forthcoming. The plan establishes a vision of the future that will guide day-to-day and year-to-year management of the national park, but full implementation could take many years.

## ACTIONS COMMON TO ALL ALTERNATIVES

The following actions would be implemented regardless of which alternative is approved. The actions described here should be considered in addition to the actions described specifically for each alternative.

### STILTSVILLE

Stiltsville is composed of seven structures in the bay waters in the northernmost portion of the park that were privately built and maintained before incorporation within the park's expanded boundary. These structures were used privately for several years under leases issued by the National Park Service. These leases have since expired. For all alternatives, the management of the Stiltsville structures would continue as described in the June 2003 general management plan amendment. Accordingly, a single, nonprofit organization under agreement with the National Park Service would continue to manage, use, and maintain the Stiltsville structures to provide broad public access and diversity of use consistent with NPS policy and best management practices for environmental protection. These uses might include public functions and services including nonprofit organization functions; public and private education programs; scientific research activities; artist-in-residence programs; professional meetings and retreats; day use; rustic retreats; and NPS functions including interpretation, resource management, and ranger activities. Funds for the maintenance and operation of the structures shall be derived from donated funds and grants, from participating entities, and from user fees.

### FISHING

Both recreational and commercial fishing would continue in the park except in the Marine Reserve Zone in alternatives 3, 4, and 5. The park would continue monitoring fish populations as identified in the *Fishery*

*Management Plan*. All actions concerning fishing in the park would be implemented in accordance with the *Fishery Management Plan* and after consulting with the Florida Fish and Wildlife Conservation Commission.

### MIAMI-AREA VISITOR CENTER

The park has long identified a need for a visitor contact station in northern Biscayne Bay to facilitate resource protection and education to park users. Possible locations of a satellite visitor education center include Coconut Grove and Virginia Key, both popular tourist destinations that are convenient to Miami residents. These properties are owned by the City of Miami and Miami Dade County, respectively, and are located less than 5 miles from the park boundary.

The park has been approached by these governmental agencies to partner with the National Park Service to open a visitor education center in one of these areas. This could include enhanced educational programming, expanded concession operations, sales outlets, and visitor contact opportunities. This action is still in the discussion stages. It is unknown what, if any, the NPS would be asked to contribute to construction or operational costs. At a minimum, the park may be able to provide some staffing and pay rent for the use of an existing facility. Any facility rental or construction would require site-specific environmental planning.

### RAGGED KEYS

The series of five small keys north of Boca Chita Key (and within the park boundary) is known as the Ragged Keys. Ragged Keys #2, #3, and #5 are currently privately owned. The National Park Service would continue to pursue acquisition of these keys, which are thought to contain important natural and cultural resources, from willing sellers.

## BLACK POINT JETTY

Adjacent to Black Point Marina County Park, the Black Point Jetty is owned by Biscayne National Park. A memorandum of agreement with the county outlines each party's responsibilities for facility maintenance. This approximate mile-long jetty would continue to offer visitor opportunities to walk, bicycle, fish, picnic, observe nature, and sightsee with broad vistas of the bay. The park would continue to explore the possibility of developing interpretive opportunities in this area.

## MOORING BUOYS

The use of mooring buoys, and park policies regarding anchoring in the presence of mooring buoys, would continue to be consistent with the selected alternative of the *Mooring Buoy and Marker Plan* (currently in progress). The Maritime Heritage Trail would be managed as described in this plan.

## DREDGED NAVIGATION CHANNELS

The management objective of these channels is for resource protection and safe travel within the park. All of the park's dredged channels—the Intracoastal Waterway, Black Point Marina Channel, Homestead Bayfront Marina Channel, and Turkey Point Channel—would continue to be periodically dredged to keep them open to boaters and shipping traffic. For example, portions of the Intracoastal Waterway would continue to be dredged by the U.S. Army Corps of Engineers, and the U.S. Coast Guard would continue to be responsible for marking the channel with navigational markers. Miami-Dade County would continue to mark and dredge both the Black Point Marina and the Homestead Bayfront Marina channels. The Florida Power and Light Company would continue to be responsible for the Turkey Point Channel.

No new dredged channels would be permitted anywhere in the park. Depth limits for dredging would continue to be enforced; that is, the dredging depths within the park would

continue with the following “not to exceed” limits:

- Intracoastal Waterway, 7 to 12 feet per USCG regulations
- Black Point Marina Channel, 4.5 feet
- Homestead Bayfront Marina Channel, 4.5 feet
- Turkey Point Channel, 7.5 feet.

## NATURALLY OCCURRING CHANNELS

Certain naturally occurring channels in the park would continue to be marked for navigation. These include Biscayne Channel, Boca Chita Harbor Channel, Caesar Creek Channel, Hawk Channel, and Pacific Reef Channel.

The U.S. Coast Guard would continue to maintain the markers for Biscayne and Hawk channels. The National Park Service would continue to maintain those for Boca Chita Harbor and Caesar Creek channels. These channels are generally kept open by tidal action and would not be dredged. They would continue to function as important elements of the park's transportation and circulation system.

## RESEARCH LEARNING CENTER

The 2001 NPS Parks for Learning Plan budget proposal called for the establishment of 32 learning centers, one serving each of America's ecoregions, with base funding of \$225,000 for each center. Biscayne National Park's proposal to host a Research Learning Center (RLC) was accepted by the review team. Funding was only received for 12 research learning centers. Although the Biscayne research learning center was not funded, should funding become available the park could consider initiating a research learning center. The mission of research learning centers is to increase the effectiveness and communication of research and science results in the national parks. Specific objectives include facilitating the use of parks for scientific inquiry, supporting

science-informed decision making, communicating the relevance of and provide access to knowledge gained through scientific research to park staff and the public, and promoting science literacy and resource stewardship to the public.

## **CLOSURES**

Area closures could be implemented through the superintendent's compendium for a variety of administrative reasons as authorized in 36 CFR 1.5. Such reasons may be to protect human health and safety, for protection of sensitive natural and cultural resources, and

for areas undergoing environmental restoration.

## **EXOTIC PLANTS**

Exotic plants would be managed as described in the "Exotic Plant Management Plan."

## **VESSEL GROUNDINGS**

Vessel groundings would be managed as described in the park's "Vessel Groundings Policy and Procedures."

# ALTERNATIVE 1 – NO ACTION

## CONCEPT

Under alternative 1, the no-action alternative, future management would be a general continuation of what is being done now to provide for visitor opportunities and to protect and preserve park resources. Current law, policy, and plans, such as the 1983 *General Management Plan* and 2003 *General Management Plan Amendment*, would continue to provide the framework of guidance. This alternative would continue to emphasize a high level of access, with recreational opportunities throughout park. Natural resources, activities for restoration, and recovery or maintenance of habitats and dependent species would continue to be actively managed. Cultural resources maintenance and monitoring would continue. The park would continue to seek partnership opportunities to provide visitor services and resource management beyond current park boundaries. For example, park employees could staff visitor contact stations and monitor water quality parameters beyond park boundaries. This alternative serves as a basis of comparison between the park's existing management and the action alternatives 2–5.

Funded projects that would be conducted under this alternative include an upgrade of the radio system, erosion control, building and grounds maintenance, landscape enhancement, maintenance mentoring program, completion of the Maritime Heritage Trail, and collection recovery.

## THE MAINLAND

### Convoy Point

Convoy Point would continue to be the primary land-based entry point to the park. Visitors would park here and access the various visitor services available. The Dante Fascell Visitor Center would continue to provide orientation and interpretive

information, including exhibits, videos, and sales of interpretive/educational materials. Park interpretive staff would continue to provide a variety of special talks and programs at Convoy Point. Visitors would have access to the designated paths, interpretive boardwalk, and jetty as part of the landscaped grounds surrounding the visitor center and park administration buildings. They could continue to picnic, bird-watch, and sightsee, with broad vistas of the bay available from the second-floor veranda of the visitor center. Pole fishing, cast-netting, and yo-yo fishing would continue to be allowed from the walkway/jetty area but would continue to be prohibited in the boat basin.

From Convoy Point, a commercial operator may continue to provide the following authorized visitor services through a concessions contract:

- a small retail store where visitors can buy sandwiches, soft drinks, practical/convenience vacation items, and souvenirs
- the rental of canoes, kayaks, and paddle boats; snorkeling and scuba diving equipment; snorkeling and diving trips to the park's coral reefs and submerged cultural resources; boat tours to view the coral reefs without getting in the water; and a transport service to and from the mainland and Elliott or Boca Chita keys for visitors who want to attend a ranger-led walk, hike independently, or camp

### Undeveloped Mainland Areas

The park's narrow mainland areas north and south of Convoy Point are comprised primarily of mangrove forest. For the most part, these areas receive very little visitation and would continue to be managed as remote natural areas primarily to protect fish nurseries and crocodile habitat.

## BAY AND OCEAN WATERS

Under this alternative, the park would continue to be open to visitors with private boats of varying sizes and sources of power, including motorboats and sailboats. Visitors could continue to choose from a variety of activities including shallow and deep-water boating, snorkeling, diving, fishing, touring via commercial visitor services boats, visiting the keys, camping, canoeing, kayaking, sailing, windsurfing, and participating in boating events. The bay, the keys, and the coral reefs would continue to provide different settings to recreate in a marine atmosphere. Visitors could continue to seek solitude, if desired, and appreciate the many natural sights and sounds of nature—both above and below the water.

Recreational and commercial fishing would continue for such species as lobster, shrimp, marlin, sailfish, grouper, snapper, and bonefish, as regulated by the state for species, fishing methods, seasons, closed areas, and catch limits. Proper Florida fishing licenses would continue to be required for both recreational and commercial fishing. For example, outside the Biscayne Bay-Card Sound Lobster Sanctuary, a Florida saltwater license with a crawfish endorsement would continue to be required to take lobsters. And to employ lobster traps, a permit from the Florida Fish and Wildlife Conservation Commission would continue to be required.

Popular snorkeling, diving, and anchoring sites would be evaluated for the installation of mooring buoys. This would provide targeted resource protection and serve to disperse use at these locations. This would also limit the number of boats in these specific locations. For more information on mooring buoys, refer to the “Common to All Alternatives” section.

## FOWEY ROCKS LIGHTHOUSE

Under this alternative, Biscayne National Park staff would seek to partner with the eventual recipient of the Fowey Rocks Lighthouse following its conveyance by the U.S. General Services Administration. The partner would

protect and preserve/stabilize the lighthouse in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties* as well as the requirements of the National Historic Lighthouse Preservation Act of 2000. NPS staff would provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary’s Standards*. The partner would continue to provide the Coast Guard with access to the lighthouse for ongoing maintenance and service of the aid to navigation.

## LEGARE ANCHORAGE

The purpose of the triangular-shaped Legare Anchorage (3 square miles in size) would continue to be the long-term protection of submerged cultural resources, particularly the H.M.S. *Fowey* shipwreck, owned by the government of the United Kingdom of Great Britain and Northern Ireland. Visitors would not have underwater access; boaters could continue to traverse the area on the water’s surface, or troll, but they could not stop, anchor, swim, or dive.

## SLOW SPEED AREAS

The bay includes many shallow water areas, and less experienced boaters often run into difficulties that result in groundings and/or propeller damage to park resources. These areas include the Safety Valve shoals, the Featherbed Bank, the shallows around the southern keys, the manatee habitat adjacent to the coast, and congested visitor use areas in and near Sands Cut. The park has regulations to manage boating activity in some of these areas to protect resources and ensure visitor safety.

The management objective of the slow speed area is to enhance visitor safety and resource protection by slowing vessel speeds in shallow water areas. Less experienced boaters often run into difficulties that result in groundings and/or propeller damage to these shallow water areas. There would continue to be three

slow speed areas in the park. The first area would be the manatee protection area that parallels the mainland, out to 1,000 feet from shore, from Black Point County Park south to Turkey Point. The second area would continue to be south of Sands Key along the northwest shore of Elliott Key to Coon Point. The non-combustion engine use area in Jones Lagoon would also continue. In this Noncombustion Engine Use Zone, boats equipped with combustion engines could be used when propelled by push-pole or electric trolling motor, with outboard engine tilted up.

## THE KEYS

### Boca Chita Key

Boca Chita Key would continue to be a park destination point for people who like boating as well as getting out and strolling in a historic designed landscape. Visitors could continue to dock in the harbor for day use activities and walk among the historic stone structures (such as the covered picnic pavilion and chapel) and tour the ornamental lighthouse. Restrooms, a picnic area, a walking trail, a primitive campground for individual and group camping overnight docking, and boat camping would also continue to be available. Kiosks for interpretation/education would remain at the harbor. The historic barn and chapel, currently used for storage, would also remain. The park would explore options to adaptively reuse these structures for park operations and visitor services. User fees would continue to be collected on Boca Chita, as would the existing procedure that allows for the private use of some visitor facilities via a park-issued special use permit.

### Elliott Key

Elliott Key would continue to be open to visitors to dock (both day use and overnight docking/boat camping), picnic, hike, camp, access restrooms, and obtain potable water. Interpretive programs, facilitated by a concession operation, would continue. Several trails would remain for visitor activities—the unhardened central hiking trail referred to as “Spite Highway,” the east-west breezeway trail,

and the self-guided interpretive loop boardwalk trail. The visitor contact/ranger station would continue to be opened occasionally to provide park law enforcement, visitor safety services, some environmental education activities, administrative operations, and interpretive visitor services.

A formal ranger-led environmental education program would continue to be offered at Elliott Key.

Day-use docking would continue to be allowed at University Dock, and existing ranger residences would remain.

### Adams Key

Facilities at Adams Key would continue to include a day-use dock, a picnic pavilion, restrooms, a walking trail, interpretive wayside exhibits, maintenance facility, and ranger residences. Adams Key would continue to remain an alternate (backup) site for the formal ranger-led environmental education program.

### Porgy, Totten, Old Rhodes, Reid, Rubicon, Swan, Long Arsenicker, and East Arsenicker

These keys would remain relatively remote places that seldom have visitors. These keys could be closed should circumstances warrant, as described in the “Common to All Alternatives” section. The historic structures on Porgy Key would remain stabilized. Visitors would not be encouraged to visit the Jones homestead site on Porgy Key. Interpretive information about these keys would continue to be provided offsite at visitor areas like Convoy Point.

### Arsenicker Key, West Arsenicker Key

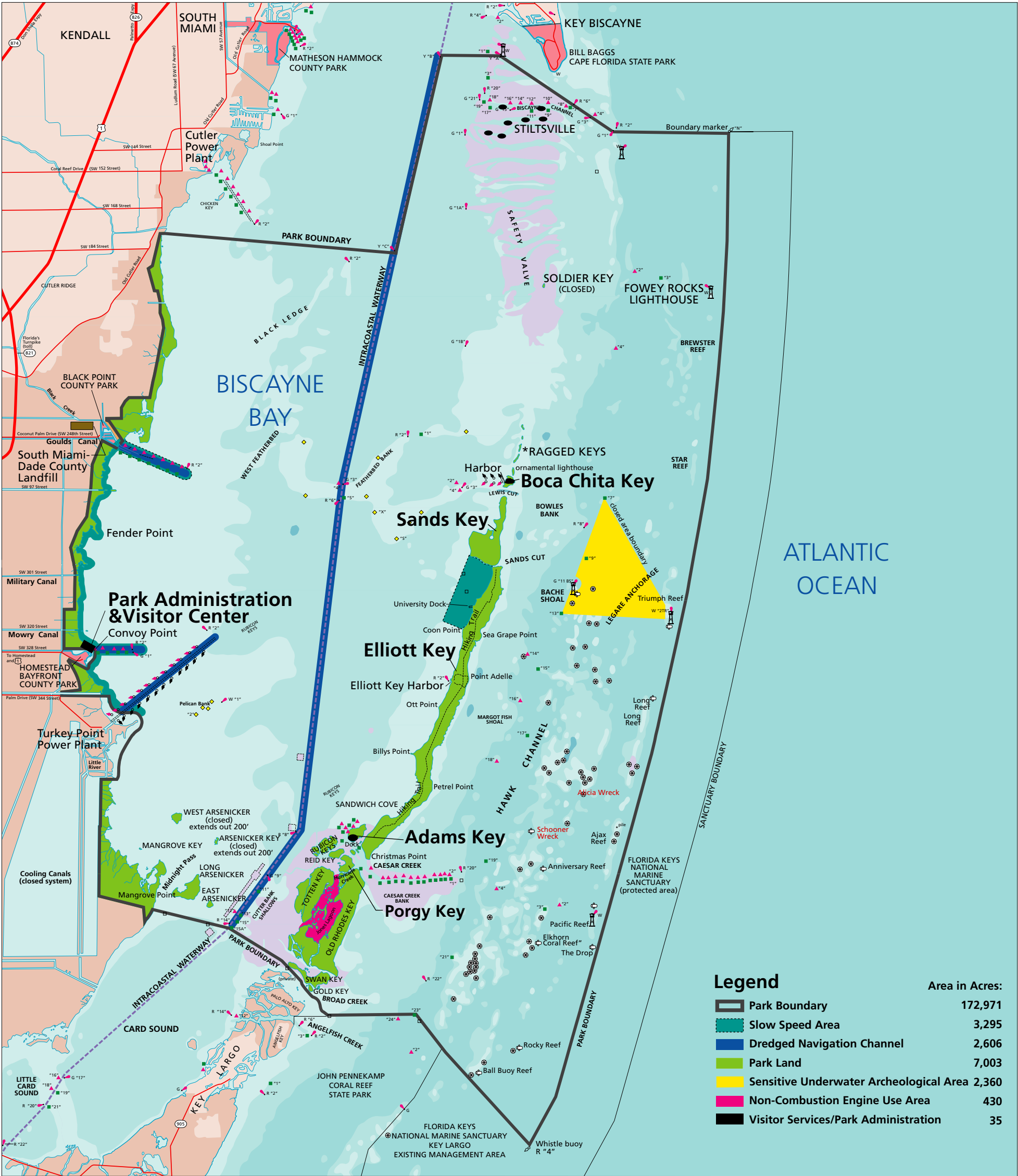
These areas and the waters extending 200 feet from their shores would continue to be closed to visitors for natural resource protection. In particular, these keys provide important habitat for nesting birds.

Soldier Key would remain closed for the protection of sensitive natural or cultural resources.

### **Jones Lagoon**

The lagoon would continue to be managed as a noncombustion engine use area to protect resources and provide a variety of visitor experience opportunities.





0 1 2 Kilometers  
0 1 2 Statute Miles  
0 1 2 Nautical Miles  
Map not for navigation

Note: To show visually, the size of zone colors have been enlarged in certain areas.

Map Key to Water Features and Landmarks		
Water Depths		
0-6 feet (0-1.8 meters)	6-12 feet (1.8-3.6 meters)	Over 12 feet (Over 3.6 meters)
Shallows and Reefs		
Shoal or spoil area	Coral reef near water surface	Coral reefs also lie deeper below water surface.
Channel Markers (entering from seaward)		
Red starboard daymarker (even numbered)	Starboard buoy	Other buoy
Green port daymarker (odd numbered)	Port buoy	Daymarker
Other Aids and Landmarks		
Light	Danger Shoal	Tower
Light color: R Red G Green W White Y Yellow	Mooring buoy	

\*RAGGED KEYS #2, #3, and #5 are Private Properties

# Alternative 1

## Biscayne National Park

United States Department of the Interior ■ National Park Service  
DSC / APRIL 2011 / 169 / 20048

back of map

## ALTERNATIVE 2

### CONCEPT

Alternative 2 would emphasize the recreational use of the park while providing for resource protection as governed by law, policy, and resource sensitivity. This concept would be accomplished by providing the highest level of services, facilities, and access to specific areas of the park of all the action alternatives. Visitors would be able to access the entire park except small areas set aside for the protection of sensitive resources. Substantial concession services would enable visitors without their own boats to access the keys and bay and ocean waters. Additional staffing and a substantial built environment might be required to implement this alternative, and some areas might be developed beyond the current level. A high level of interaction among visitors, park staff, and park resources would be expected while providing a minimum level of resource protection.

Readers should keep in mind that the discussion of actions common to all alternatives, such as Stiltsville, the Miami area visitor center, Ragged Keys, and Black Point Jetty, are a part of this alternative.

### THE MAINLAND

Convoy Point would remain the park's primary administrative and visitor service area on the mainland, as described in alternative 1. If additional administrative space were needed, selective administrative functions, currently accommodated at this location, might be moved into the local community; other functions would be expanded on-site.

Several new visitor facilities would be added to Convoy Point. A viewing platform would be constructed in the area for better views of the bay. A boardwalk/loop trail, with viewing "blind" platform, would be built near the Convoy Point entrance road through mangrove and near open marsh to the shoreline

and near the visitor center to interpret the dwarf mangrove and marsh area. Site-specific environmental planning would be conducted before constructing the boardwalk.

The visitor center jetty and boardwalk would be improved for safety and enhanced visitor access. These improvements would consist of benches and shade structures.

Undeveloped portions of the mainland between Convoy Point and Black Point County Park would be managed according to the Multiuse Land Zone. The remainder of the mainland would be in the Nature Observation Zone.

### BAY AND OCEAN WATERS

Visitors could engage in various recreational activities such as sightseeing, boating, fishing, scuba diving, snorkeling, swimming, hiking, picnicking, camping, and visiting shipwrecks. The overall objective in this zone would be to provide visitors with opportunities to recreate and learn about park resources and to minimize resource impacts from visitor use. The Multiuse Water Zone would be applied to most of the park's water acreage, (see Alternative 2 map).

Popular snorkeling, diving, and anchoring sites would be evaluated for the installation of mooring buoys, consistent with the Mooring Buoy and Marker Plan. This would provide targeted resource protection and would disperse use at these locations.

There would be four Slow Speed Zones in alternative 2. The first would parallel the mainland, between 500 and 1,000 feet out from shore from the park's northern boundary south to Midnight Pass. The second area would be due south of Sands Key along the northwest shore of Elliott Key. The third area would be in the bay west of Boca Chita Key

and would include Featherbed Bank and East Featherbed. The fourth area would be along Caesar Creek, south of Adams Key to Porgy Key, including the navigational channel between markers 20 to 24.

Under alternative 2, two shallow-water areas of the park would be included in the Noncombustion Engine Use Zone. The first area would follow the entire mainland shoreline from the northern park boundary south to Midnight Pass and extend east 500 feet from the mainland but exclude Black Point, Convoy Point, and Turkey Point channels. The second area would be east of the Intracoastal Waterway and north of Broad Creek and would include Jones Lagoon, the waters around Totten Key, and the bayside of Old Rhodes Key, as shown on the Alternative 2 map. The primary management objectives for this zone would be to immerse visitors in nature, minimize non-natural sounds, and protect shallow-water habitats and associated wildlife such as bonefish that use this area. Boats with combustion engines could enter the areas, but use of the engines would be prohibited; combustion engines would have to be tilted up in these zones. Motorized boaters would be required to use other means to propel their boats, such as electric trolling motors, oars, paddles, poles, or sails.

## **FOWEY ROCKS LIGHTHOUSE**

Under this alternative, Biscayne National Park staff would seek to partner with the eventual recipient of the Fowey Rocks Lighthouse following its conveyance by the U.S. General Services Administration. The partner would protect and preserve/stabilize the lighthouse in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* as well as the requirements of the National Historic Lighthouse Preservation Act of 2000. NPS staff would provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary's Standards*. The partner would continue to provide the Coast Guard with access to the lighthouse for ongoing

maintenance and service of the aid to navigation.

## **LEGARE ANCHORAGE**

In alternative 2, the Legare Anchorage would be reduced to about 1 square mile and included in the Sensitive Underwater Archeological Zone, primarily to continue protecting underwater cultural resources. To facilitate protection and make it easier for boaters to identify, the area would be delineated by latitude and longitude lines and marked by dayboards or signs. Travel through the area in a vessel would be allowed, but drifting, mooring, anchoring, and entering the water would not. The use of underwater viewing devices would not be allowed. Recreational hook-and-line fishing would be allowed while trolling. Commercial fishing and trapping would not be allowed. This area could be used for permitted research activities.

## **THE KEYS**

### **Boca Chita Key**

All of Boca Chita Key would be in the Visitor Services/Park Administration Zone. The management and visitor use of the existing facilities would remain as described in alternative 1.

In addition, three historic structures on the key would be reused for park operations and visitor services. Two structures would be used for park operations and visitor services. The number of kiosks providing interpretive information would be increased. More tours would be conducted, and there would be additional seasonal on-site interpretive opportunities.

The retaining wall on the north side of the island would be strengthened to maintain its current configuration.

The procedure allowing for the private use of some visitor facilities via a park-issued special use permit would continue.

## Elliott Key

Elliott Key would continue to be open to visitors to dock (both day use and overnight docking/boat camping), picnic, hike, camp, access restrooms, and obtain potable water. User fees would continue to be collected.

The Elliott Key harbor, including all existing visitor service and park administration facilities, would be included in the Visitor Services/Park Administration Zone. The specific uses of these facilities would generally remain as described in alternative 1 but could change to improve efficiency.

In addition, the current hiking trail, which goes north from the harbor area to the Sweeting Homestead and south to Sandwich Cove (known as Spite Highway), would be made universally accessible and would be maintained as necessary for visitors with mobility challenges. The Breezeway loop trail would also be made accessible. Primitive trails would be developed to connect the central trail to University Dock and to Sandwich Cove, Petrel Point, and the Sweeting Homestead. Also, primitive campsites would be established at Petrel Point area, University Dock area, and Sandwich Cove. Site-specific environmental planning including archeological surveying would be conducted before establishing these trails and/or campsites. Toilets would be added at the new campsites and at University Dock, which would remain day-use only. Visitor kiosks would be installed at the University Dock harbor. A canoe/kayak launch area would be established. The establishment of a food concession, either in a structure on the island or on a vessel, would be explored.

To reduce visitor use conflicts, the environmental education program, currently offered at Elliott Key, would be moved to Adams Key. The present environmental education structure on Elliott Key would be adapted to provide general visitor services and include ranger offices, a visitor contact facility and exhibit area, interpretive/educational material sales, and interpretive and orientation program areas. Existing ranger residences would remain.

## Adams Key

All of Adams Key would be included in the Visitor Services/Park Administration Zone. Existing facilities and uses would continue as described in alternative 1, but with improved visitor services. A staging area for canoes and kayaks might be developed, allowing visitors to be shuttled to Adams Key as a departure point to explore areas such as Jones Lagoon. The park would consider authorizing a commercial operator to provide canoe and kayak services. The storage of canoes and kayaks would easily be accommodated in the disturbed area of the island. Other potential visitor facilities might include primitive campsites, an improved trail for environmental education, and improvements to the dock. Instituting a Slow Speed Zone would be considered, and establishing a small commercial visitor services facility for sales of sundries and other convenience items would be explored.

To reduce visitor use conflicts on Elliott Key, the ranger-led environmental education program would be moved to Adams Key. To accommodate these programs, several facilities would need to be built or rehabilitated, including but not limited to improving the pavilion, establishing a group camping area, improving the existing trail, and adding indoor showers to the restrooms. Visitor use of these amenities would be restricted during the environmental education season, generally November through March. Building an additional classroom facility would be considered. The appropriate environmental planning would occur before building or rehabilitating any facilities, or any other development necessary for moving this program.

## Porgy Key

All of this island would be in the Visitor Services/Park Administration Zone. The historic Jones homestead on Porgy Key would be further stabilized and maintained and provide visitors an opportunity to see the historic uses of the keys before the creation of the park. Interpretive media would be used to tell the story of the site and life on the keys. A

canoe dock would be built to facilitate boat access to the site.

### **Other Keys**

Several keys would be included in the Nature Observation Zone—Soldier Key, the Ragged Keys, Sands Key, Rubicon Keys, Reid Key, Old Rhodes Key, Totten Key, Gold Key, East Arsenicker Key, Long Arsenicker Key, Mangrove Key, and several smaller unnamed keys around Jones Lagoon.

West Arsenicker Key, Arsenicker Key, the water extending out 500 feet from these keys, and Swan Key would be included in the Sensitive Resource Zone (and marked by dayboards or buoys) to protect exceptional and sensitive natural or cultural resources. Visitors would not be allowed in these areas, but research could occur under a science permit issued by the park.

### **PARTNERSHIPS**

Additional partnership agreements would be sought to expand the park's capacity both inside and beyond park boundaries at sites such as marinas and state and county parks. Partnerships with Homestead Bayfront County Park, Black Point County Park, Mattheson Hammock County Park, and Bill Baggs Cape Florida State Park would allow new or

improved kiosks, signs, and interpretive programs. Other potential sites to explore could include Dinner Key (in Coconut Grove), No Name Harbor (in Bill Baggs Cape Florida State Park), Crandon Park (on Key Biscayne), Deering Estate (Palmetto Bay), and Palmetto Bay Village Center. Some sites could include education programs and NPS personnel. Establishing a dock for canoe access and storage on Old Cutler Road, north of the park boundary, would be pursued.

Biscayne National Park would coordinate with Florida Keys National Marine Sanctuary to ensure compatible management strategies in adjacent federal waters.

Biscayne National Park staff would seek to partner with the future owner of the Fowey Rocks Lighthouse in order to provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and their responsibilities under the National Lighthouse Preservation Act.

The National Park Service would continue to collaborate with other entities to address water quality and many other concerns. These partnerships could include federal, state, and local agencies; community groups; commercial organizations; and individuals.



0 1 2 Kilometers  
0 1 2 Statute Miles  
0 1 2 Nautical Miles  
Map not for navigation

# Alternative 2

## Biscayne National Park

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## ALTERNATIVE 3

### CONCEPT

Alternative 3 would allow all visitors a full range of experience opportunities throughout most of the park and use a permit system to provide opportunity for visitors to experience a sense of solitude in two discrete areas of the bay. Small areas would be set aside that prohibit visitor access to protect sensitive resources and allow wildlife a respite from people. Management actions would provide strong natural and cultural resource protection and diverse visitor experiences.

Additional staffing and some additional development might be required to implement this alternative.

Visitor opportunities in this alternative would range from the challenges of exploring the natural environment alone to the conveniences of built surroundings. A high level of interaction among visitors, park staff, and park resources would be expected. Orientation to the park would help visitors choose types and locations of activities and learn about resource preservation and stewardship. Moderate impacts on resources might be tolerated in high-use areas of the park. Biscayne National Park staff would coordinate with Florida Keys National Marine Sanctuary staff to ensure compatible management strategies in adjacent federal waters.

Readers should keep in mind that the discussion of actions common to all alternatives, such as Stiltsville, the Miami area visitor center, Ragged Keys, and Black Point Jetty, are a part of this alternative.

### THE MAINLAND

Convoy Point would remain the park's primary administrative and visitor service area on the mainland, as described in alternative 1. If additional administrative space were needed, selected administrative functions currently at

this location might be moved into the local community, while other functions would be expanded on-site.

Several new visitor facilities would be added to Convoy Point. A boardwalk/loop trail, with viewing "blind" platform, would be built near the Convoy Point entrance road through mangrove and near open marsh to the shoreline and near the visitor center to interpret the dwarf mangrove and marsh area. Site-specific environmental planning would be conducted before constructing the boardwalk.

The visitor center boardwalk and jetty could be upgraded for improved safety and visitor access. These improvements would consist of benches and shade structures.

The mainland area between Convoy Point and Black Point County Park would be zoned Multiuse Land and the remainder would be Nature Observation Zone.

### BAY AND OCEAN WATERS

The Multiuse Water Zone would be applied to most of the park's water acreage (see Alternative 3 map). Visitors could engage in various recreational activities, such as sightseeing, boating, canoeing, kayaking, windsurfing, fishing, scuba diving, snorkeling, swimming, hiking, picnicking, camping, and visiting shipwrecks.

Popular snorkeling, diving, and anchoring sites would be evaluated for the installation of mooring buoys. This would provide targeted resource protection and serve to disperse use at these locations. This would also limit the number of boats in these specific locations.

There would be four Slow Speed Zones in alternative 3. The first would parallel the mainland, between 500 and 1,000 feet from shore, identical to alternative 2. The second area would be due south of Sands Key along the northwest shore of Elliott Key, identical to alternative 2. The third area would be in the Bay due west of Boca Chita Key and include the Featherbeds, a larger area than described in alternative 2. These areas would be delineated by existing and new markers. The fourth area would be along Caesar Creek south of Adams Key to Porgy Key, including the navigational channel between markers 20 to 24, identical to Alternative 2. The size and shape of this latter area would be delineated by existing and new markers.

The Noncombustion Engine Use Zone would be applied along the mainland shore out to 500 feet excluding the channels as described in alternative 2, and the waters from the Rubicon Keys and south to the Cutter Bank Shallows would also be included. Boats equipped with combustion engine could be used when propelled by push-pole or electric trolling motor, with outboard engine tilted up.

The Access-By-Permit Zone would provide visitors with relative solitude by using a permit system to limit the number of people who could be in a specified area at a time. The two areas of the park included in this zone currently receive limited visitation and would provide places of low-density use as the population of South Florida increases. The first of these areas would include an area of the bay north of the Black Point Channel, including Black Ledge. The second area would encompass the bayside waters along the southern shore of Elliott Key including Sandwich Cove north to Billy's Point.

## MARINE RESERVE ZONE

The management objective for the Marine Reserve Zone would be to provide swimmers, snorkelers, divers, and those who ride a glass bottom boat the opportunity to experience a healthy, natural coral reef, with larger and

more numerous tropical reef fish and an ecologically intact reef system.

Scientific data indicates that no-take zones are more effective at reducing mortality—especially for reef species—than other methodologies, including catch and release, slot limits, etc. Additionally, a catch and release zone would be difficult to enforce. Therefore, within this zone, recreational and commercial fishing would be prohibited for the purpose of encouraging long-term protection of the reef ecosystem. This zone would be within the boundaries of the original monument, in which the National Park Service has the authority to change fishing regulations as described in chapter 1.

Visitors could use mooring buoys within this zone and participate in typical reef activities such as boating, snorkeling, scuba diving, underwater photography, and nature viewing. The park concession tour boat would have easy access via Caesar Creek.

This Marine Reserve Zone also would provide important research opportunities, especially to monitor the difference in reef ecosystem health compared to areas where fishing occurs (see Appendix E for more information on the Marine Reserve Zone).

In alternative 3, the Marine Reserve Zone would be between Hawk Channel and the park's eastern boundary, extending from Pacific Reef north to Long Reef (10,522 acres). The proposed Marine Reserve Zone in Alternative 3 would be about 7% of the waters of the park, and less than 13% of the offshore areas of the park. The 2,663 acres of the park's coral reef protected in this zone would contribute towards the Coral Reef Task Force's goal of 20% of the reefs in Florida being included in marine reserves (U.S. Coral Reef Task Force 2000).

## FOWEY ROCKS LIGHTHOUSE

Under this alternative, Biscayne National Park staff would seek to partner with the eventual recipient of the Fowey Rocks Lighthouse

following its conveyance by the U.S. General Services Administration. The partner would protect and preserve/stabilize the lighthouse in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* as well as the requirements of the National Historic Lighthouse Preservation Act of 2000. NPS staff would provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary's Standards*. The partner would continue to provide the Coast Guard with access to the lighthouse for ongoing maintenance and service of the aid to navigation.

## LEGARE ANCHORAGE

In alternative 3, the Legare Anchorage would be reduced to about 1 square mile and included in the Sensitive Underwater Archeological Zone, primarily to continue protecting underwater cultural resources. To facilitate protection and make it easier for boaters to identify, the area would be delineated by latitude and longitude lines and marked by dayboards or buoys. Travel through the area in a vessel would be allowed, but drifting, mooring, anchoring, and entering the water would not. Recreational hook-and-line fishing would be allowed while trolling. Commercial fishing and trapping would not be allowed. This area could be used for permitted research activities.

## THE KEYS

### Boca Chita Key

All of Boca Chita Key would be included in the Visitor Services/Park Administration Zone. The management and use of the existing facilities would remain as described in alternative 1.

In addition, three historic structures on the key would be reused for park operations and visitor services. Two structures would be used for park operations and visitor services. The number of kiosks providing interpretive information would be increased. More tours

would be conducted, and there would be additional seasonal on-site interpretive opportunities.

The retaining wall on the north side of the island would be strengthened to maintain its current configuration.

The procedure allowing for the private use of some visitor facilities via a park-issued special use permit would continue.

### Elliott Key

The Elliott Key harbor, including all existing visitor service and park administration facilities, would be included in Visitor Services/Park Administration Zone. The management strategies and visitor services available on this key would be similar to those described in alternative 2, with the exceptions noted below.

A primitive connecting trail would be built to University Dock. The central trail leading south from the harbor to areas like Sandwich Cove could be improved but would not be universally accessible.

The environmental education program would be relocated to Adams Key as described in alternative 2. Ranger residences would remain.

### Adams Key

All of Adams Key would be included in Visitor Services/Park Administration Zone. Existing facilities and uses would continue with improved visitor services as described in alternative 2.

The ranger-led environmental education program would be moved to Adams Key, and existing facilities would be improved to accommodate this change. Additional improvements to the key would be considered, as needed, to allow for this change. Visitor use of this key could be restricted during the environmental education season, generally November through March, to reduce conflicts. Moving the program to Adams Key would require facilities to be built or rehabilitated,

and the appropriate environmental planning would occur before building.

### **Porgy Key**

All of this island would be in the Visitor Services/Park Administration Zone and would be managed as described in alternative 2.

### **Other Keys**

Several keys would be included in the Nature Observation Zone—Soldier Key, the Ragged Keys, Sands Key, Rubicon Keys, Reid Key, Old Rhodes Key, Totten Key, Gold Key, East Arsenicker Key, Long Arsenicker Key, Mangrove Key, and several smaller unnamed keys around Jones Lagoon.

West Arsenicker Key, Arsenicker Key, the water extending out 500 feet from these keys, and Swan Key would be included in the Sensitive Resource Zone (and marked by dayboards or buoys) to protect exceptional and sensitive natural or cultural resources. Visitors would not be allowed in these areas, but research could occur under a science permit issued by the park.

## **PARTNERSHIPS**

Additional partnership agreements would be sought to expand the park's capacity both inside and beyond park boundaries at sites such as marinas and state and county parks. Partnerships with Homestead Bayfront County

Park, Black Point County Park, Mattheson Hammock County Park, and Bill Baggs Cape Florida State Park would allow new or improved kiosks, signs, and interpretive programs. Other potential sites to explore could include Dinner Key (in Coconut Grove), No Name Harbor (in Bill Baggs Cape Florida State Park), Crandon Park (on Key Biscayne), and Deering Estate (Palmetto Bay). Some sites could include education programs and NPS personnel. Establishing a dock for canoe access and storage on Old Cutler Road, north of the park boundary, would be pursued. Biscayne National Park would coordinate with Florida Keys National Marine Sanctuary to ensure compatible management strategies in adjacent federal waters.

Biscayne National Park staff would seek to partner with the future owner of the Fowey Rocks Lighthouse in order to provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and their responsibilities under the National Lighthouse Preservation Act.

The National Park Service would continue to collaborate with other entities to address water quality and many other concerns. These partnerships could include federal, state, and local agencies; community groups; commercial organizations; and individuals.



0 1 2 Kilometers  
0 1 2 Statute Miles  
0 1 2 Nautical Miles  
Map not for navigation

**Note 1:** Existing conditions and some features such as the locations of shoals, reefs, and shallow coral areas, may be considered unchanged.

**Note 2:** To show visually, the size of zone colors have been enlarged in certain areas.

**Note 3:** Some areas in the Park Boundary are not NPS owned but do not appear at this map scale. Zoning shown would not apply to non NPS lands unless they were acquired from a willing seller.

Map Key to Water Features and Landmarks		
Channel Markers (entering from seaward)		
Other Aids and Landmarks		

\*RAGGED KEYS #2, #3, and #5 are Private Properties

# Alternative 3

## Biscayne National Park

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## ALTERNATIVE 4: THE NPS PREFERRED ALTERNATIVE

### CONCEPT

This alternative would emphasize strong natural and cultural resource protection while providing a diversity of visitor experiences. Visitor opportunities in this alternative would range from the challenges of exploring the natural environment alone to the conveniences of built surroundings. A limited amount of moderate resource impacts would be tolerated in high-use areas of the park. Some areas would be closed to visitors to protect sensitive resources and allow wildlife a respite from people. Other areas, such as the Legare Anchorage, would be reserved for limited types of visitor use.

Readers should keep in mind that the discussion of actions common to all alternatives, such as Stiltsville, the Miami visitor center, Ragged Keys, and Black Point Jetty, are a part of this alternative.

### THE MAINLAND

Convoy Point would be in the Visitor Services/ Park Administration Zone and remain the park's primary administrative and visitor service area on the mainland, as described in alternative 1. If additional administrative space were needed, some functions would be expanded on-site while an alternate location in the local community would be studied for moving other functions and facilities.

Additionally, the park would actively seek opportunities to develop a modern visitor education facility outside Convoy Point (in the Miami area).

A boardwalk/loop trail, with viewing "blind" platform, would be built near the Convoy Point entrance road through mangrove and near open marsh to the shoreline and near the visitor center to interpret the dwarf mangrove and marsh area. Site-specific environmental

planning would be conducted before constructing the boardwalk.

The visitor center boardwalk and jetty could be improved for safety and visitor access. These improvements would consist of benches and shade structures.

The mainland area between Convoy Point and Black Point County Park would be zoned Multiuse Land and the remainder would be Nature Observation Zone.

### BAY AND OCEAN WATERS

The Multiuse Zone would be applied to most of the park's water acreage (see Alternative 4 map). Midnight Pass would remain open and part of the Multiuse Zone. Visitors could engage in a wide variety of activities such as sightseeing, boating, fishing, scuba diving, snorkeling, swimming, canoeing and kayaking, hiking, picnicking, camping, and visiting shipwrecks.

There would be three Slow Speed Zones in this alternative. The first would be parallel to the mainland and adjacent to the Noncombustion Engine Use Zone, between 500 and 1,000 feet from the shore, identical to alternatives 2 and 3. The second area would be along the bay side of Elliott Key beginning at Sands Key and extending south to Elliott Key Harbor, a larger area than described in alternatives 2 and 3. The third area would be along Caesar Creek, south of Adams Key to Porgy Key, including the navigational channel between markers 20 to 24.

Four shallow-water areas of the park would be included in the Noncombustion Engine Use Zone in alternative 4. The first area would follow the entire mainland shoreline excluding the channels as described in alternative 2. The second area would be the waters offshore of West Arsenicker and Arsenicker keys between

500 and 1,000 feet (the islands and first 500 feet of offshore water would be zoned Sensitive Resource Zone). The third area would include the waters around the park's southern keys including the bay side of Old Rhodes and Totten, and near portions of Rubicon, Reid, Porgy, and Swan keys. The fourth area would include Featherbed Bank, East Featherbed, and West Featherbed. Boats equipped with combustion engine could be used when propelled by push-pole or electric trolling motor, with outboard engine tilted up.

### MARINE RESERVE ZONE

The management objective for the Marine Reserve Zone would be to provide swimmers, snorkelers, divers, and those who ride a glass-bottom boat the opportunity to experience a healthy, natural coral reef, with larger and more numerous tropical reef fish and an ecologically intact reef system. Scientific data indicates that no-take zones are more effective at reducing mortality—especially for reef species—than other methodologies, including catch and release, slot limits, etc. Additionally, a catch and release zone would be difficult to enforce. Therefore, within this zone, recreational and commercial fishing would be prohibited to encourage long-term protection of the reef ecosystem. This zone would be within the boundaries of the original monument, in which the National Park Service has the authority to change fishing regulations as described in chapter 1. Visitors could use mooring buoys in this zone and participate in reef activities such as boating, snorkeling, scuba diving, underwater photography, and nature viewing. The park concession tour boat would have easy access via Caesar Creek.

The Marine Reserve Zone also would provide important research opportunities, especially to monitor the difference in reef ecosystem health compared to areas where fishing occurs (see Appendix E for more information on the Marine Reserve Zone).

In alternative 4, the Marine Reserve Zone would be between Hawk Channel and the park's eastern boundary, extending from

Pacific Reef north to Long Reef (10,522 acres). The proposed Marine Reserve Zone in Alternative 3 would be about 7% of the waters of the park, and less than 13% of the offshore areas of the park. The 2,663 acres of the park's coral reef protected in this zone would contribute towards the Coral Reef Task Force's goal of 20% of the reefs in Florida being included in marine reserves (U.S. Coral Reef Task Force 2000).

### FOWEY ROCKS LIGHTHOUSE

Under this alternative, Biscayne National Park staff would seek to partner with the eventual recipient of the Fowey Rocks Lighthouse following its conveyance by the U.S. General Services Administration. The partner would protect and preserve/stabilize the lighthouse in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* as well as the requirements of the National Historic Lighthouse Preservation Act of 2000. NPS staff would provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary's Standards*. The partner would continue to provide the Coast Guard with access to the lighthouse for ongoing maintenance and service of the aid to navigation.

### LEGARE ANCHORAGE

In alternative 4, the Legare Anchorage would be reduced to about 1 square mile and included in the Sensitive Underwater Archeological Zone, primarily to continue protecting underwater cultural resources. To facilitate protection and make it easier for boaters to identify, the area would be delineated by latitude and longitude lines and marked by dayboards or buoys. Travel through the area in a vessel would be allowed, but drifting, mooring, anchoring, and entering the water would not. Recreational hook-and-line fishing would be allowed while trolling. Commercial fishing and trapping would not be allowed. This area could be used for permitted research activities.



## THE KEYS

### Boca Chita Key

The northern portion of Boca Chita Key, including the day use area, campground, and boat basin, would be part of the Visitor Services/Park Administration Zone. The management and use of the existing facilities in this northern portion of the key would remain as described in alternative 2. There would be no new construction. The southern portion of Boca Chita Key would be managed according to the Multiuse Zone.

The private use of some visitor facilities via a park-issued special use permit would continue.

### Elliott Key

Only the Elliott Key harbor area would be included in the Visitor Services/Park Administration Zone. The remainder would be in the Multiuse Land Zone. Elliott Key would continue to be open to visitors to dock (both day use and overnight docking/boat camping), picnic, hike, camp, access restrooms, and obtain potable water, as described in alternatives 1, 2, and 3.

Current visitor services and park administration facilities would continue to be used, but the specific uses of these facilities could change to improve efficiency, including opening a small visitor contact station in the multiuse building that currently houses the environmental education program. The park would continue to use Elliott Key as the main location for its environmental education program, and to use Adams Key as a backup location.

A staging area for canoes and kayaks might be built on the Elliott Key developed area, allowing visitors to be shuttled by motorboat to the key and depart from there to explore the island shorelines.

The Breezeway loop trail and boardwalk would be made universally accessible. The ranger residences would remain.

### Adams Key

Only the southern portion of Adams Key that includes the dock, day use/park administration area, pavilion, restrooms, and the two ranger residences would be part of the Visitor Services/Park Administration Zone. Existing facilities and uses would continue as described in alternative 1. A staging area for canoes and kayaks might be built at the Adams Key developed area, allowing visitors to explore the island shorelines.

Should the park move the environmental education program to Adams Key, facilities may need to be built or rehabilitated, and appropriate environmental planning would occur before building.

The northern portion of this key would be in the Multiuse Zone and managed accordingly.

### Porgy Key

Only the northern end of Porgy Key would be placed in the Visitor Services/Park Administration Zone. The ruins from the old Jones homestead would be maintained and interpreted onsite. A canoe dock would be established.

The southern end of the key would be in the Multiuse Zone and would be managed as described in the Multiuse Zone in this alternative.

### Other Keys

Several keys would be included in the Nature Observation Zone—Soldier Key, the Ragged Keys, Sands Key, Rubicon Keys, Reid Key, Old Rhodes Key, Totten Key, Gold Key, East Arsenicker Key, Long Arsenicker Key, Mangrove Key, and several smaller unnamed keys around Jones Lagoon.

West Arsenicker Key, Arsenicker Key, the water extending out 500 feet from these keys, and Swan Key would be included in the Sensitive Resource Zone (and marked by dayboards or buoys) to protect exceptional and sensitive natural or cultural resources. Visitors would not be allowed in these areas,

but research could occur under a science permit issued by the park.

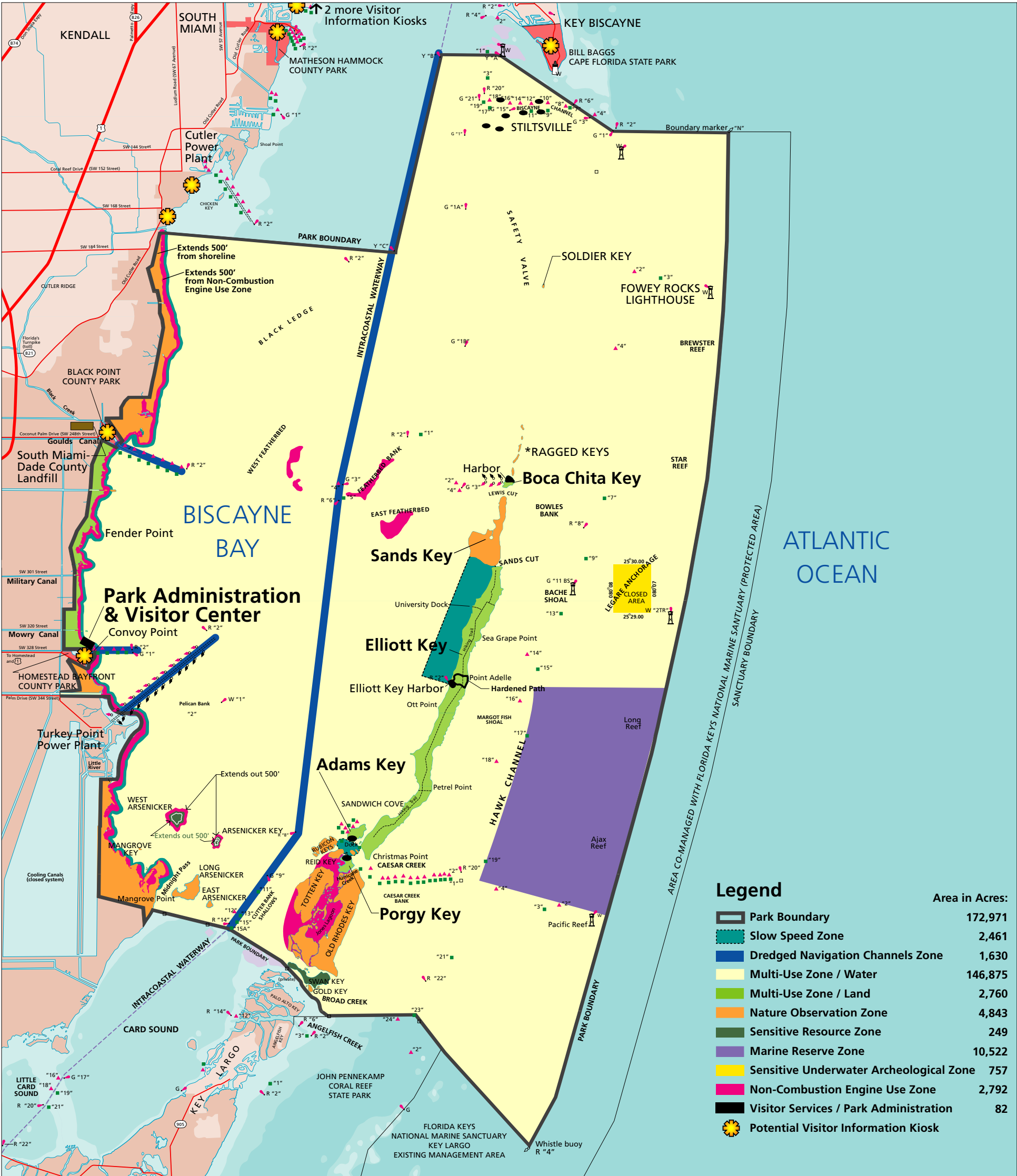
## PARTNERSHIPS

Additional partnership agreements would be sought to expand the park's capacity both inside and beyond park boundaries at sites such as marinas and state and county parks. Partnerships with Homestead Bayfront County Park, Black Point County Park, Mattheson Hammock County Park, and Bill Baggs Cape Florida State Park would allow new or improved kiosks, signs, and interpretive programs. Other potential sites to explore could include Dinner Key (in Coconut Grove), No Name Harbor (in Bill Baggs Cape Florida State Park), Crandon Park (on Key Biscayne), and Deering Estate (Palmetto Bay). Some sites could include education programs and NPS personnel. Establishing a dock for canoe access and storage on Old Cutler Road, north of the park boundary, would be pursued.

Biscayne National Park would coordinate with Florida Keys National Marine Sanctuary to ensure compatible management strategies in adjacent federal waters.

Biscayne National Park staff would seek to partner with the future owner of the Fowey Rocks Lighthouse in order to provide technical assistance to ensure the property is appropriately managed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and their responsibilities under the National Lighthouse Preservation Act.

The National Park Service would continue to collaborate with other entities to address water quality and many other concerns. These partnerships could include federal, state, and local agencies; community groups; commercial organizations; and individuals.



0 1 2 Kilometers  
0 1 2 Statute Miles  
0 1 2 Nautical Miles  
Map not for navigation

Note 1: Existing conditions and some features such as the locations of shoals, reefs, and shallow coral areas, may be considered unchanged.

Note 2: To show visually, the size of zone colors have been enlarged in certain areas.

Note 3: Some areas in the Park Boundary are not NPS owned but do not appear at this map scale. Zoning shown would not apply to non NPS lands unless they were acquired from a willing seller.

Map Key to Water Features and Landmarks

Channel Markers (entering from seaward)		
Other Aids and Landmarks		

\*RAGGED KEYS #2, #3, and #5 are Private Properties

# Alternative 4

## Biscayne National Park

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## ALTERNATIVE 5

### CONCEPT

The park would be managed to promote the protection of natural and cultural resources, including taking actions to optimize conditions for protection and restoration. Natural processes would prevail except when management actions were needed to preserve and protect significant cultural resources. This alternative would provide the highest level of resource protection and still authorize a level of visitor services greater than the no-action alternative. Visitor access and activities would be highly managed for resource protection while still enabling visitors to participate in a variety of activities. To accomplish this variety, a permit system would be used to provide an opportunity to experience a sense of solitude in the bay, in one portion of the park. Other areas, such as the Legare Anchorage, would offer diverse visitor experiences and recreational activities. Some areas would be closed to visitors to protect sensitive resources and provide wildlife a respite from people. The built environment would be limited to basic visitor safety and services and would be geographically concentrated or outside park boundaries.

Readers should keep in mind that the discussion of actions common to all alternatives, such as Stiltsville, the Miami visitor center, Ragged Keys, and Black Point Jetty, are a part of this alternative.

### FOWEY ROCKS LIGHTHOUSE

Under this alternative, Biscayne National Park staff would seek to acquire the Fowey Rocks Lighthouse from the U.S. General Services Administration, under the provisions of the National Historic Lighthouse Preservation Act of 2000, or, at a later date, seek to acquire it from a willing owner via donation. The park would protect and preserve/stabilize the lighthouse in accordance with the *Secretary of the Interior's Standards for the Treatment of*

*Historic Properties*, and would continue to allow the Coast Guard access to the light for ongoing maintenance and service of the aid to navigation.

Acquisition of the lighthouse is desirable because the structure is a significant national register-listed property whose maritime history is intimately linked with that of Biscayne National Park. It is the oldest existing historic structure within the boundary of the park and is an example of a unique piece of historic architecture. The lighthouse would make an appropriate and attractive addition to the park's Maritime Heritage Trail, an interpretive program unique in the National Park Service to Biscayne National Park.

### THE MAINLAND

Convoy Point would be in the Visitor Services/Park Administration Zone and remain the park's primary administrative and visitor service area on the mainland, as described in alternative 1.

If additional administrative space were needed, selected administrative functions currently accommodated at this location might be moved out of the park and into the local community, while other functions would be expanded on-site.

The visitor center boardwalk and jetty could be upgraded.

All of the remaining mainland portion of the park would be in the Nature Observation Zone.

### BAY AND OCEAN WATERS

The Multiuse Water Zone would be applied to most of the park's water acreage (see Alternative 5 map). Visitors could engage in various recreational activities, such as sightseeing,

boating, fishing, scuba diving, snorkeling, swimming, canoeing and kayaking, hiking, picnicking, camping, and visiting some historic sites and shipwrecks.

Popular snorkeling, diving, and anchoring sites would be evaluated for the installation of mooring buoys. This would provide targeted resource protection and help disperse use at these locations. This would also limit the number of boats in these specific locations.

There would be three Slow Speed Zones in this alternative. The first would extend the length of Elliott Key on the bay side, from Sands Key to Adam's Key. The second such zone would include a triangular area (see Alternative 5 map) north of Stiltsville. The third area would be along Caesar Creek, south of Adams Key to Porgy Key, including the navigational channel between markers 20 to 24.

In this alternative, four areas would be included in the Noncombustion Engine Use Zone. The first area would follow the entire mainland shoreline from the northern park boundary south to Midnight Pass and extend east about 1,000 feet out from the shore, excluding channels. This zone also would be applied to the waters offshore of West Arsenicker and Arsenicker keys between 500 and 1,000 feet (the islands and 500 feet of offshore water would be in the Sensitive Resource Zone). The third Noncombustion Engine Use Zone would include the waters around the southern keys, such as Totten, Rubicon, Reid, and Porgy keys and the bay side of Old Rhodes Key. Jones Lagoon and Broad Creek would be within this zone. The fourth area would include Featherbed Bank, East Featherbed, and West Featherbed. These latter areas would be delineated by markers. Boats equipped with combustion engine could be used when propelled by push-pole or electric trolling motor, with outboard engine tilted up.

The Access-by-Permit Zone would provide visitors with relative solitude by using a permit system to limit the number of people who could be in a specified area at a time. The one area included under this alternative currently receives low visitation and would provide a

place of low-density use as the population of South Florida increases. This area would be in the northwest corner of the park, immediately north of Black Point Channel.

## MARINE RESERVE ZONE

The management objective for the Marine Reserve Zone would be to provide swimmers, snorkelers, divers, and those who ride glass-bottom boats the opportunity to experience a healthy, natural coral reef, with larger and more numerous tropical reef fish and an ecologically intact reef system. Scientific data indicates that no-take zones are more effective at reducing mortality—especially for reef species—than other methodologies, including catch and release, slot limits, etc. Additionally, a catch and release zone would be difficult to enforce. Therefore, within this zone, recreational and commercial fishing would be prohibited to encourage long-term protection of the reef ecosystem. Visitors could use mooring buoys in this zone and participate in reef activities such as boating, snorkeling, scuba diving, underwater photography, and nature viewing. The park concession tour boat would have easy access via Caesar Creek.

The Marine Reserve Zone would also provide important research opportunities, especially to monitor the difference in reef ecosystem health compared to areas where fishing occurs. This zone would be within the boundaries of the original monument, in which the NPS has the authority to change fishing regulations as described in Chapter 1.

In alternative 5, the largest Marine Reserve Zone of any alternative would be established between Elliott Key and the park's eastern boundary, extending north from the Caesar Creek and Pacific Reef to marker 13 (approximately 21,810 acres). The proposed Marine Reserve Zone in Alternative 5 would be about 14% of the waters of the park, and less than 27% of the offshore areas of the park. The 3,650 acres of the park's coral reef protected in this zone would contribute toward the Coral Reef Task Force's goal of

20% of the reefs in Florida being included in marine reserves.

## **LEGARE ANCHORAGE**

In alternative 5, the Legare Anchorage would be reduced to about 1 square mile and included in the Sensitive Underwater Archeological Zone, primarily to continue protecting underwater cultural resources. To facilitate protection and make it easier for boaters to identify, the area would be delineated by latitude and longitude lines and marked by dayboards or buoys. Travel through the area in a vessel would be allowed, but drifting, mooring, anchoring, and entering the water would not. Recreational hook-and-line fishing would be allowed while trolling. Commercial fishing and trapping would not be allowed. This area could be used for permitted research activities.

## **THE KEYS**

### **Boca Chita Key**

Similar to alternative 4, the northern portion of Boca Chita Key would be included in the Visitor Services/Park Administration Zone and managed accordingly. The southern portion of Boca Chita Key would be designed and managed under the Multiuse Zone.

There would be no new construction. The private use of some visitor facilities via a park-issued special use permit would continue.

### **Elliott Key**

Only the immediate Elliott Key harbor area would be included in the Visitor Services/Park Administration Zone. Current visitor services and park administration facilities would continue to be used, but the specific uses of these facilities could change to improve efficiency. The park would continue to use Elliott Key as the main location for its environmental education program, and to use Adams Key as a backup location. A staging area for canoes and kayaks might be built on the Elliott Key developed area, allowing visitors to be shuttled

by motorboat to the key and depart from there to explore the island shorelines.

The remainder of Elliott Key would be in the Nature Observation Zone.

Ranger residences would remain, and the central hiking trail would remain unhardened.

### **Adams Key**

Only the southern portion of Adams Key that includes the dock, day use/park administration area, pavilion, restrooms, and the two ranger residences would be part of the Visitor Services/Park Administration Zone. Existing facilities and uses would continue as described in alternative 1. A staging area for canoes and kayaks might be built at the Adams Key developed area, allowing visitors to explore the island shorelines. This new service likely would be provided by a commercial visitor services operator.

Should the park opt to move the program to Adams Key, facilities might need to be built or rehabilitated, and the appropriate environmental planning would occur before building.

The northern portion of this key would be in the Multiuse Zone and managed accordingly.

### **Porgy Key**

Porgy Key would be in this Nature Observation Zone in this alternative. Current management of the ruins associated with the historic Jones homestead site would continue. Interpretation of the Jones site via waysides or ranger interaction could take place on Adams Key.

### **Other Keys**

Several keys would be included in the Nature Observation Zone—Soldier Key, the Ragged Keys, Sands Key, Rubicon Keys, Reid Key, Old Rhodes Key, Totten Key, Gold Key, East Arsenicker Key, Long Arsenicker Key, Mangrove Key, Porgy Key, and several smaller unnamed keys around Jones Lagoon. West Arsenicker Key, Arsenicker Key, the water extending out 500 feet from these keys,

and Swan Key would be included in the Sensitive Resource Zone (and marked by dayboards or buoys) to protect exceptional and sensitive natural or cultural resources. Visitors would not be allowed in these areas, but research could occur under a science permit issued by the park.

## **PARTNERSHIPS**

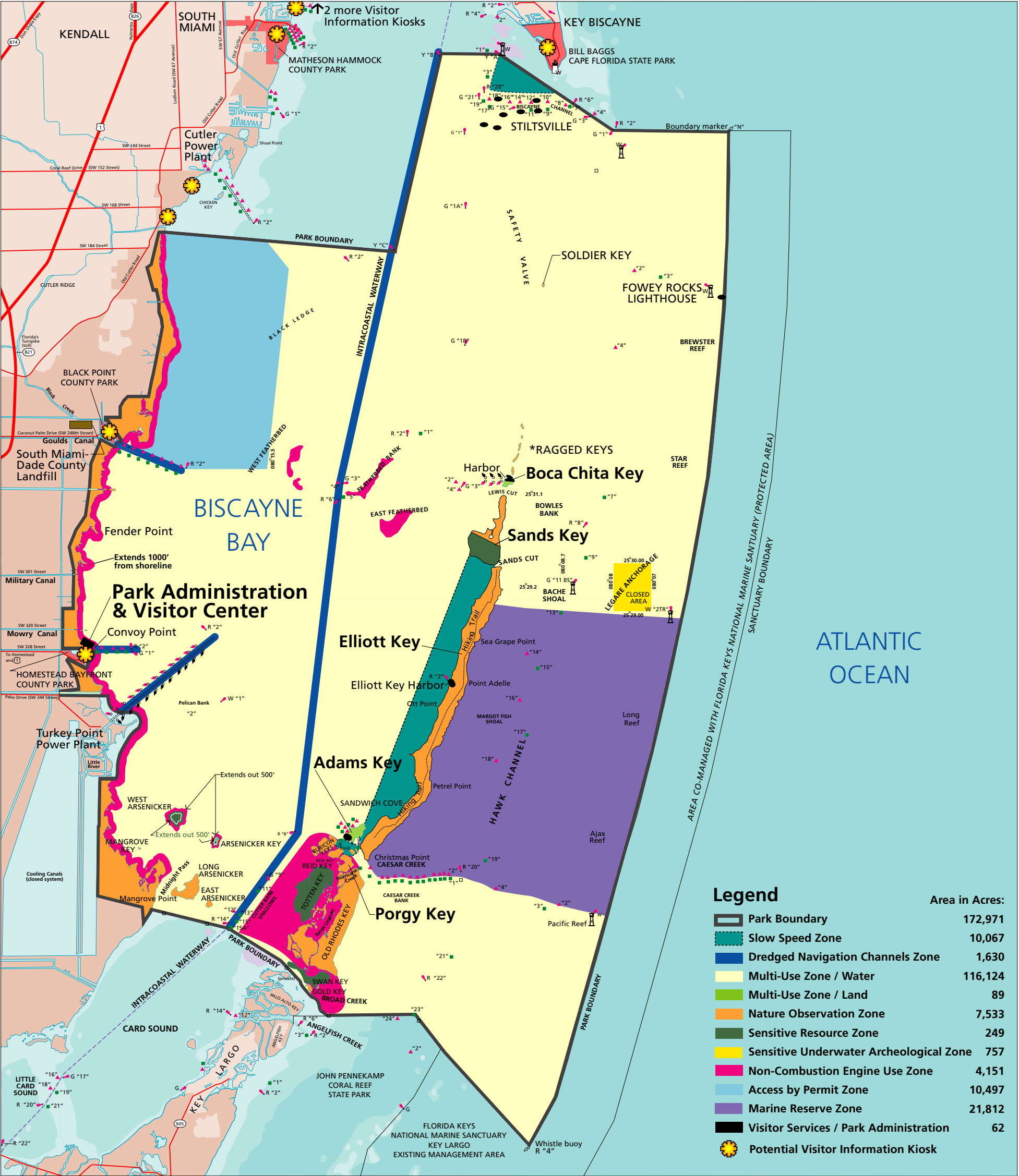
Additional partnership agreements would be sought to expand the park's capacity both inside and beyond park boundaries at sites such as marinas and state and county parks. Partnerships with Homestead Bayfront County Park, Black Point County Park, Mattheson Hammock County Park, and Bill Baggs Cape Florida State Park would allow new or improved kiosks, signs, and interpretive programs. Other potential sites to explore could

include Dinner Key (in Coconut Grove), No Name Harbor (in Bill Baggs Cape Florida State Park), Crandon Park (on Key Biscayne), and Deering Estate (Palmetto Bay). Some sites could include education programs and NPS personnel. Establishing a dock for canoe access and storage on Old Cutler Road, north of the park boundary, would be pursued.

Biscayne National Park would coordinate with Florida Keys National Marine Sanctuary to ensure compatible management strategies in adjacent federal waters.

The National Park Service would continue to collaborate with other entities to address water quality and many other concerns. These partnerships could include federal, state, and local agencies; community groups; commercial organizations; and individuals.





0 1 2 Kilometers  
0 1 2 Statute Miles  
0 1 2 Nautical Miles  
Map not for navigation

Map Key to Water Features and Landmarks			
Channel Markers (entering from seaward)			
Other Aids and Landmarks			

\*RAGGED KEYS #2, #3, and #5 are Private Properties

# Alternative 5

## Biscayne National Park

United States Department of the Interior ■ National Park Service  
DSC / APRIL 2011 / 169 / 20057

back of map

## **ALTERNATIVES OR ACTIONS CONSIDERED BUT DISMISSED**

Early discussion on alternative 5 included a large Slow Speed Zone over the Safety Valve between Boca Chita Key and Stiltsville. Park staff expressed concerns that this area was not likely to be easily identified by the public or enforceable without increased costs for marking and maintenance. Although the Safety Valve is a shallow water area, it is generally deeper than other shallow areas of the park, such as Featherbeds or Pelican Bank.

Additionally, this area is bisected by numerous deeper channels. As such, it is believed that it is probably better for boaters to maintain speeds high enough to 'plane' their boats across the area because propeller damage is reduced. This is more protective of resources and may be safer for boaters so the Slow Speed Zone was dropped from alternative 5.

## MITIGATIVE MEASURES COMMON TO ALL ACTION ALTERNATIVES

Congress charged the National Park Service with managing the lands under its stewardship “in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (NPS Organic Act, 16 USC 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of national park system resources.

To ensure that implementation of the action alternatives protects unimpaired natural and cultural resources and the quality of the visitor experience, a consistent set of mitigative measures would be applied to actions proposed in this plan. The National Park Service would prepare appropriate environmental review (i.e., those required by the National Environmental Policy Act, National Historic Preservation Act, and other relevant legislation) for these future actions. As part of the environmental review, the National Park Service would avoid, minimize, and mitigate adverse impacts when practicable. The implementation of a compliance monitoring program could be considered to stay within the parameters of National Environmental Policy Act and National Historic Preservation Act compliance documents, U.S. Army Corps of Engineers Section 404 permits, etc. The compliance monitoring program would oversee these mitigative measures and would include reporting protocols.

The following mitigative measures and best management practices would be applied to avoid or minimize potential impacts from implementation of the alternatives. These measures would apply to all action alternatives.

### NATURAL RESOURCES

#### Air Quality

Implement a dust abatement program. Standard dust abatement measures could include the following elements — water or otherwise stabilize soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate after construction.

#### Exotic Species

Implement a noxious weed abatement program. Standard measures could include the following elements—ensure construction-related equipment arrives on-site free of mud or seed-bearing material, certify all seeds and straw material as weed-free, identify areas of noxious weeds before construction, treat noxious weeds or noxious weed topsoil before construction (e.g., topsoil segregation, storage, herbicide treatment), and revegetate with appropriate native species.

Nonnative animals that reside in Biscayne National Park include the Indo-Pacific lionfish, the Green Iguana, the cane toad, and the Mexican red-bellied squirrel. Nonnative animals that prove to become invasive and problematic are managed on a case-by-case basis and the nature of the species involved and feasibility of its eradication or population control are considered.

#### Soils

Build new facilities on soils suitable for development. Minimize soil erosion by limiting the time that soil was left exposed and by applying other erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies. Once work was completed,

revegetate construction areas with native plants in a timely period.

### **Special Status Species**

Mitigative actions would occur during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on rare, threatened, and endangered species. These actions would vary by the specific project and area of the national park affected. Many of the measures listed below for vegetation and wildlife would also benefit rare, threatened, and endangered species by helping to preserve habitat. Mitigative actions specific to rare, threatened, and endangered species would include the following.

- Conduct surveys for rare, threatened, and endangered species as warranted.
- Site and design facilities/actions to avoid adverse effects on rare, threatened, and endangered species. If avoidance is infeasible, minimize and compensate adverse effects on rare, threatened, and endangered species as appropriate and in consultation with the appropriate resource agencies.
- Develop and implement restoration and/or monitoring plans as warranted. Plans should include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques.
- Implement measures to reduce adverse effects of nonnative plants and wildlife on rare, threatened, and endangered species.
- To improve sea turtle nesting success and minimize disturbances to sea turtle nests from raccoon predators, the park could implement more intensive raccoon population control, particularly in campground areas where raccoons become abundant and problematic.

### **Vegetation**

- Monitor areas used by visitors (e.g., trails) for signs of native vegetation disturbance. Use public education, revegetation of

disturbed areas with native plants, erosion control measures, and barriers to control potential impacts on plants from trail erosion or social trailing (visitor-created trails).

- Develop revegetation plans for the disturbed area and require the use of native species. Revegetation plans should specify seed/plant source, seed/plant mixes, soil preparation, etc. Salvage vegetation should be used to the extent possible.
- The park will continue performing integrated pest management practices on exotic and/or invasive plant species, as described in the “Exotic Plant Management Plan.”

### **Water Resources**

- To prevent water pollution during construction, use erosion control measures, minimize discharge to water bodies, and regularly inspect construction equipment for leaks of petroleum and other chemicals.
- Build a runoff filtration system to minimize water pollution from larger parking areas.
- The park will continue using fuel spill prevention devices when fueling boats.

### **Wildlife**

- Employ techniques to reduce impacts on wildlife, including visitor education programs, restrictions on visitor activities, and park ranger patrols.
- Implement a natural resource protection program. Standard measures would include construction scheduling, biological monitoring, erosion and sediment control, the use of fencing or other means to protect sensitive resources adjacent to construction, the removal of all food-related items or rubbish, wildlife-proof trash cans, removal of monofilament and other marine debris, and derelict trap removal and revegetation. This could include specific construction monitoring

by resource specialists as well as treatment and reporting procedures.

- The U.S. Fish and Wildlife Service recommends that boating and nonmotorized recreation be limited inside a 330-foot buffer around bald eagle nest sites during nesting season (USFWS 2007). The park will use set-back distances for mixed-species colonies of nesting birds (such as egrets, herons, and ibises) as recommended by scientific literature. No limitations are necessary outside the nesting season.

## Wetlands

- Delineate wetlands and apply protection measures during construction. Wetlands would be delineated by qualified NPS staff or certified wetland specialists and clearly marked before construction work. Perform construction activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.

## CULTURAL RESOURCES

The National Park Service would preserve and protect, to the greatest extent possible, resources that reflect human occupation of Biscayne National Park. Specific mitigation measures include the following.

- Continue to develop inventories for and oversee research regarding archeological, historical, and ethnographic resources to better understand and manage the resources. Continue to manage cultural resources and collections following federal regulations and NPS guidelines.
- Subject projects to site-specific planning and compliance. Make efforts to avoid adverse impacts through the use of the *Secretary of the Interior's Standards for Archeology and Historic Preservation* and by using screening and/or sensitive design that would be compatible with historic resources. If adverse impacts

could not be avoided, mitigate these impacts through a consultation process with all interested parties.

- Inventory all unsurveyed areas in the park for archeological, historical, and ethnographic resources as well as cultural and ethnographic landscapes. Conduct archeological surveys in unsurveyed areas where development would occur to determine the extent and significance of archeological resources in the areas.
- Document cultural and ethnographic landscapes in the park and identify treatments to ensure their preservation.
- Conduct archeological site monitoring and routine protection. Conduct data recovery excavations at archeological sites threatened with destruction where protection or site avoidance during design and construction is infeasible. Should archeological resources be discovered, stop work in that location until the resources were properly recorded by the National Park Service and evaluated under the eligibility criteria of the National Register of Historic Places. If, in consultation with the Florida state historic preservation officer, the resources were determined eligible, implement appropriate measures either to avoid further resource impacts or to mitigate the loss or disturbance of the resources.
- Avoid or mitigate impacts on ethnographic resources that may be identified in the future through continuing consultation with American Indian tribes and other stakeholders.
- Conduct additional background research, resource inventory, and National Register evaluation where information about the location and significance of cultural resources is lacking. Incorporate the results of these efforts into site-specific planning and compliance documents.
- Whenever possible, modify project design features to avoid effects on cultural resources. New developments

would be relatively limited and would be located on sites that blend with cultural landscapes. If necessary, use vegetative screening as appropriate to minimize impacts on cultural landscapes.

- Strictly adhere to NPS standards and guidelines on the display and care of artifacts, including artifacts used in exhibits in the visitor center.

## **SOUNDSCAPES**

Develop a park soundscape management plan to (1) establish soundscape standards for each management zone in the park, (2) monitor park soundscape resources and sources of noise against those standards, and (3) implement an adaptive management program to ensure that soundscape standards are met.

Standard noise abatement measures would be followed during construction. Such measures could include the following elements:

- scheduling to minimize impacts on adjacent noise-sensitive resources
- using the best available noise control techniques wherever feasible
- using hydraulically or electrically powered tools when feasible rather than engine powered

- locating stationary noise sources as far from sensitive resources as possible

Park and visitor facilities and visitor services would be located and designed to minimize objectionable noise.

## **SUSTAINABLE DESIGN AND AESTHETICS**

Projects would avoid or minimize adverse impacts on natural and cultural resources. Development projects (e.g., buildings, facilities, utilities, roads, bridges, and trails) or reconstruction projects (e.g., road reconstruction, building rehabilitation, and utility upgrade) would be designed to work in harmony with the surroundings, particularly in historic districts. Projects would reduce, minimize, or eliminate air and water nonpoint-source pollution. Projects would be sustainable whenever practicable by recycling and reusing materials, by minimizing materials, by minimizing energy consumption during the project, and by minimizing energy consumption throughout the lifespan of the project.

# FUTURE STUDIES AND IMPLEMENTATION PLANS NEEDED

## PLANS

After completion and approval of a general management plan for managing the national park, other more detailed studies and plans would be needed for implementation of specific actions. As required, additional environmental compliance (National Environmental Policy Act, National Historic Preservation Act, and other relevant laws and policies) and public involvement would be conducted. Those additional studies include but would not be limited to the following.

**Landscape reports** would be prepared for potential landscapes at the Jones Property and the Sweeting Homestead before any new development at these sites.

**A resource stewardship strategy (RSS)** is now required for all park units. The resource stewardship strategy expands the desired resource conditions from this general management plan, describes the current condition of the resources, and identifies the difference between current and desired conditions. Comprehensive strategies to achieve and maintain the desired conditions are developed that identify specific monitoring indicators and targets. The resource stewardship strategy will guide the preparation of implementation plans such as a vegetation management plan or fisheries plan.

**A park soundscape management plan** should be developed to (1) establish soundscape standards for each management zone in the park, (2) monitor park soundscape resources and sources of noise against those standards, and (3) implement an adaptive management program to ensure that soundscape standards are met.

Pending completion of the general management plan, the National Park Service will prepare a long-range interpretation plan for Biscayne National Park. This plan is a

conceptual plan that will present a visitor experience vision for the national park based on purpose, significance, and the interpretive themes identified in this general management plan. The long-range plan will provide direction and focus to visitor experiences in the national park, and it will identify an action plan that best meets current and future visitor needs and effectively tells park stories. The plan will guide interpretation managers through elimination or modification of existing programs, creation of new programs, and determination of future media needs. The plan will also provide long- and short-range views and deal with all media, including personal services and facilities.

## OTHER NEEDS

**Marine Reserve Zone** - Special rulemaking would be required to institute the no-take Marine Reserve Zone and the Non-Combustion Engine Use Zones, described within this document.

Regarding the Marine Reserve Zone, as stipulated in 16 USC Sect. 410gg-2, the Secretary of the Interior, after consultation with appropriate officials of the State, may designate species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which Biscayne National Park was established. This provision is only applicable within the original monument boundaries, since expansion areas donated by the State must be in conformance with State law. Since the proposed marine reserve zones described in Alternatives 3, 4, and 5 are all within the original monument, this plan and environmental impact statement is serving as the vehicle for consultation with the State, and upon the finalization of a decision document, no further actions are necessary. In its signed (2002/renewed 2007) Memorandum of



Understanding with the National Park Service, the State of Florida recognizes that the park intends to consider the establishment of one or more marine reserves under its general

management plan planning process for purposes other than sound fisheries management.

## ESTIMATED COSTS

Cost estimates in general management plans are required by the 1978 Parks and Recreation Act and are requested by Congress. The purpose of cost estimates is to assist managers with setting priorities and to inform the public. For comparison purposes, the planning team estimated the cost to implement each of the alternatives (see table 3 at the end of this section).

The implementation of the approved plan, no matter which alternative, will depend on future NPS funding levels; servicewide priorities; and partnership funds, time, and effort. The approval of a general management plan does not guarantee that funding and staffing needed to implement the plan will be forthcoming. Full implementation of the plan could be many years in the future.

The following applies to costs presented in this plan:

- The cost figures shown here and throughout the plan are intended only to provide an estimate of relative costs of the alternatives and should not be used for budgeting purposes.
- The costs presented (in 2010 dollars) have been developed using NPS and industry standards to the extent available.
- Actual costs will be determined at a later date, considering the design of facilities and identification of detailed resource protection needs.
- Potential costs for land protection measures (easements, acquisitions, etc.) to implement the boundary adjustment proposals in this general management plan are not included in these estimates.
- The cost estimates represent the total costs of projects. Potential cost-sharing opportunities with partners could reduce the overall costs.

The NPS Facility Planning Model was used to determine the needs for visitor service and administrative space.

### **ASSOCIATED COSTS: ALTERNATIVE 1 — NO ACTION**

Costs associated with implementing this alternative are ongoing operations (base funding) and one-time projects that are already approved and funded. Funded projects include an upgrade of the radio system, erosion control, building and grounds maintenance, landscape enhancement, maintenance mentoring program, completion of the underwater trail, and cost of collection recovery. The total funding requested for these projects is \$658,000, and this amount is included in the estimates for all alternatives as nonfacility costs. In addition to the above costs, periodic increases in base funding would be required to cover inflation and maintain the current level of park operations.

### **ASSOCIATED COSTS: ALTERNATIVE 2**

Cost estimates for this alternative include construction of new facilities and amenities at the following locations.

**Miami Area** — Construction of a new visitor center. A possible partnership with the city of Miami would cut NPS costs.

**Convoy Point** — Construction of a viewing platform in the area for better views of the bay. Build a boardwalk/loop trail with viewing platforms to interpret the dwarf mangrove forest and the mangrove shoreline north of the visitor center. Construct catwalks over the mangroves to the north and south to link the canals. Upgrade the jetty and boardwalk.

**Boca Chita Key** — Conversion of two structures used for park operations and visitor services. The number of kiosks providing interpretive information would be increased. The retaining wall on the north side of the island would be strengthened to maintain its current configuration.

**Elliott Key** — Make the hiking trail north from the harbor area to the Sweeting Homestead (3 miles) and south to Sandwich Cove (3 miles) universally accessible, and make Breezeway Loop (0.5 mile) universally accessible. Primitive trails would be developed to connect the central trail to University Dock and to Sandwich Cove, Petrel Point, and the Sweeting Homestead. Also, three primitive campsites would be established. Toilets would be added at the new campsites and at University Dock, which would remain day-use only. Visitor kiosks would be installed at the University Dock harbor. A canoe/kayak launch area would be established. Adapt former environmental education facility for visitor services.

**Adams Key** — Provide new canoe/kayak staging area and storage of canoes and kayaks at expanded dock, campsites, improved trails, and an environmental education venue.

**Porgy Key** — Stabilize Jones home site for interpretation and build a new docking area/ramp.

Funding needs for additional building maintenance and operations are also included in this alternative.

Nonfacility costs in this alternative would include cultural and natural resource management actions and funding for enhanced interpretive programs and materials throughout the park.

Twenty-one additional permanent staff positions would be recommended to fully implement this alternative. This increase would be necessary to have staff available at the external visitor contact facilities (6), other interpretive staff (8), for cultural resources management (2), natural resource management (2), law

enforcement (2), and additional maintenance work (1). Although the cost estimates were for full-time NPS employees, some work could be done by volunteers or cooperating association employees.

## **ASSOCIATED COSTS: ALTERNATIVE 3**

Cost estimates for this alternative include construction of new facilities and amenities at the following locations.

**Miami Area** — Construction of a new visitor center. A possible partnership with the city of Miami would cut NPS costs.

**Convoy Point** — Same as alternative 2.

**Boca Chita Key** — Same as alternative 2 for adaptive reuse of historic buildings.

**Elliott Key** — Same as alternative 2 except that the trail from the harbor south to Sandwich Cove and Petrel Point (3 miles) would be improved but not made fully accessible.

**Adams Key** — Same as alternative 2.

**Porgy Key** — Same as alternative 2.

Nonfacility costs in this alternative would include cultural and natural resource management actions and funding for enhanced interpretive programs and materials throughout the park.

Twenty new FTE staff positions would be recommended to fully implement this alternative. This increase would be necessary to have staff available at the external visitor contact facilities (6), other interpretive staff (5), for cultural resources management (1), natural resource management (2), law enforcement (4), for additional maintenance work (1), and for administrative support (1). Although the costs were estimated for full-time NPS employees, some work could be done by volunteers or cooperating association employees.

### **ASSOCIATED COSTS: ALTERNATIVE 4—PREFERRED ALTERNATIVE**

Cost estimates for this alternative include construction of new facilities and amenities at the following locations.

**Miami Area** — Construction of a new visitor center. A possible partnership with the city of Miami would cut NPS costs.

**Convoy Point** — Upgrade jetty and boardwalk as in alternative 2. Consider developing a boardwalk or viewing platform to interpret the dwarf mangrove forest and the mangrove shoreline north of the visitor center.

**Boca Chita Key** — Same as alternative 3.

**Elliott Key** — Make the Breezeway Loop Trail and boardwalk handicap accessible.

**Adams Key** — Establish staging area for canoes and kayaks and develop minimal environmental education venue.

**Porgy Key** — Add a primitive dock; interpret Jones home site.

Nonfacility costs in this alternative would include cultural and natural resource management actions (including management of the Marine Reserve Zone) and funding for enhanced interpretive programs and materials throughout the park.

Fourteen new FTE staff positions would be recommended to fully implement this alternative. This increase would provide necessary staff for the external visitor contact facilities (6), other interpretation (1), natural resource management (2), cultural resource management (1), law enforcement (3), and maintenance (1). Although the costs are estimated for full-time NPS employees, some work could be done by volunteers or cooperating association employees.

### **ASSOCIATED COSTS: ALTERNATIVE 5**

Cost estimates for this alternative include construction of new facilities and amenities at the following locations.

**Miami Area** — Construction of a new visitor center. A possible partnership with the city of Miami would cut NPS costs.

**Convoy Point** — Possibly upgrade jetty boardwalk.

**Adams Key** — Establish staging area for canoes and kayaks. Nonfacility costs in this alternative would include cultural and natural resource management actions (including management of the Marine Reserve and Access-by-Permit zones) and funding for enhanced interpretation programs and materials throughout the park.

There are no one-time acquisition costs for the lighthouse as the transfer would be free. However, the structure's need for a condition assessment and rehab recommendations would be a one-time cost. A contractor has provided a quote for the cost of such an assessment (\$38,000). This assessment could reveal structural deficiencies and would provide estimates of costs for their repair. Costs for these repairs and would be outlined in a separate environmental planning document. Funds for the maintenance and operation of the structures could be derived from project funds or donations.

Twenty new FTE staff positions would be recommended to fully implement this alternative. This increase would be necessary to have staff available for an external visitor contact facility (6), other interpretation (1), natural resource management (3), cultural resource management (1), law enforcement (5), maintenance (3), and administrative support (1). Two of the maintenance positions are for the Fowey Rocks Lighthouse should it be acquired. (Although the cost estimates are for full-time NPS employees, some work could be done by volunteers or cooperating association employees.)

**TABLE 3: ESTIMATED COSTS OF THE ALTERNATIVES (IN 2010 DOLLARS)**

	<b>Alternative 1 (No Action)</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4 (Preferred)</b>	<b>Alternative 5</b>
<b>Annual Operating Costs<sup>1</sup></b>	\$4,311,000	\$5,928,000	\$5,851,000	\$5,387,000	\$5,857,000
Fowey Lighthouse <sup>5</sup>					\$6,000
<b>Total Staffing (FTE<sup>2</sup>)</b>	56	77	76	70	76
<b>One Time Costs</b>					
Facility Costs <sup>3</sup>	\$500,000	\$5,610,000	\$5,340,000	\$1,070,000	\$350,000
Nonfacility Costs <sup>4</sup>	\$158,000	\$244,000	\$245,000	\$222,000	\$263,000
<b>Miami Visitor Service Center</b>		\$4,500,000	\$4,500,000	\$4,500,000	\$4,500,000
<b>Total One-Time Costs</b>	658,000	\$ 10,354,000	\$10,085,000	\$ 5,792,000	\$5,113,000

- (1) Annual operating costs (ONPS) are the total annual costs for maintenance and operations associated with each alternative, including maintenance, utilities, supplies, staff salaries and benefits, leasing, and other materials. Amounts shown for the action alternatives are estimates.
- (2) Total full-time equivalents (FTE) are the number of employees required to maintain the assets of the park at a good level, provide acceptable visitor services, protect resources, and generally support park operations. This includes staff needed to operate the potential Mimi-area VC and the Fowey Rocks Lighthouse. The full-time equivalent staff would not necessarily be NPS employees. Park managers would explore opportunities to work with partners, volunteers, and other federal agencies to manage the park efficiently.
- (3) Facility costs include those for construction or renovation of facilities. In the no-action alternative, initial construction costs include only costs for projects that are already approved and funded.
- (4) Nonfacility costs include the costs of actions for cultural and natural resource preservation and management, visitor service materials, and other park management activities that are not related to a facility but would require substantial funding above the annual park operating costs.
- (5) Acquisition of the lighthouse would be via a federal property transfer.

## ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative is the alternative that will best promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act of 1969. The environmentally preferable alternative is determined by applying the six criteria suggested in the National Environmental Policy Act and guided by the Council on Environmental Quality. In the National Park Service, this requirement is met by (1) disclosing how each alternative meets the criteria set forth in section 101(b), which are listed in the table below, and (2) by disclosing any inconsistencies between the alternatives analyzed and other environmental laws and policies.

Table 4 below and the following discussion analyze how each alternative would or would not fulfill the requirements of sections 101 and 102(1) of the National Environmental Policy Act.

When analyzing and rating the alternatives against these criteria, a scale of 1 to 3 was used. The rating of zero (0), where the criterion was not met at all, was not used because planning actions that were not environmentally sound were eliminated from consideration early in the process.

Definition of rating scale:

- 1 = alternative partially achieves (at a minimal level) the intent of the criterion
- 2 = alternative partially achieves (at a moderate level) the intent of the criterion
- 3 = alternative fully achieves the intent of the criterion

Although all of the action alternatives rated fairly close together, alternatives 4 and 5 (the NPS preferred alternative) both rated the highest with 16 points and either could be

**TABLE 4: ENVIRONMENTALLY PREFERABLE ALTERNATIVE ANALYSIS**

CRITERIA	Alternatives				
	1	2	3	4	5
a) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	1	2	2	3	3
b) Ensure safe, healthful, productive, and esthetically and culturally pleasing surroundings for all Americans.	1	2	2	3	3
c) Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.	1	3	3	2	2
d) Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices.	1	2	2	3	3
e) Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.	1	2	3	3	2
f) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	2	2	3	2	3
<b>Total points</b>	<b>6</b>	<b>13</b>	<b>15</b>	<b>16</b>	<b>16</b>

considered environmentally preferable for slightly different reasons.

The no-action alternative (alternative 1) does not provide as much resource protection as the other alternatives—more resource impacts would be expected with increasing use levels in the no-action alternative. Continuation of the widespread and relatively unregulated motorized boating in the park would be anticipated to generate more resource degradation, visitor conflicts, and safety concerns over time as visitor levels rise. Thus, the no-action alternative would not fully meet the following national environmental policy goals:

- Attain the widest range of beneficial uses of the environment without degradation.
- Preserve important natural aspects and maintain an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use.

Alternatives 2 and 3 would provide additional visitor use opportunities and access to the park. However, there would be a higher potential for adverse impacts on the environment from increased park development. Alternative 3 would have a Marine Reserve Zone, so it scored higher than alternative 2. However, alternatives 2 and 3 would not fully meet the following policy goals:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure safe, healthful, productive, and esthetically and culturally pleasing surroundings for all Americans.
- Preserve important historic, cultural and natural aspects of our national heritage

Alternative 4 would offer some additional visitor use opportunities and access to the park while providing additional protection to sensitive natural resource areas. The range of visitor experience opportunities would not be quite as great in this alternative. This

alternative would fully meet the following goals:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure safe, healthful, productive and esthetically and culturally pleasing surroundings for all Americans.
- Preserve important historic, cultural and natural aspects of our national heritage and maintain an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.

Alternative 5 would provide a high level of resource protection for sensitive areas of the bay. This alternative would meet the following goals more fully than the other alternatives:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans.
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain an environment that supports diversity and variety of individual choice.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Based on the analysis above, the environmentally preferable alternative is alternative 5 for Biscayne National Park in this general management plan. This alternative most fully satisfies the national environmental criteria. The alternative would provide a high level of protection of natural and cultural resources while concurrently providing for a wide range of neutral and beneficial uses of the environment. The alternative would integrate

resource protection with an appropriate range of visitor uses by having the most acreage in protective zoning.



TABLE 5: SUMMARY OF ALTERNATIVES

ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 — PREFERRED	ALTERNATIVE 5
GENERAL THEME / CONCEPT				
<p>No-action would continue current management trends to provide visitor opportunities and preserve resources under current laws, policies, and plans.</p> <ul style="list-style-type: none"> <li>Emphasize high level of access, with recreational opportunities throughout park.</li> <li>Actively manage natural resources, activities for restoration, and recovery or maintenance of habitats and dependent species.</li> <li>Continue cultural resources maintenance and monitoring.</li> </ul>	<p>Alternative 2 would emphasize the recreational use of the park while providing for resource protection as governed by law, policy, and resource sensitivity. This concept would be accomplished by providing the highest level of services, facilities, and access to specific areas of the park of all the action alternatives.</p> <ul style="list-style-type: none"> <li>Manage for a relatively high level of new or enhanced access, visitor services, and facilities at some locations.</li> <li>Minimally modify natural resources for increased visitor access and development.</li> </ul>	<p>Alternative 3 would allow all visitors a full range of experience opportunities throughout most of the park and use a permit system to authorize a limited number of visitors to access some areas of the park. There would be limited access to other park areas to provide an uncrowded experience, and small areas would be set aside that prohibit visitor access to protect sensitive resources and allow wildlife a respite from people.</p> <ul style="list-style-type: none"> <li>Add a relatively high level of new or enhanced access, visitor services, and facilities at some locations.</li> <li>Relative to alternatives 1 and 2, provide additional opportunities to experience uncrowded areas and natural sounds.</li> <li>Designate a marine reserve to provide visitors the opportunity to experience a healthy, natural, and ecologically intact reef community.</li> </ul>	<p>This alternative would emphasize strong natural and cultural resource protection while providing a diversity of visitor experiences. Some areas would be closed to visitors to protect sensitive resources and allow wildlife a respite from people. Other areas would be reserved for limited types of visitor use.</p> <ul style="list-style-type: none"> <li>Provide moderate level of new or enhanced access, visitor services, and facilities.</li> <li>Compared to alternatives 1, 2, and 3, increase opportunities to experience natural sounds.</li> <li>Create a combination of increased Noncombustion Engine Use and Slow Speed zones to provide high level of resource protection.</li> <li>Designate a marine reserve to provide visitors the opportunity to experience a healthy, natural, and ecologically intact reef community.</li> </ul>	<p>The park would be managed under alternative 5 to promote the protection of natural and cultural resources. This alternative would provide the highest level of resource protection while allowing the lowest level of visitor services of all the action alternatives. Visitor access and activities would be highly managed for resource protection while still enabling visitors to participate in a variety of activities.</p> <ul style="list-style-type: none"> <li>Provide the highest level of opportunity to experience uncrowded areas and natural sounds of the action alternatives.</li> <li>With the combination of increased Noncombustion Engine Use and Slow Speed zones, provide the greatest resource protection of the action alternatives.</li> <li>Designate the largest marine reserve (of the action alternatives) in the park to provide visitors the opportunity to experience a healthy, natural, and ecologically intact reef community.</li> </ul>
VISITOR EXPERIENCE				
<p><b>Mainland:</b></p> <p>Maintain current primary land-based area where visitors learn about the park and its resources and picnic, bird watch, sightsee, and fish.</p>	<p><b>Mainland:</b></p> <p>Same as alternative 1 plus provide expanded opportunities to explore, sightsee, and experience natural sights and sounds in relatively remote surroundings along mangrove shoreline.</p> <p>Add a viewing platform and a boardwalk/loop trail with viewing platforms for interpreting the dwarf mangrove forest and mangrove shoreline.</p>	<p><b>Mainland:</b></p> <p>Same as alternative 2.</p>	<p><b>Mainland:</b></p> <p>Same as alternative 2.</p> <p>Consider developing a boardwalk or viewing platform to interpret the dwarf mangrove shorelines north of the visitor center. Possibly upgrade visitor center boardwalk and jetty.</p>	<p><b>Mainland:</b></p> <p>Provide highest level of opportunities (of the action alternatives) to experience natural sounds and sights in relatively remote surroundings along <i>all</i> of the shoreline.</p> <p>Maintain current primary land-based area where visitors learn about the park and its resources and picnic, bird-watch, sightsee, and fish, plus possibly upgrade visitor center boardwalk and jetty.</p>

ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 — PREFERRED	ALTERNATIVE 5
<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"><li>• With the exception of personal watercraft, keep park waters open to boats of varying sizes and power sources and a variety of activities including diving, camping, visiting shipwrecks, and recreational and commercial fishing.</li><li>• Continue three slow speed areas for visitor safety.</li><li>• Continue one noncombustion engine use area.</li><li>• Legare Anchorage: Continue allowing visitors to drift fish, troll, and traverse area but not to stop or enter the water. Continue to allow commercial fishing and trapping.</li></ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"><li>• Keep a very large percentage of park waters open to boats of varying sizes and power sources in Multiuse Zone (where visitors can experience wide range of activities in natural and cultural settings).</li><li>• Include four Slow Speed Zones.</li><li>• Provide two Noncombustion Engine Use Zones for opportunities to experience natural soundscape.</li><li>• Legare Anchorage: Reduce size; visitors may travel through area and fish by hook and line, but they cannot stop or enter water. Prohibit commercial fishing and trapping.</li></ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"><li>• Provide large percentage of waters in Multiuse Zone.</li><li>• Include four Slow Speed Zones.</li><li>• Similar to alternative 2, provide two Noncombustion Engine Use Zones for opportunities to experience natural soundscapes in those areas.</li><li>• Manage two Access-by-Permit Only Zones for opportunities to experience areas with reduced congestion.</li><li>• Legare Anchorage: Same as alternative 2.</li><li>• Designate a marine reserve zone to provide swimmers, snorkelers, divers, and those who ride a glass-bottom boat the opportunity to experience a healthy, natural coral reef and reduce visitor use conflicts.</li></ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"><li>• Provide large percentage of waters in multiuse zone.</li><li>• Include three Slow Speed Zones.</li><li>• Provide four Noncombustion Engine Use Zones for extensive opportunities to experience natural soundscapes.</li><li>• Legare Anchorage: Same as alternative 2.</li><li>• Designate a Marine Reserve Zone to provide swimmers, snorkelers, divers, and those who ride a glass-bottom boat the opportunity to experience a healthy, natural coral reef and reduce visitor use conflicts.</li></ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"><li>• Provide moderate percentage of park waters in multiuse zone of action alternatives.</li><li>• Include three Slow Speed Zones. Provides the largest area covered by Slow Speed Zones of all action alternatives.</li><li>• Provides highest area of Noncombustion Engine Use Zone areas for opportunities to experience natural soundscape.</li><li>• Provides largest area of Access-by-Permit Zone area of all action alternatives for opportunities to experience reduced congestion areas.</li><li>• Legare Anchorage: Same as alternative 2.</li><li>• Designate largest Marine Reserve Zone of all action alternatives to provide swimmers, snorkelers, divers, and those who ride a glass-bottom boat opportunities to experience a healthy, natural coral reef and reduce visitor use conflicts.</li></ul>
<p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Maintain Boca Chita, Elliott, and Adams keys as destination sites with some development (depending on key) for boaters who want to hike, picnic, camp, or sightsee.</li><li>• Maintain relatively remote locations and self-directed activities on many remaining keys for visitor experiences.</li></ul>	<p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Similar to alternative 1 for Boca Chita, Elliott, and Adams keys, but with expanded opportunities (depending on keys) for hiking, camping, canoeing, kayaking, and increased docking capacity.</li><li>• Porgy Key: Provide improved access to and interpretation of Jones home site site.</li><li>• Provide opportunities to experience natural sounds, sights, and systems in uncrowded, relatively remote surroundings on remaining park keys except Swan, West Arsenicker, and Arsenicker keys.</li></ul>	<p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Similar to alternative 2, except Elliott Key trail would only be improved and there would be no campsites on Elliott or Adams keys.</li></ul>	<p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Same as alternative 3 except reduce area of visitor services/park administration zone on Boca Chita, Elliott, Adams, and Porgy keys compared to alternatives 2 and 3. Other areas similar to alternative 1.</li></ul>	<p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Same as alternative 4 for Boca Chita and Adams keys; eliminate visitor services/park administration zone on Porgy Key and discourage visitation at Jones home site. Designate Elliott Key as a nature observation zone,</li><li>• Visitors experience natural sounds, sights, and systems in relatively remote surroundings on Porgy and Elliott keys.</li></ul>
<p><b>Mainland:</b></p> <p>Maintain the mangrove habitat and the fresh and saltwater wetlands in their natural state.</p>	<p><b>Mainland:</b></p> <p>Manage the area between Black Point County Park and Convoy Point for enhanced visitor access and recreational use. Manage remainder for sustainable, fully functioning, natural systems.</p>	<p><b>Mainland:</b></p> <p>Same as alternative 2.</p>	<p><b>Mainland:</b></p> <p>Same and alternatives 2 and 3.</p>	<p><b>Mainland:</b></p> <p>Manage all of mainland to support sustainable, fully functioning, natural systems except zone encompassing visitor center and headquarters at Convoy Point.</p>

Table 5: Summary of the Alternatives

ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 — PREFERRED	ALTERNATIVE 5
RESOURCE MANAGEMENT				
<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"> <li>Keep existing three slower speed areas to protect manatee in two areas (along mainland shoreline; west of the north part of Elliott Key; and the area of Caesar Creek in front of the Adams key dock).</li> <li>Keep existing noncombustion engine use area in Jones Lagoon.</li> <li>Legare Anchorage: Maintain protection for submerged cultural resources (2,360 acres).</li> <li>Fowey Rocks Lighthouse: Seek to partner with the eventual owner of the Fowey Rocks Lighthouse in order to assist in technical aspects of the lighthouse's management.</li> </ul> <p><b>Keys:</b></p> <ul style="list-style-type: none"> <li>Continue to close four keys to visitation for protection of exceptional and sensitive resources — Arsenicker, West Arsenicker, Soldier, and Sands keys.</li> <li>Continue to manage remaining keys for varied visitor access and recreational use.</li> </ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"> <li>Designate four Slow Speed Zones.</li> <li>Designate two Noncombustion Engine Use Zones to protect shallow water habitat along shoreline and around south-central keys.</li> <li>Legare Anchorage: Maintain protection for submerged cultural resources (663 acres).</li> <li>Fowey Rocks Lighthouse: Same as alternative 1.</li> </ul> <p><b>Keys:</b></p> <ul style="list-style-type: none"> <li>Close three keys to visitation for resource protection—Arsenicker, West Arsenicker, and Swan.</li> <li>Possibly minimally modify resources on Boca Chita, Elliott, Adams, and Porgy keys to allow for visitor access and recreation.</li> <li>Make current hiking trail (north from the harbor area to the Sweeting Homestead and south to Sandwich Cove (known as Spite Highway) and Breezeway loop trail universally accessible. Develop primitive trails to connect the central trail to University Dock and to Sandwich Cove, Petrel Point, and the Sweeting Homestead. Establish primitive campsites at Petrel Point area, University Dock area, and Sandwich Cove.</li> <li>Provide higher level of historic structure reuse on Boca Chita Key than in alternative 1.</li> <li>Manage southern cluster of keys and Sands and Ragged keys to support sustainable, fully functioning, natural systems.</li> </ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"> <li>Designate four Slow Speed Zones.</li> <li>Designate two Noncombustion Engine Use zones to protect shallow water habitat along shoreline and around south-central keys — similar to alternative 2.</li> <li>Legare Anchorage: Same as alternative 2.</li> <li>Fowey Rocks Lighthouse: Same as alternative 1.</li> <li>Designate access-by-permit zone east of southern Elliott Key and in northwest part of park to limit damage to resources.</li> <li>Designate marine reserve zone and manage it for healthy, natural coral reef, with large and numerous tropical reef fish and an ecologically intact reef system.</li> <li></li> </ul> <p><b>Keys:</b></p> <p>Same as alternative 2, but no additional campsites on Elliott Key.</p>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"> <li>Designate three Slow Speed Zones.</li> <li>Designate four Noncombustion Engine Use Zones to protect shallow water habitat.</li> <li>Legare Anchorage: Same as alternative 2.</li> <li>Fowey Rocks Lighthouse: Same as alternative 1.</li> <li>Designate Marine Reserve Zone and manage it for healthy, natural coral reef, with large and numerous tropical reef fish and an ecologically intact reef system.</li> </ul> <p><b>Keys:</b></p> <ul style="list-style-type: none"> <li>Close three keys as in alternative 2.</li> <li>Manage Boca Chita, Elliott, Adams, and Porgy keys for visitor access and recreation, except manage larger areas as Multiuse Zone to limit development.</li> <li>Manage remaining park keys as in alternative 2.</li> </ul>	<p><b>Bay and Ocean:</b></p> <ul style="list-style-type: none"> <li>Designate three Slow Speed Zones. Represents largest area of protection by slow-speed zones of all action alternatives.</li> <li>With four Noncombustion Engine Use Zones, provide highest level of protection for shallow water habitat of all action alternatives.</li> <li>Legare Anchorage: same as alternative 2.</li> <li>Fowey Rocks Lighthouse: Seek to acquire and manage the lighthouse.</li> <li>Designate largest access-by-permit zone of all action alternatives in the northwest part of the park.</li> <li>Designate largest marine reserve zone of all the alternatives and manage it for healthy, natural coral reef, with large and numerous tropical reef fish and an ecologically intact reef system.</li> </ul> <p><b>Keys:</b></p> <ul style="list-style-type: none"> <li>Close three keys as in alternative 2.</li> <li>Manage Boca Chita and Adams keys as in alternative 4.</li> <li>Manage majority of Elliott and Porgy keys to support sustainable, fully functioning, natural systems.</li> <li>Manage southern cluster of keys and Sands and Ragged keys as in alternative 2.</li> </ul>

ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 — PREFERRED	ALTERNATIVE 5
FACILITIES				
<p><b>Mainland:</b></p> <p>Maintain visitor services and infrastructure at or near current levels with the visitor center, designated paths, boardwalk, and jetty.</p> <p>Continue limited visitor contact facilities outside the park to provide contact information and signs at public sites.</p> <p><b>Keys:</b></p> <p>Existing facilities:</p> <ul style="list-style-type: none"><li>• Boca Chita: Dock, kiosks, harbor, historic structures, picnic areas, restrooms, primitive campground, and maintenance building. Possibly reuse some historic structures for park operations.</li><li>• Elliott: Dock, marina, trails, picnic and restroom facilities, environmental education center, maintenance facility, ranger station and residences.</li><li>• Adams: Dock, trail, day use picnic pavilion, restroom facilities, wayside exhibits, ranger residences, and maintenance facility.</li><li>• Porgy: Remains of historic dock, Jones home site, no interpretation. Fowey Rocks Lighthouse: Seek to partner with the eventual owner of the Fowey Rocks Lighthouse in order to assist in technical aspects of the lighthouse's management.</li></ul>	<p><b>Mainland:</b></p> <p>Build a boardwalk/loop trail, with viewing "blind" platform, near the Convoy Point entrance road through mangrove and near open marsh to the shoreline and near the visitor center to interpret the dwarf mangrove and marsh area. Improve safety and accessibility of existing jetty and boardwalk, possibly with shade structures and benches.</p> <p>Increase visitor contact points outside the park through kiosks, signs, possibly educational programs and NPS personnel established at marinas and state/local parks through partnerships.</p> <p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Boca Chita: Reuse more historic structures for park operations and visitor services; add new docks; strengthen retaining wall on north side.</li><li>• Elliott: Improve existing/establish new trails and enhance access; establish new primitive campsites and visitor kiosks; establish canoe launch; and possibly a food concession. Move environmental education program to Adams Key and adapt current structure for park operations (including ranger offices, visitor contact facility and exhibit area, sales, and interpretive programs. Keep ranger residences.</li><li>• Adams: Build new staging area for canoes/kayaks, develop primitive campsites; improve trails, improve dock, possibly establish canoe rentals, and possibly a campers/convenience store and classroom facility.</li><li>• Porgy: Improve Jones site for visitation; building docking area/ramp to facilitate boat access; interpretation on site.</li><li>• Fowey Rocks Lighthouse: Same as alternative1.</li></ul>	<p><b>Mainland:</b></p> <p>Same as alternative 2.</p> <p>Visitor contact points outside the park: same as alternative 2.</p> <p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Boca Chita: Same as alternative 2.</li><li>• Elliott: Same as alternative 2 except no primitive campsites.</li><li>• Adams: Same as alternative 2 except no primitive campsites.</li><li>• Porgy: Same as alternative 2.</li><li>• Fowey Rocks Lighthouse: Same as alternative1.</li></ul>	<p><b>Mainland:</b></p> <p>Same as alternative 2.</p> <p>Visitor contact points outside the park: Same as alternative 2</p> <p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Boca Chita: On north part continue s day use facilities, campground, and boat basin; use some historic structures for park operations/visitor services.</li><li>• Elliott: Maintain existing harbor facilities and continue administrative and visitor services uses, and open small visitor contact station. Make Breezeway loop trail and boardwalk universally accessible.</li><li>• Adams: Build new staging area for canoes/kayaks. Establish environmental education program with minimal facilities.</li><li>• Porgy: Build rustic dock to improve site for visitation; stabilize Jones home site and offer interpretation on site.</li><li>• Fowey Rocks Lighthouse: Same as alternative1.</li></ul>	<p><b>Mainland:</b></p> <p>Same as alternative 1.</p> <p>Visitor contact points outside the park: Same as alternative 2.</p> <p><b>Keys:</b></p> <ul style="list-style-type: none"><li>• Boca Chita: Same as alternative 4.</li><li>• Elliott: Continue administrative and visitor services uses in existing harbor facilities.</li><li>• Adams: Same as alternative 1.</li><li>• Porgy: Same as alternative 1.</li><li>• Fowey Rocks Lighthouse: Seek to acquire and manage the lighthouse.</li></ul>

**TABLE 6: SUMMARY OF KEY IMPACTS OF IMPLEMENTING THE ALTERNATIVES**

(See Chapter 4, Environmental Consequences, for full impact analysis)

	ALTERNATIVE 1 — NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 —PREFERRED	ALTERNATIVE 5
<b>Impacts on Natural Resources</b>					
Impacts on Fisheries	Under the no-action alternative adverse impacts on fisheries and fish habitat in the park would continue to be adverse, minor to moderate, and long term, but there would be no additional impacts caused by implementing this alternative.	Adverse impacts now occurring on fisheries and fish habitat in the park would be reduced under this alternative, resulting in a long-term beneficial impact and continuation of a minor to moderate adverse impact.	Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced under this alternative, resulting in a long-term, moderate, beneficial impact overall.	Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced under the preferred alternative, resulting in a long-term beneficial impact.	Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced substantially under alternative 5, resulting in a long-term, minor to moderate, beneficial impact.
Impacts on Special Status Species	Management under the no-action alternative would continue to support populations of threatened and endangered species in the park. Under this alternative there would be no new actions that would impact these species and, therefore, it would have a Section 7 determination of no effect.	Implementing alternative 2 would result in a beneficial impact on manatees and acroporid corals. Under this alternative there would be proposed development that could impact American crocodiles, sea turtles, and Schaus swallowtail butterflies. The park would continue to coordinate with the U.S. Fish and Wildlife Service and NOAA Marine Fisheries Service and work to mitigate any adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park.	Implementing alternative 3 would result in a beneficial impact on manatees and acroporid corals. Under this alternative there would be proposed development that could impact habitat for American crocodiles, sea turtles, and Schaus swallowtail butterflies. The park would continue to coordinate with the U.S. Fish and Wildlife Service and NOAA Marine Fisheries Service and work to mitigate any potential adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park.	Implementing alternative 4 would result in a beneficial impact on manatees and acroporid corals. Under this alternative there would be proposed development that could impact American crocodiles, sea turtles, and Schaus swallowtail butterfly. The park would continue to coordinate with the U.S. Fish and Wildlife Service and NOAA Marine Fisheries Service and work to mitigate any adverse impacts on these species. Thus, the Section 7 determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park.	Implementing alternative 5 would result in a beneficial impact on manatees and acroporid corals. There would be no effects on sea turtles. Under this alternative there would be proposed development that could negligibly impact American crocodiles and the Schaus swallowtails. The park would continue to coordinate with the U.S. Fish and Wildlife Service and NOAA Marine Fisheries Service and work to mitigate any potential adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park.
Impacts on State Listed Species	Under this alternative there would be no new actions that would impact bald eagles or other listed birds. There would be no new impacts on the Miami blue butterfly.	Under this alternative there would be proposed development that could result in long-term, negligible, adverse impacts on state listed species..	Implementing alternative 3 would result in long-term negligible adverse impacts on bald eagles, other listed birds, and Miami blue butterflies.	Implementing alternative 4 would result in long-term, negligible, adverse impacts on bald eagles, other listed birds, and Miami blue butterflies and would not be likely to lead to federal listing.	Implementing alternative 5 would result in long-term negligible adverse impacts on bald eagles and other state listed species and no effect on Miami blue butterflies.
Impacts on Terrestrial Vegetation	Under the no-action alternative, existing adverse impacts on terrestrial vegetation in the park would continue, but there would be no additional impacts caused by implementing this alternative.	Implementing this alternative would result in long-term, negligible to minor, adverse impacts on terrestrial vegetation.	Implementing this alternative would result in long-term, negligible to minor, adverse impacts on terrestrial vegetation.	Implementing this alternative would result in long-term, negligible to minor adverse impacts on terrestrial vegetation.	Implementing this alternative would result in long-term, negligible, adverse impacts on native terrestrial vegetation.
Impacts on Submerged Aquatic Communities	Under the no-action alternative, existing adverse impacts on submerged aquatic vegetation in the park would continue, but there would be no new impacts caused by implementing this alternative.	Alternative 2 would result in long-term, minor, beneficial impacts on submerged aquatic communities.	Alternative 3 would result in long-term, minor, beneficial impacts on submerged aquatic communities.	Alternative 4 would result in long-term beneficial impacts on submerged aquatic communities.	Alternative 5 would result in long-term beneficial impacts on submerged aquatic communities.

ALTERNATIVE 1 — NO ACTION		ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 —PREFERRED	ALTERNATIVE 5
Impacts on Wetlands	There would be no new impacts on wetlands under this alternative.	Under this alternative the proposed development would have an adverse impact on the wetlands along the mainland coast of the park, particularly the mangroves. Short-term impacts associated with construction would continue to be adverse but minor to moderate and localized. The long-term impacts would be mitigated through design and would be adverse but localized and minor.	Under this alternative the proposed development would have a minor adverse impact on the wetlands along the mainland coast of the park, particularly the mangroves. Short-term impacts associated with construction would continue to be adverse, minor to moderate, but localized. The long-term impacts would be mitigated through design and would be adverse but localized and minor.	Short-term impacts associated with construction under this alternative would be minor to moderate, localized, and adverse. The long-term impacts would be mitigated through design and would be adverse but localized and minor.	There would be minor to moderate, beneficial, long-term impacts to wetlands as a result of protective zoning.
Impacts on Natural Soundscapes	Alternative 1 would have no new effects on natural soundscapes.	Implementing alternative 2 would have long-term, minor, beneficial impacts on soundscapes and short-term, minor, adverse impacts during construction.	Implementing alternative 3 would have long-term, minor, beneficial impacts on soundscapes, and short-term, minor, adverse impacts during construction.	Implementing alternative 4 would have long-term, minor, beneficial impacts on soundscapes and short-term, negligible to minor, adverse impacts during construction.	Implementing alternative 5 would have long-term, minor to moderate, beneficial impacts on soundscapes and short-term, negligible, adverse impacts during construction.
Impacts on Cultural Resources					
Archeological (including Submerged Maritime) Resources	Under this alternative, there would be primarily localized, negligible to moderate, adverse, short-term to permanent impacts on submerged archeological resources, while impacts on terrestrial archeological resources would be in the negligible to minor range. Some benefits would result from survey and inventory of both submerged and terrestrial properties potentially eligible for National Register listing. Generally, both submerged and terrestrial archeological resources would continue to be surveyed, inventoried, and evaluated, and all ground-disturbing activities would be preceded by site-specific archeological investigations to ensure that archeological resources would not be damaged or lost as a result of NPS actions.	Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although they would be subjected to greater potential risk because of expanded recreational use and increased visitor services, facilities, and access in some areas of the park.  For section 106 there would be no adverse effect.	Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although they would be subjected to minor to moderate potential adverse impact by the alternative's provision for expanded recreational use and enhanced visitor services, facilities, and access to some areas of the park.  For section 106 there would be no adverse effect.	Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although the strong emphasis on cultural resource protection could be expected to have some additional, long-term, beneficial impacts on archeological sites.  For section 106 there would be no adverse effect.	Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although the emphasis on natural resource preservation, as well as protection of significant cultural resources, could be expected to have some additional, long-term, beneficial impacts on archeological sites.  For section 106 there would be no adverse effect.

Table 6: Summary of Key Impacts of Implementing the Alternatives

ALTERNATIVE 1 — NO ACTION		ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 —PREFERRED	ALTERNATIVE 5
Historic Structures and Buildings	<p>Actions under alternative 1 would generally have localized, long-term, beneficial and long-term negligible to minor adverse impacts on historic structures and buildings. Actions under this alternative would attempt to minimize the continued loss of historic fabric to historic structures and buildings in the Boca Chita Key Historic District through law enforcement efforts and cyclic maintenance and preservation treatment.</p> <p>Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the <i>Secretary's Standards</i>.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District those listed under alternative 1. As with alternative 1, impacts on historic structures and buildings would be localized, long term to permanent, and generally beneficial.</p> <p>Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the <i>Secretary's Standards</i>.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would generally have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1.</p> <p>Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the <i>Secretary's Standards</i>.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because they would be rehabilitated, preserved, and interpreted by the National Park Service in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties</i>. As with alternative 1, impacts on historic structures and buildings would be localized, long-term to permanent, and generally beneficial.</p> <p>Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the <i>Secretary's Standards</i>.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because they would be rehabilitated, preserved, and interpreted by the National Park Service in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties</i>.</p> <p>Implementation of this alternative would have long-term beneficial impacts on the Fowey Rocks Lighthouse because it would be acquired by the NPS and preserved / rehabilitated in accordance with the <i>Secretary's Standards</i>.</p> <p>For section 106 there would be no adverse effect.</p>
Cultural Landscapes	<p>Actions under alternative 1 would have beneficial impacts on the landscape at the Boca Chita National Historic District, as well as other potential cultural landscapes because park properties would continue to be surveyed, inventoried, and evaluated under National Register criteria of evaluation to determine their eligibility for listing in the National Register. Listed and eligible cultural landscapes would be managed to preserve their natural resource values and culturally significant character-defining patterns and features in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i>.</p>	<p>Implementation of this alternative would generally have the same beneficial impacts on cultural landscapes as those listed under alternative 1, although expanded recreational use, enhanced visitor services, facilities, and access, and increased development could have some minor, adverse, long-term impacts on the integrity of the park's potential cultural landscapes.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same beneficial impacts on cultural landscapes as those listed under alternative 1, although expanded recreational use, enhanced visitor services, facilities, and access, and increased development in some areas of the park could have some minor adverse impacts on the integrity of the park's potential cultural landscapes.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same beneficial impacts on cultural landscapes as those listed under alternative 1. Although this alternative would emphasize strong cultural resource protection, provision for diversified recreational opportunities, and development of enhanced visitor services and facilities in some areas of the park could result in minor, adverse, long-term impacts on the integrity of the potential cultural landscapes in the park.</p> <p>For section 106 there would be no adverse effect.</p>	<p>Implementation of this alternative would have the same impacts on the park's cultural landscapes as those listed under alternative 1, although the emphasis on natural resource preservation, as well as protection of significant cultural resources, could be expected to have some additional long-term, beneficial impacts on cultural landscapes.</p> <p>For section 106 there would be no adverse effect.</p>

ALTERNATIVE 1 — NO ACTION		ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 —PREFERRED	ALTERNATIVE 5
Impacts on Visitor Experience					
	Continued speed limitations along the mainland and at Sands Cut and closures of certain keys under this alternative would have negligible, long-term, adverse impacts on current visitor use patterns or opportunities. The potential for increased crowding and conflict, especially during peak use times and between different user groups, would likely increase. This would result in increased short-term, minor to moderate, adverse impacts on visitor experiences.	Additional speed restrictions and new noncombustion engine requirements would potentially exclude some visitors from these areas, which would be a long-term, minor, adverse impact. The Slow Speed and Noncombustion Engine Use zones would help over time to separate conflicting visitor uses, increase boating safety, and increase nonmotorized recreational opportunities. These would be long-term beneficial impacts on some visitors' experiences. The upgrade of visitor services and facilities would substantially enhance opportunities to learn about, access, and safely recreate in the park. These would be long-term beneficial impacts on most visitors' experiences.	Additional speed restrictions, new Noncombustion Engine Use and Access-By-Permit zones would potentially exclude some visitors from these areas, which would be a long-term, minor to moderate, adverse impact. The same zones would help over time to separate conflicting visitor uses; increase boating safety; and increase recreational opportunities like canoeing and kayaking, wildlife viewing, and solitude. These would be long-term beneficial impacts on some visitor experiences. Establishment of a Marine Reserve Zone would result in major beneficial impacts to snorkelers and divers, minor to moderate adverse impacts to visitors who formerly fished in the Marine Reserve Zone, and minor to moderate beneficial impacts to visitors who fish outside the Marine Reserve Zone.  Overall, there would be long-term beneficial impacts on most visitors' experiences.	Additional speed restrictions and new Noncombustion Engine Use Zones would exclude some visitors from these areas, which would be a long-term, minor to moderate, adverse impact. The same zones would help over time to separate conflicting visitor uses, increase boating safety, increase nonmotorized opportunities, and increase opportunities for solitude, which would be long-term beneficial impacts on some visitors' experiences. Upgrades in visitor information, services and facilities would be limited but result in a long-term beneficial impact on some visitors' experiences. Marine Reserve Zone would result in major beneficial impacts to snorkelers and divers, minor to moderate adverse impacts to visitors who formerly fished in the Marine Reserve Zone, and minor to moderate beneficial impacts to visitors who fish outside the Marine Reserve Zone.  Overall, there would be long-term beneficial impacts on most visitors' experiences.	Additional Slow Speed Zones, new Noncombustion Engine Use Zones, a new Access-by-Permit Zone, and a large Marine Reserve Zone would potentially exclude some visitors or visitor activities from these areas, which would be a long-term. Marine Reserve Zone would result in major beneficial impacts to snorkelers and divers, minor to moderate adverse impacts to visitors who formerly fished in the Marine Reserve Zone, and minor to moderate beneficial impacts to visitors who fish outside the Marine Reserve Zone.  Overall, there would be long-term beneficial impacts on most visitors' experiences.
Impacts on Park Operations and Facilities					
	Overall, actions under alternative 1 would result in continuing, long-term, minor to moderate, adverse impacts on park operations and facilities.	Overall, actions under alternative 2 would result in short-term and long-term, minor to moderate, adverse impacts on park operations and facilities.	Overall, actions under alternative 3 would result in short-term and long-term, minor to moderate, adverse impacts on the park's budget for park operations and facilities.	Actions under alternative 4 would generally result in long-term, minor, adverse impacts on park operations.	Overall, actions under alternative 5 would generally have long-term, minor to moderate, adverse impacts on park operations and facilities.
Impacts on the Socioeconomic Environment					
	Implementing the no-action alternative would have no new impact on the regional economy.	Implementing alternative 2 would have short-term and long-term beneficial economic impacts in the region.	Implementing alternative 3 would have short-term and long-term beneficial economic impacts in the region.	Implementing the preferred alternative would have a long-term negligible adverse impact and short-term and long-term beneficial impacts on the regional economy.	Implementing alternative 5 would have a long-term, minor, adverse impact and short-term and long-term, beneficial impacts on the economy in the region.



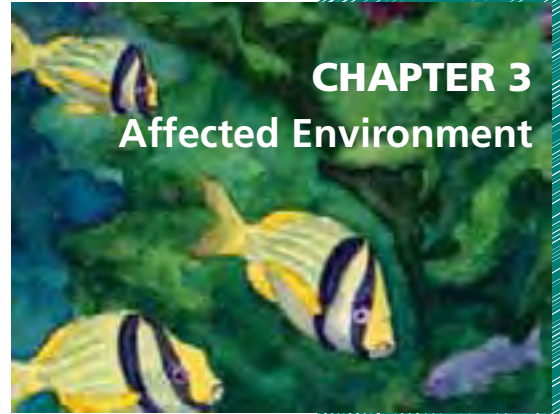
**TABLE 7: THREATENED AND ENDANGERED SPECIES IMPACT DETERMINATIONS**

Species	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Florida manatee ( <i>Trichechus manatus latirostris</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Sea turtles ( <i>Caretta caretta</i> , <i>Chelonia mydas</i> , <i>Lepidochelys kempii</i> , <i>Eretmochelys imbricata</i> , and <i>Dermochelys coriacea</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
American crocodile ( <i>Crocodylus acutus</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Smalltooth Sawfish ( <i>Pristis pectinata</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Schauss swallowtail butterfly ( <i>Heracles aristodemus ponceanus</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Acroporid corals ( <i>Acropora palmata</i> and <i>A. cervicornis</i> )	No effect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect



## CHAPTER 3

### Affected Environment



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## INTRODUCTION

This chapter describes the existing environment of Biscayne National Park and the surrounding region. It is focused on the park resources, uses, facilities, and socioeconomic characteristics that have the potential to be

affected if any of the alternatives were implemented. Some features, such as endangered species, are discussed because they provide context or must be considered in an environmental impact statement.

## NATURAL RESOURCES

Biscayne National Park is south of downtown Miami at the northernmost end of the Florida Keys. The park is a unique subtropical marine and estuarine environment of national significance, renowned for its productive coral reefs, diverse and abundant natural resources, and spectacular scenic beauty. The park includes the southern two-thirds of Biscayne Bay.

Biscayne National Park consists of the following four primary ecosystems:

- the beginning of the third-largest coral reef in the world
- the southern expanse of Biscayne Bay
- a narrow fringe of mangrove forest along the mainland shoreline
- the northernmost islands of the Florida Keys

Each of these ecosystems is comprised of a variety of smaller communities like seagrass meadows, hardbottom areas, and hardwood hammocks. The geology of the area has been influenced by changing sea levels, currents, hurricanes, and reef-building organisms like corals. South Florida's subtropical climate produces forest types that are more typical of the Caribbean than of mainland North America.

Of the 173,000 acres in the park boundary, about 95% (165,000 acres) is water, and the balance consists of emergent lands (keys and mainland). About 72,000 acres of the park contain coral reefs. About 9,100 acres are shoreline and keys. There are 42 islands or keys in the park.

The southern tip of the Florida peninsula is a complex, water-dependent ecosystem resulting from a combination of its climate and physiographic setting. The northern end of the South Florida ecosystem is just south of the Orlando area, in the Kissimmee River

drainage. Water once flowed freely from the Kissimmee River to Lake Okeechobee and southward through the Everglades to the estuaries of Biscayne Bay, the Thousand Islands, and Florida Bay.

In the late 1800s colonial settlers moved into Florida and began an effort to reclaim land, because the area was viewed as “worthless swamps.” These efforts to reclaim lands primarily focused on the construction of drainage canals and levees. In 1948 Congress authorized the Central and South Florida Project. This project involved the construction of an elaborate network of roads, canals, levees, and water control structures throughout South Florida. The purposes of this project were to provide water and flood protection for urban and agricultural lands. Today, the National Park Service is part of an intensive effort to restore the South Florida ecosystem, trying to mitigate the impacts of this past massive land reclamation effort.

The unique biophysical environment of Biscayne National Park supports a rich base of natural resources, including a unique combination of habitats, fisheries, wildlife, and physical environment.

### THE BAY

The topography of Biscayne Bay is a basin, with shallow areas ranging from 0 to 6 feet (0 to 2 meters) along the western and eastern sides of the bay) with deeper areas ranging from 6 to 12 feet (2 to 4 meters) in the central portion of the bay (Ault et al. 2001). Voss et al. (1969) report that the bay is a relatively enclosed body of water with limited exchange with the offshore area. The bay is affected by atmospheric conditions and thus has seasonal changes in temperature and salinity.

Bottom substrates of the bay can be grouped into three basic types: seagrass, hardbottom,

and barebottom. Seagrass consists of sandy or silt-clay sediments vegetated by the turtle grass (*Thalassia* spp.), Cuban shoal grass (*Halodule* spp.), or manatee grass (*Syringodium* spp.). The productivity of these areas is very high, and they serve as nursery ground for shrimp, lobster, and many species of fish.

Seasonal salinity patterns in the bay highlight three broad regions with respect to magnitude and variability of salinity. The first region is in the eastern bay adjacent to the Atlantic Ocean, which is characterized by near oceanic salinities (32–36 parts per million [ppm]) that vary little throughout the year. The mid-basin region shows variability based on the wet and dry seasons. It is characterized by somewhat lower average salinities (20–28 ppm) during the peak wet season because of increased freshwater inflow (July–September). The third broad area is on the western side of the bay, which is a lower salinity region with high variability caused by the freshwater discharges from drainage canals (Ault et al. 2001).

A major threat to seagrass communities is the scarring from boat propellers. Miami-Dade, Broward, Monroe, Palm Beach, Lee, and Collier counties have more than 200,000 registered vessels. In addition to an increasing number of registered vessels, the average size and horsepower of the vessels have increased. The increasing numbers and size of vessels have been a detriment to the seagrass communities. Sargent, et al. (1995) reports that about 11,200 acres of seagrasses in Miami-Dade County show light, moderate, or severe scarring by boat propellers.

The hardbottom is characterized by a foundation of oolitic limestone covered by a thin sediment layer populated with a variety of soft corals and sponge species.

The barebottom is substrate that is generally devoid of large benthic organisms. This community is typically found in deeper portions of the bay and along the eastern side of the bay, along the keys.

Climate change is anticipated to have a variety of impacts on natural resources in Biscayne National Park. One aspect of climate change that will affect the bay, as well as several other impact topics below, is the amount and rate of sea-level rise. Model predictions indicate that sea level could rise from 4 to 9 inches by the middle of this century (IPCC 2007), and from 9 to 22 inches by the end of the century, depending on the emissions scenario model (NRC 2008). The rate and amount of sea-level rise is difficult to predict, but will likely have effects on park facilities and visitor opportunities in Biscayne Bay.

Facilities such as docks, boat/kayak landing sites, and the stone wall and visitor amenities on Boca Chita Key are examples of resources that may be affected by sea level rise. While the model predictions include a time span greater than the lifetime of this plan, the next 20 years will provide information on the rate and amount of sea-level rise so that park managers can respond to impacts on resources in Biscayne Bay and throughout the park.

Harmful algal blooms, which can smother coral reefs and cause mortality in fish, are likely to increase with increased water temperatures (Florida Oceans and Coastal Council 2009). Algal blooms are also equally likely to result from eutrophication (nitrogen- and phosphorus-based fertilizers washing into the bay). Warm water also holds less oxygen than cooler water, which affects both marine plant and animal species. Lower dissolved oxygen levels are expected to act synergistically with increased nutrient loading into Biscayne Bay, causing stress or mortality to flora and fauna in coastal and ocean waters.

## THE MANGROVE SHORELINE

Mangroves are shoreline trees that live in the intertidal area. Four species of trees are considered mangroves in South Florida: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), buttonwood (*Conocarpus erectus*), and black mangrove (*Avicennia germinans*).

Mangroves are important as the basis of the detrital food chain in estuarine waters (USFWS 1999). The detritus provided by decomposition of mangrove leaves is the food base for microcrustaceans and other detrital processors that are consumed by macrocrustaceans, small fishes, and other first-order predators. These animals in turn are the prey of larger fish species, such as snook (*Centropomus* spp.), snappers (*Lutjanus* spp.), and jacks (*Caranx* spp.).

In addition, mangroves provide important habitat for a wide variety of species. The U.S. Fish and Wildlife Service (1999) estimates that at least 1,300 species of animals rely on mangroves for habitat.

Mangroves are mostly found along the western side of the park, along the shoreline of the mainland. Mangroves are also found on the eastern and western sides of Sands and Elliott keys, the Rubicon keys, Totten Key, and in Jones Lagoon. Several of the overwash islands in the southern part of the park are made up almost entirely of mangroves.

Coastal development in Florida has dramatically reduced the size and abundance of mangrove communities throughout the state. Wetland areas, and mangroves, are often dredged and filled to create waterfront property. The shoreline in the park represents one of the largest undeveloped shorelines along the east coast of Florida.

On the mainland shoreline of the park, mangroves are replacing some estuarine areas. Mangrove areas support lower biodiversity than the estuarine areas they are replacing, which would reduce overall habitat diversity in the park. Mangrove distribution is also expected to shift northward as temperature rises on the Florida coast (Florida Oceans and Coastal Council 2009).

## THE KEYS

The park contains 42 islands, or keys. These islands are the northern end of the coral rock Florida Keys. Most of these islands are the

remains of coral reefs that formed when ocean waters were higher. As the sea receded, the reef was exposed, forming the islands.

Elliott Key, the largest island in the park, is the true northernmost Florida Key. The islands from Sands Key north are considered “transitional” islands, meaning they share some of the features of the hard rock coral keys to the south and some of the features of the sand barrier islands to the north.

The islands are typically vegetated with subtropical species. The outer perimeters of the islands are typically vegetated by mangrove forest. As you move inward and gain elevation, the species become more upland species. The canopy is a mixture of tropical trees such as wild lime, gumbo limbo, willow bastic, and pigeon plum.

With this overview of the park’s natural resources, the rest of this section describes more specifically which natural resources might be affected by implementing the alternatives.

## FISHERIES

Both recreational and commercial fishing occurs in the park, under the authorities described in Chapter 2 and summarized in Appendix E. These activities will continue to occur in the park subject to state regulations, NPS mandates, and legislation. Fisheries regulations in Biscayne National Park are the same as those in state waters with the following exceptions: (1) a ban on lobster harvest within Biscayne Bay waters, (2) reduced bag limit of lobsters within nonbay park waters during the two-day sport season, and (3) a ban on sponge harvest and ornamental marine life (fish, invertebrates, and plants) harvest within all waters of the park. New state fishery regulations for the park will be proposed in accordance with the park’s Fishery Management Plan, which is a cooperative effort between the State of Florida and the National Park Service, and is described in more detail in chapter 1.



The harvesting of sea life (fish, crustaceans, etc.) is allowed according to state regulations. Thus the park must balance the existence of recreational and commercial fishing in park waters with its mandate and responsibility to manage fishery resources in a way that such resources remain unimpaired (NPS 2008).

The park provides habitat for many species of fish such as bonefish, snook, tarpon, permit, pink shrimp, spotted sea trout, oysters, clams, blue and stone crabs, bait fishes; and numerous coral reef fishes including snappers, groupers, grunts, barracuda, spadefish, spiny lobster, parrotfish, surgeonfish, and triggerfish. There are more than 325 fish and marine macroinvertebrate species in the park; 150 of these species are subject to some form of pressure from recreational and commercial fishing activities (Ault et al. 2001).

It is likely that the recreational fishing pressure in the park has increased in the past decades. This is based on the following:

- The human population of Florida has been growing at a phenomenal rate. The population of Miami-Dade County grew from just under 5,000 residents in 1900 to more than 2.25 million in 2000 (U.S. Census Bureau website).
- The Florida Fish and Wildlife Conservation Commission (FWC 2001) determined that the sales of resident saltwater fishing licenses from 1990 through 1998 tracks the increase in Florida's population. Therefore, fishing activity can be used as a general proxy for understanding population growth and activity in the vicinity of the park.
- The NOAA / NMFS Marine Recreational Fishery Statistics Survey (MRFSS) data shows a statistically significant increasing trend for the number of people participating in fishing along the east coast of Florida (NMFS 2001).
- Additionally, the MRFSS data shows a statistically significant increasing trend in the number of fishing trips anglers are

taking along the east coast of Florida (NMFS 2001).

- The recreational vessel fleet in South Florida (Broward, Collier, Miami-Dade, Monroe, and Palm Beach counties) has grown substantially. The number of licensed vessels grew by 444% between 1964 and 1998 (Ault et al. 2001).
- The fishing efficiency has increased over time because of the continued advances in technology—such as fish finders, depth indicators, global positioning systems, improved vessel design, increased engine horsepower, and radio communications.

Commercial fishing is allowed in the park in accordance with the enabling legislation. From 1964 to 1998 the commercial fishing fleet in South Florida has grown 197% (Ault et al. 2001). Aside from the direct removal of fish and shellfish by commercial fishing, intensive use of fishing gear on seagrass, hardbottom, and coral reef communities has also become a great concern. The park is fished commercially for a variety of finfish (such as grouper, snapper); a variety of macroinvertebrates including lobster, crabs, and shrimp; and other fish species that are used as bait (such as herrings and ballyhoo).

Similar to the recreational fishing fleet, the commercial fishing fleet's efficiency has increased because of improved vessel designs; more powerful propulsion systems; and improved equipment, such as fish finders, depth gauges, and global positioning systems (Ault et al. 2001).

The preponderance of data suggests that numerous fish stocks in the park are heavily exploited and/or overfished, as defined in the Magnuson–Stevens Fishery Conservation and Management Act. This is based on the following information:

- As discussed above, the park has been subjected to considerable and consistent fishing pressure.
- According to Ault et al. (2001), 77% of the 35 fish stocks are overfished. This is

based on the federal definition of overfishing found in the Magnuson–Stevens Fishery Conservation and Management Act.

- The South Atlantic Fishery Management Council (NMFS 2001) has listed 14 species in the federal waters of the Atlantic off the coast of North Carolina, South Carolina, Georgia, and Florida as being overfished. Six of these species occur in the park. These species are goliath grouper, Nassau grouper, gag grouper, black grouper, vermillion snapper, and yellowtail snapper.
- Stock biomass is critically low for most of the targeted species in the recreational fishery (Ault et al. 2001).
- Preliminary analysis from a reef fish visual census performed in 2002 by NOAA/ University of Miami–Rosenstiel School of Marine & Atmospheric Science indicated that groupers and snappers (highly desirable reef fish) were smaller in the park compared to areas with lower fishing pressures (J. Ault and S. Smith 2002).

In addition to fishing pressure, hydrological processes in the region have changed substantially because inland water management actions have altered the freshwater flows entering the park and therefore the ecology of the bay. The increasing human population has also resulted in extensive coastal development, which has resulted in the loss of extensive areas of coastal wetlands. These wetlands provide habitat for a variety of fish species. Serafy et al. (1997) report that many estuarine fishes and shellfish, namely the larger drum species and oysters, have precipitously declined because of the reduction or elimination of once extensive freshwater and brackish water habitats.

Climate change is expected to impact the fisheries in Biscayne National Park. Warmer seasurface temperatures are expected, which is anticipated to contribute to increased incidences of disease in marine fisheries. Die-offs in reef fish have already increased with

more outbreaks of *Brooklynella*, a marine disease caused by a protozoan. Some fish species that cannot move to cooler waters, either north or deeper in the water column, may also be impacted by warmer sea-surface temperatures. Changes in acidity (pH), nutrients, and dissolved oxygen in the water are likely to affect vegetation, invertebrates, and coral reef habitat that support many fish species in the park. The outcome of some of these changes cannot be determined yet, but the causes of change such as increased sea-water acidity are already being documented (Florida Oceans and Coastal Council 2009). The fossil record indicates that fish species change regional distribution during periods of climate change; however, air and water temperatures are currently changing at much faster rates than in the past. Therefore, the ability of these species to respond to climate change has not been ascertained.

## SPECIAL STATUS SPECIES

### Federally Listed Species

The Endangered Species Act of 1973 prohibits the taking of any species listed by the U.S. Fish and Wildlife Service as being either threatened or endangered. Harming such species includes not only directly injuring or killing them, but also disrupting the habitat on which they depend. Section 7 of the act also requires federal agencies to consult with the U.S. Fish and Wildlife Service or the Marine Fisheries Service when any activity permitted, funded, or conducted by that agency may affect a listed species or designated critical habitat or is likely to jeopardize proposed species or adversely modify proposed critical habitat.

This section, along with the impacts analysis for the preferred alternative in chapter 4 of this plan, fulfills the National Park Service's obligation under Section 7 to document federally listed species and impacts of the preferred alternative on these species via an embedded Biological Assessment.

Table 8 lists the federal threatened and endangered species and candidate species that

could potentially be found in the national park due to the presence of appropriate habitat. The table includes one listed for similarity of appearance (alligator) and candidate species. Some of these species are transient and occur in the park only for a portion of the year. However, the park has resident populations of

several federally listed threatened and endangered species including the West Indian (Florida) manatee, the American crocodile, three species of sea turtles, and elkhorn and staghorn coral. These species are discussed below.

**TABLE 8: FEDERALLY LISTED AND CANDIDATE SPECIES KNOWN TO OCCUR IN BISCAYNE NATIONAL PARK**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS/ NOTES
<b>Mammals</b>		
West Indian manatee	<i>Trichechus manatus</i>	E, CH
<b>Reptiles</b>		
American crocodile	<i>Crocodylus acutus</i>	T, CH
American alligator	<i>Alligator mississippiensis</i>	T/SA
Green sea turtle <sup>2</sup>	<i>Chelonia mydas</i>	E
Hawksbill sea turtle <sup>2</sup>	<i>Eretmochelys imbricata</i>	E
Leatherback sea turtle <sup>2</sup>	<i>Dermochelys coriacea</i>	E
Loggerhead sea turtle <sup>2</sup>	<i>Caretta caretta</i>	T
Kemp's Ridley sea turtle <sup>2</sup>	<i>Lepidochelys kempii</i>	E
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T
<b>Fishes</b>		
Smalltooth sawfish <sup>2</sup>	<i>Pristis pectinata</i>	E
<b>Invertebrates</b>		
Schaus swallowtail butterfly	<i>Heraclides aristodemus ponceanus</i>	E
Miami blue butterfly	<i>Cyclargus thomasi bethunebakeri</i>	C
Staghorn coral <sup>2</sup>	<i>Acropora cervicornis</i>	T, CH
Elkhorn coral <sup>2</sup>	<i>Acropora palmata</i>	T, CH
<b>Plants</b>		
Florida semaphore cactus	<i>Consolea corallica</i>	C

1. E=Endangered; T=Threatened; C=Candidate; SA=Similarity of Appearance to a listed species, CH = Critical Habitat designated

2. National Marine Fisheries Service (NOAA) has lead responsibility rather than FWS

NOTE: Per NPS policy the park manages both federally listed and species of concern as if listed.

### ***Florida Manatee***

The Florida manatee (*Trichechus manatus latirostris*) is a distinct subpopulation of the West Indian manatee. The manatee is a federally listed endangered species (USFWS 1999). The manatee can be found in fresh, brackish, and marine habitats. During the cold winter temperatures, the manatees concentrate around peninsular Florida. In the summer, their range expands as far north as Rhode Island on the East Coast and as far west as Louisiana on the Gulf Coast. During the January 1992 aerial survey of warmwater refugia, the most manatees counted was 1,856 individuals (USFWS 1996).

Manatees prefer grazing on seagrass in shallow water adjacent to deep channels. The deep channels allow the manatees to seek shelter away from boats. In the park, manatees are found mainly in near-shore waters where the water is warm and there is abundant seagrass. Black Point and Convoy Point have the greatest concentration of animals. In the winter manatees may also be found near Stiltsville, and there have been sightings in the tidal creeks between the islands. Sightings in the eastern side of Biscayne Bay are rare, probably because there is less seagrass for the manatees to eat. The park, in cooperation with the state and Miami-Dade County, has implemented a Slow Speed Zone along the entire mainland coastline in the park. This zone extends out 1,000 feet from the mainland shoreline. The Slow Speed Zone in the park is consistent with areas so designated outside park boundaries. These zones are designed to provide boat operators time to react when they observe manatees, reducing the potential of striking the animals (Dade County DERM 1995).

Miami-Dade County Department of Environmental Resources Management (DERM) conducts quarterly manatee surveys, including the waters in the park. These surveys have shown the highest use of the park by manatees occurs during the winter. The park's winter manatee population averages 100 animals (Kevin Mayo, DERM, pers. comm. 2002).

These animals are typically seen close to the shore between Convoy Point and Black Point.

Mortality data collected since 1974 indicates a clear increase in manatee deaths during the last two decades. The largest source of human-related manatee mortality is collisions with motorized watercraft. An analysis of the injuries of 406 manatees killed by watercraft and recovered between 1979 and 1991 indicates that 39% of the animals died from propeller cuts, 55% died from impact from boat watercraft hulls, and 4% died from both. The analysis determined that most of the propeller wounds are caused by medium to large boats, but the impact wounds were from fast-moving small or medium boats. Between 1996 and July 1999, an average 24% of all manatee deaths were caused by watercraft hull impacts or propellers (MPPRC 2009).

### ***Sea Turtles***

There are five federally listed species of sea turtles in Florida. Three of these species—loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), and green (*Chelonia mydas*) turtles—may use park waters (USFWS 2010). The National Park Service has recorded two species of turtles (loggerhead and hawksbill) nesting in the park. However, nesting by hawksbills has only been documented in the park four times and not since 1990. The most common turtle recorded in the park is the loggerhead. Sea turtle nesting activity has been documented on Elliott Key, Boca Chita Key, Sands Key, and historically but not recently on Soldier Key. Nesting on Soldier Key may have ceased because red mangrove has become established along the shoreline and prevents turtle access to the beach.

The loggerhead was listed as threatened in 1978 in accordance with the Endangered Species Act of 1973. The hawksbill sea turtle was listed as endangered in 1970. Internationally, all species of sea turtles are considered endangered by the International Union of Conservation of Nature and Natural Resources (IUCN) and listed in appendix I of the Convention of International Trade in

## Endangered Species of Wild Fauna and Flora (CITES).

The southeastern U.S. nesting aggregation of loggerhead turtles is of paramount importance to the survival of the species and may be second in size only to the nesting aggregation of the islands in the Arabian Sea. It is estimated that most loggerhead nesting in the southeastern U.S. occurs in six Florida counties—Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward.

During sea turtle nesting season (May through October), the beaches of Elliott Key are monitored daily and mesh screens are placed upon newly discovered nests to prevent predation by raccoons, ghost crabs, and other predators. The beaches of Elliott Key are not closed to the public during nesting season, but due to the limited accessibility of these beaches, public use remains low and does not pose a threat to sea turtle nesting.

From 1991 through 2009 the park has documented 209 sea turtle nests and 297 “false crawls,” which occur when a turtle leaves the water to nest and returns to the water without laying eggs. Factors that may contribute to a false crawl include the presence of coral rubble, marine debris, rocks, or vegetation. In many instances no obvious reason can be determined why the emergence did not result in nesting (NPS 2001).

A major threat to turtle nests in the park is predation by raccoons, fire ants, and ghost crabs. During the last 10 years, 51% (n=72) of the nests were affected by predation. Of these nests, 30 were totally destroyed and 22 were partially destroyed. On Elliott Key, the majority of predated nests have been attributed to raccoons. Sea turtles may be injured or killed from collisions with boats. On average, park staff report that three to six turtles a year have been killed by collisions with boats. Sea turtles can also be injured or drown from entanglement in marine debris, including commercial fishing gear. It is likely that additional undocumented turtle deaths occur from these sources.

## *American Crocodile*

The American crocodile inhabits coastal waters of South Florida, the Caribbean, Mexico, Central America, and northern South America. South Florida represents the northern limits of its range. Crocodiles were listed as endangered throughout their range in 1975, and critical habitat was established for the species in 1979 (USFWS 1999). The listing of the species and the protection of habitat were required because of documented population declines most likely associated with habitat alterations and direct human disturbances of crocodiles and their nests (USFWS 1984). The current distribution of crocodiles is limited to extreme South Florida, including coastal areas of Miami-Dade, Monroe, Collier, and Lee counties.

Crocodile habitat is typically along the shoreline in the mangroves and in the canals. The U S Fish and Wildlife Service has designated all land and waters encompassed by a line beginning at Turkey Point traveling southeast to the southernmost point of Elliott Key and southwest along the eastern shorelines of the keys to the park boundaries as critical habitat (USFWS 1999).

In Biscayne Bay, crocodiles have been observed as far north as Chatman Field. However the greatest concentration of crocodiles near the park is in the cooling canals of the Turkey Point Nuclear Electrical Generating Facility. Significant nesting activity occurs in these waters. Although crocodiles are not nesting in the park, the park provides important habitat for subadult crocodiles (2 to 8 years old) that typically avoid the adults. According to Mazzotti and Cherkiss (1998) the combination of the nesting area in the Turkey Point area and the refugia of coastal areas of the park for the subadults have been essential to the survival of the species in Florida. The park has received reports that a crocodile has been seen as on the eastern side of Biscayne Bay near Elliott Key Harbor. During summer 2010, a crocodile was frequently observed in the shallow waters immediately surrounding the visitors center and boardwalk/jetty area. If the population of

crocodiles continues to increase at its current rate, the potential exists for visitor-crocodile conflicts, and these conflicts will be managed on a case-by-case basis in which a variety of regulatory actions, such as temporary or permanent restrictions on swimming, fishing, and/or dog access, will be considered and implemented.

### ***Smalltooth Sawfish***

Smalltooth sawfish (*Pristis pectinata*) commonly reach 18 ft (5.5 m) in length, and may grow to 25 ft (7 m) (NOAA, 2005a). Little is known about the life history of these fish, but they may live up to 25-30 years and mature after about 10 years. Like many elasmobranchs, smalltooth sawfish are ovoviviparous, meaning the mother holds the eggs inside of her until the young are ready to be born, usually in litters of 15 to 20 pups.

Sawfish species are usually found in shallow waters very close to shore over muddy and sandy bottoms. Smalltooth sawfish have been reported in both the Pacific and Atlantic Oceans, but the U.S. population is found only in the Atlantic. Historically, the U.S. population was common throughout the Gulf of Mexico from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state. No accurate estimates of abundance trends over time are available for this species. However, available records, including museum records and anecdotal fisher observations, indicate that this species was once common throughout its historic range and that smalltooth sawfish have declined dramatically in U.S. waters over the last century.

Sawfish are extremely vulnerable to overexploitation because of their propensity for entanglement in nets, their restricted habitat, and their low rate of population growth. The decline in smalltooth sawfish abundance has been caused primarily by bycatch in various fisheries, including being

entangled in trawl nets and being caught on hook-and-line. Degradation of the mangrove shorelines used by both juvenile and adult sawfish (NMFS, 2006) is a secondary factor contributing to smalltooth sawfish decline.

Although sightings are very rare, smalltooth sawfish have been observed from various areas of the park, including in marked channels and very close to coastlines. The Florida Museum of Natural History's National Sawfish Encounter Database reports a total of nine encounters (sightings and/or captures) reported from within Biscayne's boundaries from 1998 through 2009. Some encounters have been reported from deeper water reef habitats within the park. Information is lacking regarding historical abundance or distribution in Biscayne Bay.

The primary factor affecting smalltooth sawfish within Biscayne National Park is bycatch from hook-and-line fishing activity. Since smalltooth sawfish can be caught on hook-and-line, this species could be negatively affected if commercial or recreational hook-and-line fishing increased. Assuming sawfish would be released following an accidental catch, the fish could still suffer stress and injury associated with being landed. Sawfish sightings and catch-and-release events in the park are both very rare, although up to 30 catch-and-releases are reported annually in nearby Everglades National Park (T. Schmidt, Everglades National Park, pers. comm.).

### ***Schaus Swallowtail Butterfly***

The Schaus swallowtail (*Papilio aristodemus ponceanus*) was first described in 1911 from collections in the Miami area. Between 1924 and 1981 there was a general decline in range and numbers. The species was listed as threatened in 1976 because of population declines caused by the destruction of its tropical hardwood hammock habitat, mosquito control practices, and over-harvesting by collectors. The Schaus swallowtail butterfly was reclassified to an endangered species in 1984 because its

numbers and range had declined dramatically since its initial listing (USFWS 1999).

The butterfly occurs exclusively in subtropical hardwood hammocks. Hammocks are now extensive only in the Upper Keys in Miami-Dade and Monroe counties. About 43% of the remaining suitable habitat is in Biscayne National Park. Most of the population in the park is found on Elliott Key, with smaller populations on Adams, Old Rhodes, Swan, and Totten keys.

Between 1985 and 1990, the Elliott Key population fluctuated between 600 to 1,000 adults annually, with smaller populations of 50 to 100 individuals on each of the other keys. Surveys following Hurricane Andrew (1992) revealed that the park's population was reduced to 58 individuals. However in 1994 the population rebounded to more than 600 and was presumed to be stable (Emmel 1995).

In 2000, the population of the Schaus swallowtail inside Biscayne National Park represented the largest numbers remaining in the species' range, and the park continues to provide crucial protected habitat for this endangered butterfly. According to Emmel (2000), the estimated adult population size for the Schaus swallowtail inside the park in 2000 was 260 to 300 individuals. The population in the park has fallen to less than 300 per year since 2000, and only 69 adults have been observed on Elliott Key over three years during annual monitoring between 2007 and 2009 (Minno and Minno 2009).

### ***Acroporid Corals***

Elkhorn coral (*Acropora palmata*) and staghorn coral (*Acropora cervicornis*) are federally listed/proposed as threatened under the US Endangered Species Act. Within Biscayne, elkhorn coral is more abundant than staghorn coral, although they often are found together in various locations throughout the park. These two Acroporid corals are more commonly observed in the southern reefs of the park. Additionally, all waters east of the chain of islands running from north to south in the park are included in an area that has

been designated as 'critical habitat' for elkhorn and staghorn corals.

Acroporid corals can be adversely affected by a variety of factors including fishing, pollution, vessel groundings, sedimentation, macroalgal overgrowth, disease, and increasing sea temperatures. Anticipated impacts to the federally listed Acroporid species are discussed under the 'Special Status Species' of each Alternative within Chapter 4. These impacts are similar to impacts to all other stony corals in the order Scleractinia (which are all protected from harvest within the state of Florida) and the coral reef habitat in general, which are discussed under 'Submerged Aquatic Communities' Impact Topic.

Other stony coral species found in the park, such as lesser star coral, *Montastrea annularis*, are being considered for listing as threatened or endangered species under the Endangered Species Act. These species share the same distribution in the park as the Acroporid corals. If listed, these other stony coral species would experience similar impacts from alternatives 1-5 as described for Acroporid corals.

### **Federally Listed Species Dismissed from Further Analysis**

The eastern indigo snake and the Key Largo woodrat were considered but dismissed from further analysis. There is only one record of an eastern indigo snake in the park and no records to document the existence of the Key Largo woodrat in the park. Suitable habitat does exist on the mainland and the keys, and reintroduction efforts for this species could be considered. Areas in the park that are considered their preferred habitat would not be physically disturbed by the alternatives proposed in this plan.

Similarly, the piping plover, wood stork, Key Largo cotton mouse, red knot, and roseate tern are dismissed from further analyses because they either migrate through or are not found within the park. Beach jacquemontia and Johnson's seagrass are not found in the

park but suitable habitat for these plants does exist. However, the quality of potential habitat would not be degraded by any of the alternatives proposed in this plan so they are dismissed.

## State Listed Species

### Birds

In addition to species listed under the Endangered Species Act, the state recognizes species as being imperiled. Several of these state-listed species include the bald eagle (*Haliaeetus leucocephalus*), white ibis (*Eudocimus albus*), reddish egret (*Egretta rufescens*), roseate spoonbill (*Platalea ajaja*), tri-colored heron (*Egretta tricolor*), osprey (*Pandion haliaetus*) and white-crowned pigeon (*Patagioenas leucocephala*), and the snowy egret (*Egretta thula*) use habitats in the park. Many of these species are water-associated birds that use one or more coastal habitats in Biscayne National Park for nesting, foraging, roosting, and/or loafing. The Arsenicker Keys (particularly West Arsenicker) are known as nesting grounds for bald eagles, white ibis, reddish egrets, tri-colored herons, and/or white-crowned pigeons. Historically, bald eagle nesting has also been observed along the southern end of Sands Key and on the ocean side of Elliott Key south of Petrel Point. A very limited number of roseate spoonbill nests have been observed in a contained area of one of the islands bordering Jones Lagoon.

Nesting birds respond to disturbance in different ways in different areas, depending upon type of disturbance (motorboats, personal watercraft, people on foot), location of nest (high in trees, near edge of land, etc.), and level of habituation. A nesting bird exposed to a disturbance can “flush,” or move away from its nest. A nesting bird that is startled off its nest can inadvertently crush and destroy the eggs in the nest. Similarly, if the disturbance results in a prolonged or permanent absence from the nest, eggs can be exposed to extreme temperatures that can result in death of the developing eggs.

Disturbances have led to egg and nestling mortality, premature fledging or nest evacuation, reduced body mass or slower growth of nestlings, and altered adult foraging patterns and/or reproductive behaviors (Rodgers and Smith 1995).

### Miami Blue Butterfly

The Miami blue butterfly (*Cyclargus thomasi bethunebakeri*) is a state endangered species (and a federal candidate species). According to the state, the Miami blue is one of the most imperiled insects in the United States. The butterfly prefers pine rock lands, beach scrub, and tropical hardwood hammock habitat.

Threats to the butterfly’s continued survival in the wild include impact from hurricanes, freezes, illegal collecting, low genetic diversity, and an increasing lack of natural habitat. Because of the loss of coastal habitat, the state lists the nickel-sized Miami blue as an endangered species.

Florida Museum lepidoptera researchers are working to recover the Miami blue to ensure that it remains a part of Florida’s rich mix of native fauna. A few thousand captive-hatched caterpillars have been reintroduced on Elliott Key in the park with the objective of establishing an experimental population. Management of this species is currently covered by a monitoring and recovery plan.

## Climate Change

With respect to all species of concern, regardless of their listing status, climate change is expected to have profound effects on wildlife because their biological cycles are so closely tied to temperature and their habitat. Birds, mammals, insects, and marine species are most likely to be affected. Sensitive species such as the manatee and the American crocodile, which already have a reduced habitat range, are especially vulnerable to the impacts of climate change. Bird migration patterns are already changing, with birds wintering in the southeast U.S. arriving on average 13 days earlier. Earlier breeding and egg-laying dates and range expansion are already being seen in a variety of bird species.



Biscayne National Park is home to both migratory and resident bird species, some of which are tropical wading birds with habitat in areas likely to be affected by climate change.

Fish and other marine species are especially sensitive to changes in water temperature and chemistry. Disruptions in the life cycles of these species, especially breeding and egg laying, are already occurring. Disease outbreaks in ocean species, in part because of range expansion of marine parasites, are also occurring and are expected to increase as water temperatures rise. Sea turtle nesting sites are likely to be lost in areas with beach erosion and sea level rise (NPS 2009c) and vegetative shifts, such as from dunes to mangroves. Other documented impacts on predator-prey relationships and wildlife habitat in marine and terrestrial environments are already occurring, such as changes in the male/female ratio of sea turtles and amphibians (Loehman and Anderson 2009). Butterflies and insects are especially susceptible to minor changes in host plant availability and the timing of pollination, and they may experience major physiological disruptions with climate and habitat change (NPS 2009c). Terrestrial Vegetation Typically, the upland areas of extreme southern Florida are associated with outcroppings of limestone covered with pinelands and tropical hardwood hammocks. Many of the keys in the park, such as Elliott and Totten, are these limestone outcroppings. The outcroppings are primarily mid-Pleistocene marine limestone representing the Key Largo geological formation (Snyder et al. 1990).

Tropical coastal hardwood hammocks are found on many of the park's islands. Hammocks are evergreen, broad-leaved forest composed predominately of trees common to the Bahamas and Greater Antilles. The canopy is typically 29–39 feet (9–12 meters) tall with gumbo limbo, pigeon plum, wild tamarind, willow bastic, Jamaica dogwood, mastic, and strangler fig as common trees. The subcanopy contains white stopper, Spanish stopper, crabwood, torchwood, wild coffee, and marlberry. Hammocks are typically abundant with epiphytic plants, including orchids, bromeliads,

and ferns. A mature hammock has relatively open understory. As the elevation slopes towards sea level, halophytic (salt-tolerant) plants such as buttonwoods become more dominant.

Hurricane Andrew, a compact but very intense storm, made landfall as a category 5 hurricane on August 24, 1992. The eye of the storm passed through Biscayne National Park, Everglades National Park, and Big Cypress National Preserve, with a forward speed of about 32 mph and maximum sustained winds of 150 mph. Vegetation was affected in a 31-mile swath. In Biscayne this swath was observed from Old Rhodes Key on the south to Sands Key on the north. The effects of the hurricane on the hammock forest on Elliott Key were dramatic. Large trees were extensively damaged—with 20% to 30% downed and nearly 100% having large branches sheared off. Much of the canopy and subcanopy were defoliated. (NPS 1996a).

Climate change is expected to affect the vegetation composition in the park, especially in the mangroves and other areas where changes in sea level may alter the water table or soil characteristics. Air temperature in Florida is predicted to increase, with average low temperatures in winter increasing by 3.1° F to 10.1° F, and average high temperatures increasing by 3.1° F to 7.0° F by 2100. These changes are expected to alter species composition in the park because species requiring cooler temperatures move northward. Storm surge and altered flooding regimes, from overwash as well as groundwater, are expected to alter soils, leading to potential changes in the terrestrial plant communities.

Components of the unique plant assemblage that represents the interface between the subtropical and temperate zone may shift northward. Plant-animal interactions such as pollination, seed dispersal, and insect control may be disrupted. Invasive species are also expected to expand their ranges because of altered precipitation and temperature regimes (Loehman and Anderson 2009).

## SUBMERGED AQUATIC COMMUNITIES

The park encompasses a mosaic of submerged aquatic communities, including seagrasses, hardbottom, barebottom, and coral reef. The combination of these communities makes the area ecologically rich and biologically diverse.

The seagrass beds or meadows in Biscayne Bay cover about 72,000 acres, or about 42% of the park area. The seagrass beds provide shelter from predators, breeding and nursery areas for many fish, and forage for other species such as the manatee. The beds also absorb nutrients from coastal and estuarine systems, stabilize substrates, and minimize the effects of wave action.

Seagrasses in the park include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium* spp.), and shoal grass (*Halodule* spp.). Growth and distribution of seagrasses are controlled by light attenuation, photoperiod, temperature, salinity, and sediment type. These communities can be found in monocultures, mixed grass species, or in association with several species of algae. These habitat types comprise the major benthic plant communities in the bay and are highly productive (Thorhaug 1976). The seagrass is a primary food source for manatees. The root mass of these plants stabilizes sediments, and their leaves create resistance to water currents and promote water clarity, trapping suspended sediments and providing habitat for a wide variety of benthic organisms. Species diversity and densities of organisms can be very high within seagrass beds. Numerous species of shrimp, crabs, worms, clams, snails, lobster, and echinoderms inhabit these areas (Milano 1983). Seagrass beds provide habitat for both small fish and larvae.

Currently, the greatest threats to the productivity of the seagrass beds are vessel groundings and scarring by motorboat propellers. Propeller scarring occurs when boats traverse water that is too shallow for the drafts of the boats. The propellers cut and pull out the grasses, leaving unvegetated furrows.

The scars tend to widen over time because of erosion of the unprotected sediments and wave action. Repeated scarring can ultimately lead to completely denuded substrates and the subsequent loss of habitat and the degradation of water quality. Groundings have an even more severe impact on seagrass beds. In this case a boater runs aground in the shallow water and tries to get free by force. This can cause blowouts in the substrate and suspend enough sediment to create water quality impacts in an area substantially larger than the area of physical impacts. The turbidity reduces photosynthesis in the seagrass beds, reducing productivity. The proposed Noncombustion Engine Use Zones are designed, in part, to protect seagrass beds from scarring and reduce localized turbidity, which in turn benefits the organisms that rely on the beds for food and shelter.

Hardbottom communities generally occur in the areas that have exposed rock and/or less than 6 inches of sediment. These communities consist primarily of sponges, alcyonarians, and various inshore corals. The dense hardbottom community characteristically has a greater diversity of soft corals, including a variety of large, attractive sea fans; sea whips; and related forms. These assemblages of soft corals and sponges, because of their size and density, provide an excellent refuge for fish and various kinds of invertebrates, including shrimp, crabs, worms, brittle stars, and sea urchins (Milano 1983).

Barebottom communities occur in areas where sediment depth, sediment quality, or water quality will not support the growth of seagrasses or corals. Organisms that live in these areas may include worms, mollusks, tunicates, nematodes, crabs, shrimp, amphipods, clams, snails, and sea cucumbers.

## CORAL REEFS

Coral reefs are among the most diverse and biologically complex ecosystems on earth. Reefs provide economic and environmental benefits to millions of people as areas of natural beauty and recreation and sources of

food, jobs, chemicals, pharmaceuticals, and shoreline protection. Now under threat from multiple stresses, coral reefs are deteriorating worldwide at alarming rates. An estimated 10% of the world's reefs have been already lost, and 60% are threatened by bleaching, disease, and a variety of human activities including shoreline development, water pollution, boat groundings, over-harvesting, destructive fishing practices, and global climate change. Sustained downward trends in coral reef health suggest that these are areas that are in peril (United States Coral Reef Task Force 2000).

Biscayne National Park is important to the function and dynamics of the larger Florida reef tract because it provides important habitat for both larvae and juveniles of a diverse array of species. The adult organisms then migrate to the reef tract (Ault et al. 2001). In the park, the reef environment extends eastward from the keys out to outer edge of the coral reef tract. The salinities of the reef area are oceanic and have very little seasonal variability.

Coral communities are primarily found east of the keys. The coral communities can generally be broken into two types—the patch reef and the reef tract. Patch reefs typically are structures of living masses of coral. The patch reefs in the park range in size from an individual coral head to masses more than 150 feet across. The reef tract, or outer reef, is generally along the eastern boundary of the park. This reef consists primarily of dead coral rubble. Live coral lie mostly on the seaward side of the reef adjacent to deeper water and the Florida current.

The patch reefs are composed of living masses of coral heads rising directly from the bottom in water typically 10 to 20 feet deep. The coral heads tend to have nearly perpendicular sides and rise to within 2 to 3 feet of the water surface. The patch reefs range in size from individual coral heads to masses in excess of 150 feet across. The bottom around the reefs is usually flat and covered with seagrass. There typically is a bare sand halo around the reef, the result of grazing by fishes, especially parrot fish. These patch reefs provide habitat

to a large variety of fishes and other marine life.

The reef tract is predominantly dead coral rubble, with live corals lying mostly along the seaward edge of the reef immediately adjacent to deeper water and the Florida Current. Two main outer reef types occur in the park. The first is represented by Long Reef, which is a long, low, shallow structure formed by loose coral rock and sheets of dead *Acropora* coral. Within this reef structure and beneath the rock slab exists a wealth of marine life. The second type, represented by Ajax Reef, is largely made of live *Millepora* coral colonies.

Careless boaters have a dramatic affect on coral reef resources. It is estimated that there are 20 to 30 significant boat groundings on coral reefs each year, each damaging 10 to 100 square feet of coral reef (Biscayne park staff). When the hard coral cover on the reef is down to less than 3% and declining rapidly due to yet unknown causes, 100 square feet is substantial.

Commercial and recreational fishing is also taking its toll. Commercial and recreational fishing gear tangles on the reef, breaking branching corals and smothering boulder corals. Fishing also disrupts the natural food web resulting in imbalance and loss of species, including those that normally would control algal growth on reefs. Improperly placed anchors tear up the reef by breaking coral free of the reef, increasing the potential for mortality by smothering. Other anchors, even if properly placed, tear up seagrasses when removed, destroying forage used by a spectrum of coral reef organisms.

It is currently impossible to determine the impact that pesticides, herbicides, heavy metals, and pharmaceuticals are having on the biotic resources of coasts and coral reefs. Generally, these dissolved pollutants are found at very low concentrations in our coastal waters. There are no established water quality standards for marine systems. In lieu of established standards, federal and state regulators are forced to use water quality standards established for terrestrial aquatic

(freshwater) systems as the acceptable reference level for marine pollution. Most of these standards have lower limits 1-5 parts per billion (micrograms per liter); however, there is some indication in the literature that marine organisms, especially plankton, are affected by chemical pollution at the parts per trillion level, three orders of magnitude lower. Both hard and soft corals, sponges, and some fish are planktivores, and many other members of the coral reef community feed on coral, sponges, and fish—thus providing the mechanism for magnifying low pollutant concentrations into serious levels in the upper food chain.

Reef-building corals have temperature tolerances that are now being approached; some corals will probably exceed their temperature tolerance because of climate change (Florida Oceans and Coastal Council 2009). Incidences of disease and coral bleaching are also higher with increased acidification and temperature of ocean waters. Because sea waters rise faster than coral reefs are built, the reefs would effectively be in deeper water, resulting in less light (and reduced photosynthesis) for the reefs and their inhabitants. Also, predicted ocean acidification will reduce the availability of calcium carbonate that is used in reef building, and this could result in decreased growth and skeletal density (NPS 2009c). Lower species diversity in coral reefs that are already disturbed or compromised will also make them less resilient to climate change (EDF 2008).

Even international shipping well outside territorial waters has impacts on coral reefs by jettisoning weighted garbage and dunnage (packing material such as wood, rope, or inflatable bags) over the side. Much of the discarded dunnage floats, and some of the jettisoned garbage containers break up and release plastics and other buoyant material to float to the surface. Both are then carried by currents throughout the world. Researchers have even used the cargo released from sinking ships to determine oceanic current patterns. In 1988 the park estimated that the rate of garbage and dunnage accumulation on

the seaward shorelines was in excess of 2 pounds per square meter per day.

Climate change is predicted to cause increased water temperature, decreased dissolved oxygen content, and increased nutrient and pollutants in the water column. This would impact seagrasses and hardbottom and barebottom communities by reducing light and impacting photosynthesis and community dynamics. Seagrass die-offs are expected to increase with increased water temperature (Florida Oceans and Coastal Council 2009). Changes to marine invertebrate habitat and community dynamics are also likely because of increased sea water temperature and light attenuation (NPS 2009c).

## WETLANDS

Wetlands are found along the coast of the mainland and the fringes of the keys and are an important ecosystem. Wetlands provide natural filtration of waters as they enter the park and habitat for a variety of aquatic and terrestrial species. Historically the mainland coast of southern Florida was predominantly wetlands. Changes in land use and modifications to natural drainage patterns have dramatically reduced the amount of wetlands in the region, and today the three national park system units (Biscayne, Big Cypress, and Everglades) contain some of the last wetland areas in South Florida.

The wetlands in the park are predominately mangrove forest. The vegetation is a combination of buttonwood and red, white, and black mangroves. These coastal mangrove areas provide important nursery areas for a many marine species. The heavy vegetation provides refugia for larval and immature stages of a host of species. The mangroves also provide roosting and nesting sites for several species of birds, such as herons, egrets, and songbirds. The mangroves also provide habitat for the endangered American crocodile.

Expected changes in air and water temperatures in Florida because of climate change is

predicted to alter the nutrient cycling in wetland areas of Biscayne National Park, because temperature has a marked effect on the biogeochemical processes in those shallower wetland and salt marsh areas. Freshwater wetlands are likely to be inundated by saline water as warmer ocean waters rise, causing landscape-scale changes to these ecosystems and detrimental impacts on freshwater resources (NPS 2009c). Salt marshes may have some resilience to sea level rise, especially if new sedimentation rates are roughly equal to the rate of sea level rise. However, localized impacts on salt marshes could occur depending on the rate and type of changes. Additionally, shifts in water temperature may have dramatic impacts on the acidity (pH) of wetlands, which could cause a cascade of effects in oxygen content, nutrient cycling, and associated vegetation and wildlife, including coral. Estuaries and smaller bay areas along the keys are especially vulnerable to these types of water temperature changes (Loehman and Anderson 2009).

## SOUNDSCAPES

The natural soundscape in a park system unit is defined as its mix of ambient acoustic conditions without the intrusion of human-caused sound. The soundscape is a resource associated with the natural settings and conditions found in a park. A healthy natural soundscape is critical to the enjoyment of a park by visitors and to some natural biological processes that are part of a park's ecosystem.

Preservation and restoration of the natural soundscape has become a foremost challenge in the protection of national park system resources. Biscayne National Park offers some of the best places to hear a “symphony” of natural sounds, including the calls of wildlife and the melodies of wind and water that together form a rich natural resource that is important to the park's ecological communities. Today, these natural ambient sounds, are threatened as the human-produced noises increasingly intrude into even the most remote corners of the park.

Natural ambient sound is the sound created by processes in the natural environment, and it may include a combination of sounds created by wind, flowing water, crashing waves, thunderstorms, animals, birds, insects, vegetation rustling in the wind, and other biological and physical components. The opportunity to experience natural sounds is an enjoyable part of the visitor experience for many in the national park. In considering natural ambient sounds as a resource, the ability to clearly hear the quieter intermittent sounds of nature for extended periods of time is an important consideration in Biscayne's soundscape management.

In 1997 Biscayne National Park staff was concerned about noise management because of the proposed transfer of portions of the former Homestead Air Force Base to Metropolitan Dade County for development as a major commercial airport. Eventually this concern led to broader questions about the relationship of all sounds, natural and human-caused, to the purposes for which Congress established Biscayne National Park.

### Biscayne National Park Soundscape Characteristics

The natural sounds (transmitted through air) that make up the ambient sound environment or soundscape of Biscayne National Park consist of a combination of one or more of the following—wind, insects, animal vocalizations, water, thunderstorms, and vegetation rustling in the wind. Several studies have found that the ambient sound levels vary with wind and the local ground cover. The natural sounds are related to the type of nearby vegetation, the population of wildlife that is drawn to the vegetation, and the interaction of the wind with the vegetation.

The character of the sound level or loudness of wind flowing through the foliage of mangrove trees and other vegetation depends primarily on the wind speed and sometimes on wind direction. Lapping water on the shore and through mangrove roots is another characteristic element of the soundscape. The loudness primarily depends on the tides, wind

speed, and wind direction. Animal sounds, including insects, and bird calls, are common in the national park. Thunderstorms and heavy periods of rain are frequent characteristic sounds, especially during the summer.

Many other natural intermittent sounds can be heard in the national park that can inspire humans with a feeling of peace and tranquility. Along the mangrove fringe one can hear the occasional slap of a leaping mullet, a snort of a Manatee, or the call of an osprey or a heron. While diving or snorkeling around the reefs, visitors can hear parrot fish feeding on coral or the sound of shrimp clicking their claws together. While sitting on a boat near the reef one commonly hears the sound of wind and waves and sometimes a call of a seabird or even a slap of a dolphin's fluke.

The high density of water compared to air allows sounds to travel further and faster underwater than above. Whale calls, for instance, are occasionally detected between oceans, and the U.S. Navy uses sound to detect distant submarine operations. If one listens, it is very noisy underwater, and the detection of sound (i.e., pressure) is very important to most marine organisms. Fish have lateral lines that detect very small changes in pressure to avoid predators. Invertebrates, such as the snapping shrimp (*Alpheus heterochaelis*) and pistol shrimp (*Alpheus randalli*) use loud sharp sound to immobilize or stun prey. Natural underwater sounds vary widely in purpose, frequency, and duration. Human-caused sounds are often louder than natural sounds. How those sounds affect the natural environment is largely unknown. However, a few brief experiments in Biscayne National Park have demonstrated that human-caused underwater sound, especially high frequency sounds, increases several orders of magnitude during weekends because of the marked increase of recreational boating during that time.

### Human Sound Impacts on Soundscape Resources

Sound pressure levels are commonly measured in units called decibels (dB). The human

ear is not equally sensitive to all sound frequencies, being generally less sensitive to very low and very high frequency sounds; therefore, the A-weighted decibel scale (dBA), which is calibrated to the human ear's response, is often used when analyzing impacts.

For the average human a 10-dBA increase in the measured sound level is subjectively perceived as being twice as loud, and a 10-dBA decrease is perceived as half as loud. The average human with normal hearing can detect a 1 dB change in sound levels if listening attentively; however, generally a change of 3 dBA is noticeable. There is generally a 6-dBA reduction in sound level for each doubling of distance from a noise source.

Many factors affect how an individual responds to noise. Primary acoustical factors include the sound level, the distribution of sound levels across the frequency spectrum, the duration of the sound, and other factors. Each of these factors is sensed relative to the ambient soundscape that exists without the specific noise under consideration.

Nonacoustical factors also play a role in how an individual responds to sounds. Such factors vary from the past experience and adaptability of an individual to the predictability of when a noise will occur. The listener's activity will also affect how he/she responds to noise.

Biscayne National Park noise management issues and concerns can be categorized as noise related to (1) park operations and concessions; (2) visitor and commercial activities; and (3) other intruding sources from outside the park. Noise concerns have been identified through an internal and a public scoping process during which participants were asked about impacts on their quality of experience at the park. Although not representative of all visitors, a diversity of opinions on the noise issue has been provided. Identified intrusions include noise from idling tour buses, boat engines, military overflights, and audio devices at mooring areas. In addition, many surveys have shown that opportunities for quiet and solitude and hearing of natural sounds have been men-

tioned as important indicators of quality visitor experience. Park users consistently state that escaping noise and enjoying the sounds of nature are among the most important reasons why they visit natural areas.

Identification of intruding noise sources impacting the Biscayne National Park soundscape or the experience that the park is intended to provide include the following:

#### **Convoy Point**

- air conditioner
- idling buses
- slamming car doors
- audio devices
- aircraft overflights
- maintenance machinery
- park communication radios
- concession boats
- boat engines

#### **Elliott Key**

- boat generators
- boat engines
- air conditioner
- audio devices
- generators
- maintenance machinery
- aircraft overflights

#### **Adams Key**

- boat engines
- generators
- aircraft overflights

#### **Boca Chita Key**

- boat generators
- boat engines
- air conditioner
- audio devices
- aircraft overflights
- generators
- maintenance machinery

#### **Tidal Creeks and Shallow Waters between Old Rhodes Key and Totten Key**

- boat noise (especially for sensitive wildlife species)
- aircraft overflights

#### **Central to Eastern Biscayne Bay**

- aircraft overflights
- boat engines

#### **Intracoastal Waterway**

- high-performance boats
- barges

#### **Coral Reefs/Submerged Cultural Resources**

Noise concerns near the coral reefs include the quality of the visitor experience while enjoying fishing, snorkeling, and scuba diving as well as resource concerns for the integrity of shipwreck sites and associated biota. Research indicates that underwater noise can have a detrimental effect on marine biotas, particularly marine mammals. Cumulatively, the effect of intrusive noise, when combined with other environmental stressors, can cause degradation of resources and decrease visitor enjoyment.

#### **Baseline Natural Ambient Soundscape Information**

*The Soundscape in South Florida National Parks*, a study prepared by Wyle Laboratories in June 2000, provided a detailed reanalysis of the field data gathered to date and developed general procedures for measuring the natural ambient soundscape. The primary goal was to take sound measurements in South Florida parks (Biscayne, Big Cypress, and Everglades) and to describe the natural soundscape of the parks. Whereas previous studies involved sound level monitoring with manned observations over relatively short time periods of one to three hours in which all natural and intruding sounds were identified, this study evaluated the use of unmanned monitors to extend measurement of the natural soundscapes to several days. Results from unmanned measurements were compared to previous manned studies, and methods for quantifying the natural soundscape and the effect of intrusions were determined.

The sound levels for the season of the study (June 1999) exhibited a diurnal pattern with the highest natural sound levels occurring mostly at night and the lowest sound levels during the day. Future monitoring will look at

seasonal variations in sound levels. The higher sound levels at night correspond to the increase in insect activity; the sound levels rise and remain mostly constant over the nighttime period, which would be consistent with insect sounds. Conversely, the study found that intruding transient sounds increased during the day and decreased at night. This makes intuitive sense as well because visitors and human-generated noise increases during daylight hours.

Past studies have used various metrics to describe in qualitative terms the baseline sound level at parks throughout the park system. The Wyle report helped to refine metrics and standards concerning baseline data. The report indicates that the L90—the sound exceeded 90% of the time—is a reasonable approximation of the natural ambient sound levels and furnishes a basis for determining intrusive event threshold levels. The most accurate method of determining natural ambient sound levels is to physically remove all human-caused sounds and calculate the median of those data without human-caused sounds. Research has shown that the L90 is a reasonable estimate of natural ambient sound levels.

For sites monitored in Biscayne National Park, the A-weighted sound levels due to natural sources were reasonably consistent over the region for the time period studied. The average 24-hour L90 for all the sites was 33 dBA. Quantitatively, the protected shorelines, such as the mangrove shoreline of the mainland and mangrove-dominated keys, were the quietest sites. Characteristic zones were monitored to test the hypothesis that characterizing the natural sound of the South Florida sites could be accomplished based on acoustic zones. Representative zones included open water, forest on a key, key shoreline, shoreline mangrove key, and developed area. Although the Wyle study concluded that the natural ambient soundscape is fairly constant over the South Florida parks for the season and period of time monitored, it reported differences in day and night levels due to insects.

Biscayne National Park is an important habitat area for migrating birds to stop and rest or feed before they continue their journey. Behavior disruption from human-caused noise intrusions is particularly applicable to migratory and nesting birds. The National Park Service, which participates in the Partners In Flight Program, has identified loss, fragmentation, and quality of habitats for migratory birds worldwide as a serious problem.

The following areas contain species of concern that potentially could be sensitive to noise impacts in and near Biscayne National Park:

1. Some of the most environmentally sensitive lands in the national park that provide wildlife habitat are in and around the park's western shoreline. This area contains some of the only remaining true natural area in all of the Florida Keys. The area in and around Jones Lagoon, including Totten Key, Little Totten Key, and Old Rhodes Key, is virtually undisturbed and has had little human-caused influence (other than some historic agricultural operations). This area also includes the entire mainland shoreline of the park (excluding Black Point, Convoy Point, and Turkey Point), the Arsenicker keys, and Mangrove Key.

Sensitive habitats in this area (the park's western shoreline) include rookeries for several species of wading birds, and the marine and wetland environments provide habitat for rare species. Also, the waters adjacent to the park's mainland shoreline are nursery grounds for a number of commercially important fish and invertebrates, which serve as a food source for birds.

2. The national park consists primarily of marine environments but also includes some significant upland areas such as Elliott Key. Sensitive habitats in the park provide important migratory habitat.
3. Areas of the national park that are heavily impacted by man include Hawks Channel and the Intracoastal Waterway (heavy boat



traffic areas for visitors who may or may not use other park resources), channels dredged for boat traffic (Convoy Point, Black Point, and Turkey Point, and Biscayne Channel) for visitors who use park resources, and Stiltsville. Most species use these areas sparingly or while traveling through the region. Certain species, including the American crocodile, Manatee, shorebirds, wading birds, and migratory raptors and passerines, use these areas.

4. The reefs in the park are heavily used by commercial and recreational anglers of all types, by pleasure boaters, and by divers and snorkelers. Thus, the number of human-caused disturbances is potentially high. Fish and other marine vertebrates may feel impacts from increased noise levels.
5. Animals in the developed areas of the national park, such as Convoy Point, Elliott Key Harbor and camping area, Adams Key residence area, and Boca Chita day use and camping area, generally only use the peripheries of these areas or pass through them. However, some species that may be encountered in these areas, including wading birds, land birds, and shorebirds;

river otters; marsh rabbits; bobcats; indigo snakes; and other common snakes, may be impacted by noise from aircraft overflights.

### **Culturally Sensitive Areas**

Biscayne National Park's cultural resources are rich with examples of the international maritime heritage that has shaped the history of southeast Florida and the Caribbean region. There is potential for concern involving the degradation of the park's cultural resources that may occur to historic buildings and underwater archeological remains from the effects of vibration from aircraft and/or motorboats. Sound from aircraft activity can cause archeological resources, structures, and museum objects to vibrate. Depending on the character of the sound, the effects range from audible rattle to items "walking across surfaces," to fatigue cracking, and potentially to direct or indirect structural damage. Potential for impacts depends upon the relationship of the aircraft overflights to the resource, the frequency of overflights, and the frequency-dependent responses of the resource to impinging sound waves.

# CULTURAL RESOURCES

## INTRODUCTION

Biscayne National Park contains significant cultural resources that are associated with human activity from prehistoric times to the present. The park's cultural resources include archeological resources, historic buildings and structures and sites, and cultural landscapes. Human activities have occurred on and around the mainland, keys, and waters of Biscayne Bay for some 12,000 years. These activities are associated with American Indian habitation, land use, and subsistence, and with European-American exploration, settlement, and socioeconomic development, including fishing, citrus agriculture, and recreational development (Leynes and Cullison 1998; NPS 1999).

## TYPES OF CULTURAL RESOURCES

The National Historic Preservation Act of 1966, as amended, recognizes five cultural resource property types: districts, sites, buildings, structures, and objects. As called for in the act, these categories are used in the National Register of Historic Places, the preeminent reference for properties worthy of preservation in the United States. To focus attention on management requirements within these property types, NPS *Management Policies 2006* categorize cultural resources as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources. (Museum objects and ethnographic resources were dismissed as impact topics for this general management plan.) Director's Order 28, "*Cultural Resource Management Guideline*," provides definitions for the aforementioned cultural resource types:

**Archeological resources** are the remains of past human activity and records documenting the scientific analysis of these remains. Archeological features are typically buried but may extend above-ground or be under water; they are

commonly associated with prehistoric peoples (resources that predate the beginning of written records), but may be products of more contemporary society (resources that postdate European-American contact with Native Americans). What matters most about an archeological resource is its potential to describe and explain human behavior.

**Cultural landscapes** are settings that people have created in the natural world and that reveal fundamental ties between people and the land. Landscapes—geographic areas that exhibit evidence of human habitation and intertwined patterns of things both natural and constructed—constitute special places that are expressions of human manipulation and adaptation of the land.

**Structures** are material assemblies that extend the limits of human capability and constitute elaborations of human productive ability and artistic sensitivity. Structures—prehistoric and historic—include buildings, roads, vessels, fences, and other assemblies of historical, aesthetic, or scientific importance.

## HISTORIC OVERVIEW

### Prehistory

The prehistoric cultural history of South Florida is generally divided into three time periods. The first period is referred to as the Paleoindian, extending from about 13,000 to 8,000 BP (before the present). Archeological evidence indicates that the earliest inhabitants of southern Florida lived in a marine-terrestrial environment that differed considerably from the present-day topography. During the Paleoindian period sea levels were considerably lower than at present, and Biscayne Bay was a freshwater marsh ringed by limestone hills of the present-day keys and

the low ridge that forms the current eastern Florida coast. In addition, paleontological studies indicate that the climate was considerably drier, and that the predominating vegetative types along the eastern Florida coast were savannah and dune scrub interspersed with more lush vegetation along watercourses (Sears and McGregor 1973; Leynes and Cullison 1998; NPS 1999).

Because of environmental conditions in southern Florida, little cultural evidence—other than lithic tools and the sites where they were manufactured—survives to illustrate the Paleoindian period. The people who inhabited Florida at that time appear to have been organized in small groups of mobile hunters and gatherers, using areas where a steady water supply, good stone resources for tool making, and firewood were available. Although the cultural remains associated with the Paleoindian period consist almost entirely of lithic artifacts that exhibit a generalized subsistence pattern, the presence of large, lanceolate projectile points suggests that this cultural group hunted now extinct Pleistocene megafauna such as the saber-toothed tiger and giant armadillo. The stone tool tradition among Paleoindians along the Florida coast includes high-quality chert projectile points.

Around 12,000 years ago, warmer temperatures prompted a rise in sea levels as glacial polar ice caps melted. As the sea levels rose, many of the terrestrial American Indian sites in South Florida were inundated. On Florida's western shoreline, underwater surveys in Apalachee Bay have located six submerged sites as far as 6 miles offshore. Deep sinkholes in Sarasota County (Warm Mineral Spring and Little Salt Spring) have also yielded data about Paleoindian life. Closer to the keys, the Cutler Fossil site on Biscayne Bay has yielded radiocarbon dates as early as  $10,620 \pm 120$  BP.

The Archaic period (9,500 to 2,500 BP) followed the Paleoindian and was marked by the continued rise in sea levels. As the climate gradually became wetter, people expanded their areas of settlement to coastal areas and along inland rivers. This period featured the beginnings of larger settlements, group

burials, and the introduction of ceramics. During this period, water from the Gulf of Mexico began flowing over the lower elevations of the Florida peninsula, inundating the southeastern Florida coastline and filling in Biscayne Bay. The low offshore limestone hills were almost covered by the rise in sea levels; the summits of these hills are visible today as the Florida Keys. By 4,000 BP the southern Florida shoreline was similar to present-day topography. In general, most Archaic sites in Florida are found in the interior highlands; St. Johns River valley; the Everglades; and along the Atlantic, southwest, and panhandle coasts as well as the Gulf Coast near Tampa. The rise in sea levels undoubtedly flooded coastal sites in South Florida's lowland areas and shorelines that had been inhabited during the first 5,500 years of the Archaic period. Thus, it is likely that Archaic period sites not in upland areas are now submerged, some possibly within Biscayne Bay.

The third period of prehistoric occupation—generally known as the Formative period—began about 2,500 BP and continued until European-American contact in AD 1513. In southern Florida this period is defined by archeologists as the Glades Tradition, which is distinguished by a typology and relative chronology of ceramics defined by changes in ceramic decorative motifs. Seven periods comprise the Glades chronology: Glades I Early (2,500–1,500 BP); Glades I Late (1,500–1,250 BP); Glades IIa (1,250–1,100 BP); Glades IIb (1,100–900 BP); Glades IIc (900–800 BP); Glades IIIa (800–600 BP); and Glades IIIb (600 BP to Euro-American contact in AD 1513). Archeological evidence of the Glades periods includes a variety of lithic tools and ornaments that indicate that the peoples living along the southeast Florida coast had developed a thriving trade network. During this period, people concentrated in river valleys and along the coast, built earth mounds for burials, engaged in expanding long-distance trade networks, and developed rudimentary agricultural plant cultivation and harvest practices. All of the currently known prehistoric sites in Biscayne National Park fall within the Glades Tradition, however some

include evidence of interaction with Europeans during the later Contact Period.

## History

When Juan Ponce de Leon first landed in Florida in 1513, he claimed the land for Spain. The Spanish encountered a thriving American Indian population consisting of at least five separate tribes—the Tequesta in southeast Florida, the Calusa in the southwest, the Jobe and Ais along the east coast north of the Tequesta, and the Mayaimi near Lake Okeechobee. Conservative estimates place the Indian population prior to European-American contact at 25,000. The Calusa maintained political dominance over the Indian groups of southern Florida. During the early historic period, the peoples inhabiting the area currently in the boundaries of Biscayne National Park were referred to as the Tequesta (Tebeau 1971).

The Tequesta practiced small-scale horticulture on the rich lands north of the park where they grew corn, beans, and squash and fished and hunted along the southeastern coast. Villages were situated at the mouth of the Miami River and along the coastal islands. Although the Tequesta supplemented their diet with garden vegetables and meat, such as bear, deer, and wild boar that were hunted in the Everglades, resources found in their immediate marine environment formed the major portion of their diet. The abundant wildlife and marine life, as well as the mild climate, encouraged political and economic stability in Tequesta society, which was organized into villages controlled by village chiefs and religious leaders (McNicoll 1941).

The geographic relationship of Florida to the Florida Straits and Gulf Stream made the southeastern Florida coastline strategically important to Europeans interested in controlling, or at least exploiting, popular shipping routes from the Caribbean and South America to Europe. Following the discovery of the Gulf Stream and its northward currents by Ponce de Leon in 1513, the Spanish quickly recognized the geographic significance of Florida. Thus, they were the first European-

Americans to colonize Florida, and they began constructing forts and Roman Catholic missions. Spain claimed most of the present-day southeastern United States during the early period of European colonization, but because nothing as valuable as the gold and silver of Mexico and South America was found, the area was used primarily as a buffer to protect Spanish holdings farther south. Although the Spanish may have landed on the keys that are now in Biscayne National Park, the area's water routes were their primary concern. Almost all ships returning to Europe used the Gulf Stream to expedite their voyages, and because the Florida Keys are on the Gulf Stream, most ships using this route would have passed the keys. Many of these ships were laden with precious metals from the New World.

The Florida Keys were not occupied and little explored; however, the sinking of the Spanish Plate Fleet in 1733 and attempts at its recovery brought about the exploration and naming of the principal keys. Although the derivation of the Biscayne name is uncertain, the bay may have been named for the Bay of Biscay between Spain and France, or a Spaniard by the name of Vixcayno may have lent his name to the bay. The term "key" derives from the Spanish word *cayo*, meaning islet or small island.

French and British exploration of Florida began in the 16th century, with French explorers penetrating northern Florida from the west via the Mississippi River and the British expanding their colonial boundaries south from Georgia. Despite these incursions and the brief period of British rule from 1763 to 1784, the Spanish retained control of Florida until 1821.

With the arrival of the European-Americans, the culture of the southeastern American Indians changed abruptly. One of the first effects of contact on the American Indians in Florida was the introduction of diseases by Europeans and African slaves; the natives had no defense against these diseases. By 1700 it is estimated that the American Indian population of Florida may have been reduced by as

much as 90% because of outbreaks of smallpox, mumps, measles, influenza, and pneumonia. By 1763, when the English gained control of Florida, the Indian population had been reduced to only several hundred people. Much of this remnant population is thought to have migrated to Cuba with the Spanish when the British and later the Americans took control of Florida.

Following the decline of the Tequesta population, Creek Indians from Alabama and Georgia moved into Florida. Groups of Lower Creeks moved to Florida to get away from the dominance of the Upper Creeks, and other Creeks searched for new agricultural areas for planting corn, beans, and other crops. For some years, Spain encouraged these migrations to help provide a buffer between its Florida settlements and the British colonies. Thus, Spanish Florida became a refuge for Creek Indians.

During the brief period of British rule in Florida between 1763 and 1784, the Indian population of Florida consisted of several groups, primarily the Creeks and the Miccosukee. The population also increased by runaway slaves who found refuge among the Indians. Smaller Indian groups included the Yamasses and Yuchis and several other aboriginal remnants. The British called the people of Creek Indian descent “Seminoles,” a name probably derived from the Spanish word *cimarrones*, meaning “rebel” or “outlaw” and commonly used by the Spanish to identify Native Americans and in a similar derivative, *maroon*, meaning runaway slaves.

During British rule, Florida was divided into two colonies—East Florida and West Florida. The British government surveyed most of the Florida Keys in 1774.

No permanent European-American settlements were established on the Florida Keys when the United States assumed control of Florida in 1821. Thereafter, the largest group of whites to settle on the keys was mariners from the Bahamas. Known as “Conchs,” these people were descendents of British patriots who had fled to the Bahamas during the

American War for Independence. By 1870 the population of the Upper Keys was about 130, and most people were at Key West. Although the keys were covered with hardwood hammocks and had little arable soil, some early settlers who were familiar with coral island farming techniques attempted to cultivate lands on the keys (Gannon 1996; Tebeau 1971; NPS 1999).

#### **Marine Casualty Salvage (Wrecking).**

Flowing north between Cuba and the Florida Keys at between two and four knots, the Gulf Stream maintains a width of about 40 to 50 miles. This wide column of water eases the eastward progress of ships; however, the adjacent Florida Reef near the keys presents a marine hazard that has caused numerous shipwrecks. Two of the most significant wrecks in Biscayne National Park are the *Nuestra Senora de Populo*, a Spanish galleon wrecked in 1733, and the *HMS Fowey*, a British warship that ran aground and sank in 1748 (Skowronek and Fischer 2009).

Because of the proximity of the keys, indigenous American Indians and early settlers on the islands became adept at salvaging the numerous marine casualties. Early populations of indigenous American Indians undoubtedly profited from salvaging the spoils of shipwrecks, and by the 1700s the salvage of marine shipping accidents, known locally as “wrecking,” had developed into an industry that dominated the economy of the keys until about 1890. Because wrecking was a sporadic activity, people engaging in this industry also pursued other work such as fishing, sponging, or farming, which enabled them to maintain a presence near the ocean shipping route in the Gulf Stream.

On July 4, 1823, the Territory of Florida passed a wrecking act that required salvagers of wrecked property to report the salvage to the nearest public authority and established procedures for ascertaining ownership and compensation. To prevent the cargo from ships wrecked within U.S. jurisdiction from being adjudicated in foreign ports, Congress passed the Federal Wrecking Act of 1825, which required property from marine

casualties in American waters to be brought to a U.S. port of entry. In 1828 the United States established a Superior Court with maritime and admiralty jurisdiction in Key West. The building of lighthouses and the development of other aids to navigation in the late 1800s gradually brought the wrecking industry to a close. The introduction of steam-powered and mechanically driven ships, which were much more maneuverable than wind-driven vessels, also contributed to the decline of the wrecking industry. The Wrecking License Bureau of the federal court closed in 1921.

**American Jurisdiction and the Seminole Wars.** In 1783, at the conclusion of the American War for Independence, Florida was returned to Spain. With reestablishment of Spanish control of Florida in 1784, Spanish colonists returned. The influx of settlers to Florida from the newly established United States grew at an even greater pace with Florida became increasingly populated with American settlers. As Florida's population increased, conflict between the Seminoles and European-American settlers escalated. American settlers wanted to gain control of Indian lands and wanted their escaped slaves returned. After several official and unofficial U.S. military expeditions into the territory, Spain formally ceded Florida to the United States in 1819 under the Adams-Onís Treaty, although transfer of flags did not occur until 1821. The Creeks and proto-Seminole had been in the area as early as the 18th century, and during the three Seminole Wars (1817–18, 1835–42, and 1855–58) independent bands of Florida Indians established themselves in the Everglades to avoid removal from Florida. Known locations of Seminole land use near Biscayne National Park area include a battle site dated to the Second Seminole War just north of the park at Key Biscayne, and a Seminole trading post north of the park near Matheson Hammock.

Modern Seminoles are divided into two groups along linguistic lines. The Muskogee-speaking Seminoles reside on the Big Cypress Reservation, Brighton Reservation near Lake Okeechobee, and Seminole Reservation near Hollywood, Florida. The Hitchiti-speaking

Miccosukees live on the Miccosukee Reservation near the Big Cypress Reservation and in several small towns along and near the Tamiami Trail (Covington 1993).

**Agriculture on the Keys.** The keys, covered with hardwood hammocks and little arable soil, did not provide a likely area for agriculture; however, subsistence farming was practiced on the keys from the time of the earliest settlers. The first attempts to produce marketable commodities occurred during the 1850s. Crops, including pineapples, tomatoes, Irish potatoes, cassava, beets, carrots, turnips, and various tropical fruits, were raised with varying degrees of success.

Pineapple was the first successful crop to be grown in the keys. By 1890 growers had established pineapple plantations throughout the keys; the largest was on Elliott Key. The keys produced all of the pineapple grown in the United States until about 1884 when the crop was introduced to mainland Florida locations (Niedhawk 1969).

After the decline of the pineapple industry, the residents of the keys developed a lime industry. The first lime trees on the Florida Keys had been introduced from the Yucatan region of Mexico by Henry Perrine in 1838. The Mexican lime (*Citrus aurantifolia*), popularly known as the key lime, would become the essential ingredient for making Florida's famous key lime pie. Although lime production peaked in 1923, a devastating hurricane in 1926 damaged most of the lime groves on the keys and the industry never recovered.

Elliott Key was the center of the agricultural efforts on the Biscayne Keys. At the peak of pineapple production, Elliott Key had a population of about 90. Pineapples were grown on the bay side of the key, and Elliott Key residents, like their neighbors on other keys, supplemented their income by salvaging wrecked ships and fishing. One of the earliest homesteaders to farm on Elliott Key was Asa Sweeting, who emigrated to Key West from the Bahamas in 1866. He claimed a 154-acre homestead at the northern end of Elliott Key

in 1882. After obtaining additional acreage in 1896, the Sweeting family developed a substantial pineapple plantation and also planted lime groves and other crops. Typical of other farmers and settlers on the keys, the Sweetings (the last member of the family left the key in 1930) also engaged in coastal trading of merchandise and produce and salvaging wrecked ships (Niemiec and Mattick 1997).

Another Elliott Key settler was Israel Lafayette “Parson” Jones, a black settler who arrived in the area in the late 1800s. Parson Jones and his family owned and operated a lime and pineapple plantation on Totten Key. Jones made significant contributions to Miami’s black community and ran a successful agricultural-based business for many years. Lancelot Jones, the last descendant of the family, lived on Porgy Key until Hurricane Andrew forced his evacuation in 1992. (De Gale 1997; Gilpen n.d.; NPCA 2010).

Various factors contributed to the demise of agricultural enterprise on the keys. These included the lack of deep water access, inadequate transportation for timely shipping of perishable foods, frequent storms and hurricanes, lowering of the water table, and infertility of the thin soil. By 1935 the viability of commercial farming on the keys had weakened, and the amount of acreage under cultivation was considerably reduced.

#### **Recreational Development of Biscayne Bay.**

The development of Henry M. Flagler’s Florida East Coast Railway in 1896 opened southeastern Florida to commerce and travel. Flagler was a prominent businessman from the Midwest with considerable assets from business ventures in grain, distilleries, and petroleum. Flagler purchased and rebuilt a short-line railroad between Jacksonville and St. Augustine during the 1880s to provide improved access to two hotels that he had built in the latter town. This railway, known as the Florida East Coast Railway, was soon extended to the south, and in 1896 it reached Miami, then known as Fort Dallas. War with Spain in 1898 and construction of the Panama Canal during the early 1900s enhanced the significance of the Caribbean, Cuba, and

South America in the American public’s consciousness (Gannon 1996).

Prospects of the profits to be gained by participating in the commerce of the Caribbean encouraged Flagler to consider an extension of the railroad across the arc of the Florida Keys. In 1902 survey work for the railroad project began, and construction started in 1905. Although halted by hurricanes in 1906 and 1909, the project was completed to Key West in 1912. The Florida East Coast Railway route to Key West operated for 23 years before its tracks and bridges were demolished by a severe hurricane in 1935. Uncertain economic conditions during the Great Depression and the storm damage caused the railroad, which had become the Overseas Railway, to cease operations, and the right-of-way was sold to the state for modification as a highway. During its period of operation, the popular railroad route operated trains between Miami and Key West three times a week. From Key West, steamships made direct connections with Havana and elsewhere in Cuba. Many engineering structures associated with the railroad still stand and are now part of the Overseas Highway route through the Florida Keys. The development of the Florida East Coast Railroad to Miami and beyond did much to encourage the commercial and resort development of southeast Florida. The railroad provided easy and relatively inexpensive access to the southeast coast of Florida, and the region’s mild winters attracted increasing numbers of visitors and new residents to settle in the area.

Following the end of World War I, the advent of the automobile and the construction of roads, such as the Dixie Highway from northern Michigan to Miami in 1925, contributed to the enhanced mobility of many Americans. By the late 1920s southeastern Florida had become increasingly accessible.

Also during the 1920s southeastern Florida became the focal point of considerable land speculation and extensive development schemes. In Miami, land promotions quickly transformed the small coastal town into a popular tourist destination. Completion of a

bridge connecting Miami to a barrier reef and subsequent development of the reef through dredging resulted in development of the Miami Beach resort. By 1919 Miami Beach lots were selling quickly, and the value of beach property escalated. Effects of this land promotion were also felt in the keys, where development continued throughout the 1930s despite deteriorating economic conditions, hurricanes, and unreliable transportation.

As the popularity of the Miami area grew, developers used the same dredging schemes that had created Miami Beach to build artificial islands and expand Boca Chita, Adams, and Elliott keys in Biscayne Bay. Flagler, who had opened a resort on Soldier Key, was the first of these promoters. Later prominent developers included Carl G. Fisher, founder of the Prest-O-Lite Company and the Indianapolis Speedway. In 1916 Fisher and two partners built a vacation lodge, known as Cocolobo Cay Club, along Caesar's Creek on Adams Key. Resort developments were established on other keys as well. On Elliott Key, Dr. John C. Gifford subdivided and sold 20-acre lots on which buyers built weekend residences and private fishing camps.

Development of Boca Chita Key during the 1930s by Mark C. Honeywell followed previous development work on the island by Carl Fisher, F. A. Seiberling, and Milton W. Harrison. Honeywell purchased Boca Chita Key from Harrison in 1937 and built a vacation retreat on the island. After their purchase of Boca Chita, the Honeywells retained earlier improvements built by Harrison, including a two-story frame house, and began building additional structures on the north end of the key. Constructed with Miami oolitic limestone between 1937 and 1940, the new structures included an ornamental lighthouse, chapel, picnic pavilion, and barn or garage. The Honeywells used the complex as a rural retreat and often entertained on the island. Mrs. Honeywell (Olive Lutz Honeywell) died in 1939, and Mark Honeywell sold Boca Chita to Florence Emerman six years later (Cullison and Leynes 1997).

**The Great Depression, World War II, and Beyond.** Following the severe hurricane season of 1926, the Florida economy slumped dramatically because much of the area's transportation was destroyed and land prices dropped. The state's economy remained moribund throughout the Great Depression. However, public works programs initiated by President Franklin D. Roosevelt's administration, including the Public Works Administration and the Civilian Conservation Corp (CCC), were much in evidence in Florida during the 1930s. A major Works Progress Administration (WPA) project in the Florida Keys was initiated for reconstruction of the Overseas Highway, and a CCC camp was established just north of the current national park boundary at Matheson Hammock (Gannon 1996; Tebeau 1971).

Throughout the Great Depression, however, Miami and the keys remained as resort areas for America's wealthy. In 1935, for instance, an estimated 600 millionaires spent the winter at Miami Beach.

With the coming of World War II, the nation's work force was reemployed in support of the war effort. Because of its mild climate Florida emerged as a key training center for both the U.S. Army Air Corps and the U.S. Navy. Highway and airport construction accelerated, and by war's end Florida had a restored transportation network. One of the most significant demographic trends in Florida during the postwar era has been steady population growth as a result of extensive migration to the state from within the United States as well as countries throughout the Western Hemisphere, notably Cuba and Haiti. Florida is currently the fourth most populous state in the nation.

During the post-World War II years, development of the Biscayne Keys revived with plans to connect the Upper Keys with the mainland. Proposals to accomplish this connection included construction of causeways over Biscayne Bay from Key Largo to the south and over the shoals of the Safety Valve on the north. A causeway to the keys did not materialize, and Dade County officials advised



landowners that they would have to build the route themselves if they wanted to connect the Florida Keys to the mainland. In support of this project, resort-minded property owners on the keys incorporated, and the city of Islandia was established as a municipality in December 1960.

Developer's plans to build a causeway met organized opposition from conservationists promoting ecological protection for the Upper Keys. Controversy over divergent futures for the Biscayne Keys escalated during the early 1960s with residents of Islandia City advocating development of a road connection to the mainland and conservationists advocating environmental protection for the islands. In 1967 Islandia City bulldozer operators constructed a 120-foot wide strip across the center of Elliott Key, subsequently known as the "Spite Highway," to advance and publicize the city's hopes for connecting the keys to the mainland. Despite the efforts of Islandia's citizens, however, momentum for establishment of a national park increased, and public hearings in the area resulted in calls for a national monument in the Upper Keys. Congress approved establishment of Biscayne National Monument with passage of Public Law 90-606 in 1968. The national monument was expanded in 1974 by the acquisition of Gold Key and Swan Key under the provisions of Public Law 93-477. In 1980 Public Law 96-287 expanded the northern boundaries of the national monument and redesignated the monument as a national park.

## ARCHEOLOGICAL RESOURCES

Settlement patterns on the Biscayne Keys reflect the strong influence of the maritime environment. Inhabitants of the keys of all time periods have depended primarily on the water for transportation and subsistence, and the waters and lands of Biscayne National Park are littered with physical remains that document human interaction with the marine and terrestrial environment of Florida's southeast coast. Evidence of this human interaction with the environment portrays a larger picture than its local context because

the park is at the edge of the Gulf Stream and is part of the international maritime heritage of the Caribbean (NPS 1999, 2011).

## Prehistoric Archeological Resources

Archeological resources in Biscayne National Park document more than 2,000 years of history, and there is great potential for identifying submerged prehistoric cultural sites that relate to some 10,000 years of human settlement. Prehistoric archeological resources in the park richly portray the interaction with and human adaptation to the terrestrial and marine environment of Florida's southeastern coast (Lanzendorf 2001; NPS 1999, 2011).

The isolation of the northernmost Florida Keys in the area of Biscayne National Park has protected archeological sites from most recent development and has sheltered cultural resources that may hold the record of prehistoric human settlement patterns in South Florida. Preliminary and limited archeological surveys in the park were conducted beginning in the 1970s and continuing into the 21st century. These surveys examined both terrestrial areas of the keys as well as known submerged sites. In 1973 the Department of Anthropology, Florida Atlantic University, surveyed the coastlines of Elliott and Sands keys and documented prehistoric sites. Their survey did not include the interior of the islands and as such they found only relatively small sites that had been heavily impacted by shoreline erosion.

Significant and intact archeological sites have since been located within the interiors of Sands and Totten keys. During the 1980s the NPS Southeast Archeological Center staff examined a terrestrial site on Totten Key, and a Dade County archeologist conducted an archeological survey on Sands Key in 1990 (Carr and Beriault 2009). The results of these projects and subsequent investigations at the Sands Key and Totten Key sites have determined that they are rich in both prehistoric and early historic information and are eligible for listing in the National Register of Historic Places, potentially as prehistoric districts. Both sites contain archeological features that

are unique and no longer represented anywhere else in the continental United States. Given the level of development in Miami-Dade and Monroe counties, their current state of preservation and protection grants them substantial significance in the local culture history (Lawson 2009).

All of the known prehistoric archeological sites in Biscayne National Park are associated with the Glades culture sequence. In the park, Glades sites tend to be along the eastern shorelines of the keys or near inshore freshwater sources. Sites in the park are predominantly associated with the Glades IIa and Glades IIIa periods, distinguished by incised loops or arches, some grooved vessel lips, and the appearance of parallel incised lines on their ceramics. Because of wave-generated erosion, only two of the 10 prehistoric sites identified in the 1973 archeological survey could be positively classified into distinct Glades periods.

Prehistoric archeological sites in the park are found on Soldier, Sands, Elliott, Adams, and Totten keys. Many other sites are suspected to be present, but much of the park, particularly Old Rhodes Key and the other southern islands, have yet to be systematically surveyed. The Cutler Fossil site (10,000 BP), immediately adjacent to the park on the mainland, strengthens the possibility that the lands and waters in the national park may have earlier sites than currently recorded.

### **Historic Archeological Resources**

Following the last Glades period and during the historic period beginning in 1513, references in historic documents are made to the Tequesta culture group inhabiting the east coast of southern Florida and living on or using the resources of the Florida Keys. Several well-preserved Tequesta sites are in the park, and several site types are found in the keys. Additional Tequesta sites are undoubtedly present in submerged locations.

Lending credence to the argument for the potential presence of early Tequesta sites in the park is the Miami Circle site, located on a

2.2-acre parcel on Brickell Point adjacent to the Brickell Avenue Financial District in downtown Miami. Discovered during archeological salvage excavations in 1998, the site is on the south bank of the mouth of the Miami River where it meets Biscayne Bay (4 miles north of Biscayne National Park). This archeological feature is 38 feet in diameter and consists of about 20 irregular basins and several hundred smaller postholes arranged in a nearly perfect circle that is recognizable when seen from above (Wheeler 2000, Wheeler and Mattick 2001).

Public outcry over the impending destruction of the Miami Circle and planned development of the property led to additional research at the site, which documented that the bedrock limestone formation had cut holes on about 70% of the property and intact accretionary midden deposits on at least 35% of the property. Miami Circle is the only known site of this type in Florida, and artifacts found at the site indicate that the Native Americans may have occupied it for about 2,000 years (Wheeler 2000, Wheeler & Mattick 2001). A cooperative effort between the state, Miami-Dade County, and many other public and private organizations and individuals led to the state's acquisition of the Brickell Point site and Miami Circle feature in 1999. The National Park Service conducted a study to determine the national significance, suitability, and feasibility of including the Miami Circle site in the national park system. The study found the site to be both suitable and feasible. The Miami Circle was designated a National Historic Landmark in 2009.

Since European contact with the American continent, the Florida Keys have been a meeting point for maritime trade routes from Europe and the Northeast American continent to the Caribbean, South America, and Mexico. The combination of geography and geological resources found in the park, including the Florida Reef, the Gulf Stream, and shallow waters, have often caused ships to wreck. The array of goods, ship parts, equipment, wreckage, and other artifacts left in the archeological record of the park indicates the sheer volume of the shipping trade that

continues to pass through these waters. The historic maritime archeological record can reveal clues about ship construction, ship building techniques, economics, human behavior, and the history of international relations. Other maritime casualty events may be represented by jettisoned material such as ballast, cannon, and cargo (indicating sites of a stranding or grounding).

Ship repair, discard areas such as anchorages, remains of piers and other structures along the shore, and fishing areas along the shoreline and in open water may also leave evidence in the historic archeological record. Shipwreck sites and other material remains of maritime casualties are now preserved as submerged archeological sites in the park, and some are listed in the National Register of Historic Places.

In 1975 a limited magnetometer search of known submerged resources was conducted by the NPS Southeast Archeological Center (SEAC). The survey confirmed the location of several known submerged archeological sites. In 1980, SEAC staff and members of the NPS Submerged Cultural Resources Unit (SCRU) (now known as the Submerged Resources Center or SRC) conducted a magnetometer reconnaissance of 1 square mile of the Legare Anchorage, locating the site of the shipwreck *HMS Fowey*. Additional testing and evaluation of the *Fowey* site was performed by SEAC staff in 1983 and again by SRC staff at various times in the 1990s. SEAC staff later conducted a submerged archeological inventory, including magnetometer survey and site assessment of 4,000 acres that confirmed 21 previously known sites and 14 new sites. A primary objective of this SEAC survey was to collect data in support of the nomination of the Offshore Reefs Archeological District to the National Register of Historic Places (Beditz 1980).

During three consecutive field seasons beginning in 1993, damage assessment of submerged cultural resources caused by Hurricane Andrew resulted in remote sensing of 46 square miles (about 29,500 acres) or 16% of the park by the Submerged Cultural

Resources Unit. During the late 1990s, information obtained via remote sensing was used to guide the park staff's archeological reconnaissance efforts in conducting dives at the sites of about 100 magnetic anomalies. These efforts culminated in an archeological survey of about 6,000 acres or 3% of the park.

Currently there are more than 70 known submerged sites in the park, more than half of which are shipwrecks. The park's cultural resources program continues to work toward documenting each of these individual sites using NPS staff, volunteers, and outside researchers. Many of the most significant sites, including the *Fowey*, the Populo, the English China Wreck, the Outline Wreck, the Keel Showing Wreck, the Soldier Key Wreck, and each of the six Maritime Heritage Trail sites, have been at least preliminarily studied and documented. A near future goal for the program is the development of an archeological overview and assessment that will gather dispersed research on all of the park's archeological sites and present it in a single document. Concurrent with site documentation, a site-monitoring program was initiated to track the effects of storms and other natural processes, as well as human-caused effects (particularly looting) on submerged sites. Monitoring of submerged sites indicates that the condition of many of the park's underwater archeological sites is unstable. The number, extent, and rate of deterioration from erosion of submerged archeological sites in the park remains unknown.

The monitoring program has been particularly active at the site of the *HMS Fowey*, a British warship that sank in a storm on the Florida Reef in 1748. After Hurricane Andrew in 1992, Biscayne National Park initiated the *HMS Fowey* Project, an interdisciplinary project designed to stabilize and preserve the wreck. An objective of the project was to determine the feasibility of stabilizing the *Fowey* and establishing a long-term monitoring program. The wreck is on the seaward edge of the natural distribution of seagrass. There is no protective reef barrier, and the site is subject to wave action that continues to expose the wreck's structure and disperse its associated

artifacts. The project included site mapping, evaluation, and remote sensing for further documentation and continued monitoring. Since that time additional remote sensing has been completed as well as three-dimensional mapping (Skowronek & Fischer 2009). To date, a stabilization plan for the *Fowey* has not been completed, but it is a short term goal of the park's cultural resource program.

The *Fowey* site is just one of many sites making up the Offshore Reefs Archeological District, which was listed on the National Register of Historic Places in 1984. The district's contributing resources include artifacts and remnants of more than 40 shipwrecks in various states of preservation embedded in and scattered across the Florida Reef (Beditz 1980).

Climate change may impact archeological sites in Biscayne National Park if more erosion occurs because of increased storm frequency and intensity or sea level rise. As archeological and historic resources become submerged or compromised because of climate change, they become unavailable for archeological research and visitor enjoyment. Prehistoric sites on the islands are especially vulnerable because of the potential for inundation and increased shoreline erosion. Furthermore, rising sea levels could cover or destroy archeological sites yet to be identified on much of the unsurveyed lands in the park. The park's cultural resource program is currently working toward the complete survey of the park's terrestrial holdings and a full evaluation of the contents and significance of the known terrestrial sites. Historic shipwrecks and other maritime sites may also be compromised if amplified wave action occurs because of increased storm activity associated with global climate change. If the ongoing monitoring program determines that loss of any of these sites is inevitable, then steps will be taken to mitigate loss through archeological data recovery.

## CULTURAL LANDSCAPES

Biscayne National Park's "Historic Resource Study" (1998) evaluated the park's cultural resources within five historic contexts—aboriginal populations and European-American exploration (1513–1859); the wrecking industry (1513–1921); American settlement on the keys (1822–65); agriculture on the keys (1860–1926); and recreational development of Miami and Biscayne Bay (1896–1945). Since 1998 a single cultural landscape, the Honeywell Complex on Boca Chita Key, has been documented and a Historic Structure Report and Cultural Landscape Inventory was completed for it in 2010. There remains potential for the identification of other cultural landscapes that reflect any of the park's five historic contexts.

A draft "Cultural Landscape Inventory (Level 0)" was completed for the national park in 1997. This initial inventory was limited to a review of existing park cultural resource and planning documents. The inventory suggested that the entire park could be considered as one cultural landscape that reflected changes over time and determined that the marine environment was the unifying element common to all historic themes at the park.

Human occupation and settlement patterns in the Biscayne Bay region and on the keys were and continue to be greatly influenced by the water, and all occupation periods on the islands contribute to the bay's maritime history. Shell middens and concentrations of wrecked ships document aboriginal use of the area as well as European-American exploration and exploitation. Shipwrecks and debris illustrate the tradition of marine salvage and the wrecking industry that thrived on the keys for nearly 400 years. Remnant landscape alterations for crop production and structures for human habitation and recreation endure on the keys as a testament to American settlement of the area, attempts at agriculture, and development of the keys as a scenic setting in which to recreate.

Evaluation of the park's cultural landscapes in the context of its larger regional cultural

environment may be a valid approach, because the park is physically, culturally, and environmentally associated with the Caribbean. The initial inventory also identified potential areas in the park that exhibit vestiges of human manipulation and adaptation of the landscape and thus require further documentation and evaluation as cultural landscapes.

Currently the only documented cultural landscape in Biscayne National Park is the Boca Chita National Historic District, an 11-acre site on the north end of Boca Chita Key. Its location and complex of historic structures is a unique example of recreational resort development that took place in the region during the 1920s and 30s, primarily by northern industrialists. The specific period of significance for the landscape is from 1937 to 1945, when Boca Chita Key was developed and actively used as a resort island by its owner at the time, Mark Honeywell, and other wealthy families that were active in the Miami social scene. The main historic structures in the district feature Miami oolitic limestone, are associated with the firm of prominent Miami architect August Geiger, and have maintained their integrity. All of the historic structures were constructed during the Honeywell era. Until 1992 there were several frame structures and historic vegetation that also dated to the Honeywell period, but Hurricane Andrew destroyed these features. Nevertheless, the setting and spatial character remain largely unchanged. Vegetation planted since Hurricane Andrew has helped to recreate the general landscape character that existed during the period of significance, primarily lawn and palm trees with views of the ocean, Biscayne Bay, and the island's historic lighthouse. Ownership of Boca Chita Key changed hands several times until it was acquired by the National Park Service in 1985. During this time it continued to serve primarily as a recreational site. The island is only accessible by boat and is still used for recreation, largely by weekend visitors from the Miami area. A small harbor constructed before the period of significance allows for overnight or short-term docking, and many visitors camp on the island.

Other keys in the park contain a combination of natural and cultural resources that might also be considered as cultural landscapes. Most notable among the homestead/plantation remnants is the Sweeting Homestead (about 240 acres and listed in the National Register of Historic Places in 1997) near the northern edge of Elliott Key. Although most of the land was so rocky that it could be tilled only by hand with axes and hoes, the Sweetings cleared about 30 acres and planted bananas, pineapples, and tomatoes. During establishment of the farm, many large mangrove trees were cut, and the land was burned to create openings for pineapples and lime trees. The Sweetings farmed their Elliott Key homestead for some 24 years, during which they built six wood frame houses, a school/church, a general store, a hurricane house, a chicken house, cabins for farmhands, packing houses, outhouses, and water cisterns (Niemiec and Mattick 1997; NPS 1997b).

The hurricane season of 1906 inundated Elliott Key, destroying the pineapple plants and rendering the soil infertile for future plantings. In 1975 Abner Sweeting sold the last parcel of the homestead to the U.S. government. Today only rubble remains to mark the locations of the Sweeting houses and buildings. The most intact remnants of the homestead are the cisterns and intentionally planted vegetation, such as coconut trees, date palms, and seagrape trees (Niemiec and Mattick 1997; NPS 1997b).

An area encompassing portions of both Porgy and Totten Keys may also be considered as a cultural landscape because of the built environment associated with the lives of Israel Lafayette Jones and his descendents, who resided there from the late 19th century until well after the establishment of the national park. The Jones story is a remarkable one, of a black family that was able to obtain economic prosperity during the decades following the Civil War and throughout the years of racial segregation in the South. Following the Emancipation Proclamation, racial tensions arose throughout the country. Although many northern blacks experienced a circumscribed freedom, blacks still struggled with the fear of

re-enslavement in southern states. In addition, further barriers were constructed for free blacks determined to build a new life. These included being denied the right to vote, being denied access to white business establishments and educational institutions, and being forbidden to hold religious services without the presence of a licensed white minister. Florida was no exception. Blacks who lived in what is now Miami-Dade County were largely runaway slaves and Bahamian blacks. Few possessed the means to establish a homestead and successful business. It is within this context that Israel Lafayette Jones traveled from North Carolina to Florida, developed agricultural and maritime skills, and successfully produced pineapples and limes on his own farm. In addition, he expanded his wealth through real estate and played an integral role in the development of the black community in the county. While the Jones Family story is a significant example of the development of the black community in Miami-Dade County and of the county itself, it also provides a lens into the strategies undertaken by blacks and whites in Florida to negotiate a contentious time in American history.

In addition to the remarkable story of Israel Jones himself, his sons, particularly Lancelot, were instrumental in bringing about the creation of Biscayne National Park. As the second largest landowners in what was to become the park and the only permanent residents of the islands, the Jones family's preference toward the preservation and protection of the islands and water surrounding them provided needed support to the conservation movement in the 1960s that eventually halted development on the islands and lead to the establishment of the park. The cultural landscape associated with the Jones family includes the ruins of their homesite on Porgy Key, a hand-dug canal in the shallow waters north of Totten Key, and ruins, archeological vestiges of farming activities, and relict agricultural fields on Totten Key.

Biscayne National Park also contains the potential for the establishment of a maritime

cultural landscape inclusive of all the archeological and historic resources related to maritime activity in the park, whether they are on land or in the water. The maritime cultural landscape would encompass shipwrecks and submerged stranding sites, but could also include sites on the shore such as docks and wharves, the Fowey Rocks Lighthouse, and other historic aids to navigation. Even the terrestrial domestic historic sites could be considered as contributors to a maritime cultural landscape because of their inescapable dependence on the sea and, for the historic sites at least, their occupants' association with the tradition of marine salvage and the wrecking industry that thrived on the keys for nearly 400 years. The landscape would also include the natural geography of the park, i.e., the reef tract, and shallow shoals whose placement adjacent to the heavily traveled Gulf Stream created the perfect storm for the loss of so many historic vessels.

Climate change may affect cultural landscapes in the park, including the Boca Chita Key Historic District, the Jones sites, the Sweeting Homestead, and any of the maritime sites. As identified and potential cultural landscapes, these areas represent connections between people and the land. Sea level rise, increased storm intensity or frequency, and increased air and water temperature may damage natural or cultural resources in these locations, compromising the cultural landscapes as a whole. Resilience of these landscapes may depend on their ability to withstand both gradual and extreme weather variations.

## **HISTORIC BUILDINGS AND STRUCTURES**

### **List of Classified Structures**

Biscayne National Park's "Historic Resource Study" generated a List of Classified Structures. This list, compiled in 1997, identified 11 historic structures, 10 of which are contributing resources in the Boca Chita Key Historic District. The district's 10 structures, which represent typical resort architecture for the

Miami area in the 1930s, include a lighthouse, chapel, picnic pavilion, garage/barn, engine house and cistern, bridge, cannon, stone walls, canal, retaining walls, and concrete walkway.

The Fowey Rocks Lighthouse is also included in the park's List of Classified Structures. Although in the park's boundaries, it has been excised by the U.S. Coast Guard. The historic lighthouse was included in the list because of the potential that it might be transferred to the National Park Service.

### **Boca Chita Key Historic District**

Although Elliott Key is the largest of the islands in the park and was the center of agricultural activity on the Biscayne Keys during the late 19th and early 20th centuries, Boca Chita is the only key in the park on which substantial intact historic structures are located. The Boca Chita Key Historic District encompasses the northwest portion of the island and is bounded by Biscayne Bay on the west and Lewis Cut to the north (NPS 1997a).

The development of Boca Chita by Mark C. Honeywell in the late 1930s peaked near the end of the first wave of recreational and resort development in Miami and the Upper Keys during the first half of the 20th century. The growth and development of South Florida and the Miami area in the early 20th century was reflected in the Upper Keys primarily by resort development. As a wealthy group of industrialists found the subtropical climate and exotic nature of the keys a likely place to entertain themselves and their friends, they purchased the offshore keys and established vacation retreats. Thus, the Boca Chita structures represent typical resort development in Miami and South Florida during this period.

The earliest development on Boca Chita began in 1916 when Carl Fisher and F.A. Seiberling purchased the key. The first improvements were constructed by Seiberling and included a wooden bulkhead and several buildings for use by visitors. Seiberling also enlarged the key by adding fill material up to depths of 13 feet on top of the existing limestone, thus

creating the present size of the key. Following the devastating hurricane season of 1926, Seiberling sold the key to Milton W. Harrison who replaced destroyed wooden bulkheads with steel, increased the depth and size of the boat basin, and built a two-story frame "cottage" with an upper veranda (which was destroyed by fire during the 1960s). In 1937 Harrison sold the key to Honeywell, and the Honeywell family transformed the relatively undeveloped key into a rural vacation retreat. During 1937–40, the Honeywells constructed a complex of nine buildings and manicured the landscape with ornamental plants to enhance their exclusive island vacation home.

Many of the structures on Boca Chita were designed by the August Geiger architectural firm in Miami and by Leon Angle Camp. The exterior surfaces of all of the structures were constructed of Miami limestone, a popular building material in South Florida during the early 20th century.

One of the most prominent features of the historic district is the 65-foot lighthouse at the north of the boat basin. The lighthouse was probably never intended to be used for navigation. Designed by Camp, the structure is a pared cylinder of concrete blocks clad in uncoursed limestone. Other buildings in the historic district have steeply pitched roofs and are rectangular in shape, Mediterranean in style, and of varying sizes. The picnic pavilion, across the boat basin from the lighthouse, is an open structure crowned by a classical cornice and frieze supporting the hipped shingle roof. The two-story garage/barn, which is the largest structure in the complex, rests on a concrete slab foundation and features low chimneys at either end and four large door openings on the north façade.

The engine house has a front gable roof and an octagonal concrete cistern attached to the east wall. An arched concrete bridge crosses a narrow bulkheaded canal that is now dry after being blocked at the north end by a metal bulkhead in 1965. A cannon, which was fired to welcome guests, rests on a stone base near the bottom of the lighthouse. A limestone wall with seven gateways originally enclosed the

primary structures in the complex, but only three gates are currently standing. Along the north shore of Boca Chita, the Honeywells constructed a limestone retaining wall that is deteriorating.

During the Honeywell period of ownership, Boca Chita Key was the scene of prestigious Miami society gatherings, including the annual charity party of the Miami Beach Committee of One Hundred. Honeywell lost interest in the Boca Chita property after the death of his wife and sold the property to Florence Emerman in 1945 (Leynes and Cullison 1998; NPS 1997a).

### **Fowey Rocks Lighthouse**

The Fowey Rocks Lighthouse is a pile reef light built in 1878 to supersede the Key Biscayne Lighthouse at Cape Florida. Located east of Soldier Key, it is one of six built on the Florida Coral Reef between 1852 and 1880. Its lamp was first lit on June 15, 1878, and it still functions as an aid to navigation. Like the Eiffel Tower in Paris, cast iron skeletal girders comprise its main octagonal construction. Once known as the “Eyes of Miami,” the lighthouse was named for the nearby 1748 shipwreck of the HMS *Fowey*.

The 110-foot-tall dark brown tower of the lighthouse has an attached residence and enclosed stair cylinder. During the mid-1930s, the light was changed from incandescent oil vapor to electric power from generators, and a radio-beacon was installed. The light was automated in 1972.

The history and architectural character of the lighthouse are an integral part of the park’s history. The structure is listed in the National Register of Historic Places under criteria A and C because of its association with the

history of 19th and 20th century shipping and transportation off the Florida coast and its iron architecture that is typical of pile reef lights along the Florida coast (NPS 1999, USGC 2010).

Although within the boundary of the park and resting on submerged bottomlands owned by the National Park Service, the lighthouse is not owned by the Park Service. The lighthouse has been exsessed by the U.S. Coast Guard; under the National Historic Lighthouse Preservation Act of 2000 (NHLPA), the property may be transferred to a public or private entity. Any future owner must continue to allow access for the Coast Guard to maintain and service the navigation aid and must maintain the structure in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*.

Climate change may affect historic buildings and structures in various ways. Sea level rise may degrade foundational elements, while increased storm frequency and intensity may damage structures and materials. Additionally, rapid temperature changes or extreme weather may further weaken or cause deterioration of the original materials and structures such as the Fowey Rocks Lighthouse and those on Boca Chita Key. Some buildings and structures may eventually be compromised to the point where rehabilitation or restoration is not feasible, resulting in loss of these important cultural resources. As archeological and historic resources become submerged or compromised due to climate change they may become less available for their archeological and historic value, research, and visitor enjoyment (Colette 2007).



# VISITOR EXPERIENCE

## OVERVIEW

The park's proximity to the Miami-Dade County metropolitan area plays an important role in the type and level of visitation it receives. Just more than half a million people visited Biscayne National Park in 2007. Based on the "Biscayne National Park Visitor Study" (Simmons 2001), about 75% of visitors were Florida residents. Data indicates that most of these Florida visitors live in the Miami-Dade County metropolitan area. The remaining 25% were a combination of visitors from other states (about 14%) and countries (11%).

The high percentage of visitation from the local area may lead to an indication of potential future use of the park. Currently, the U.S. Census Bureau projects a 68% increase in Florida population between 2000 and 2020.

Most local visitors have their own motorboat and access the park via nearby Miami-Dade County marinas, especially Homestead Bay-front Park, Black Point Park, and Matheson Hammock Park. The visitor surveys showed that most of these visitors had been to Biscayne before and usually visit the park at least twice a year. About 25% of visitors surveyed said they visit the park several times a year. Visitors usually come in small groups of two to four friends and/or family members and spend part or all of the day in the park. About 25% of the visitors may spend one or more nights camping on their boat or on one of the keys. A small percentage of visitors are long-distance boaters passing through the area. Many of the visitors who access the park by boat are unaware they are in a national park.

The main entrance to Biscayne National Park is at Convoy Point. Visitors who access the park by land use their own car or a rental vehicle. There currently is no public transportation to the park. The park is 35 miles south of Miami International Airport

and 9 miles east of the nearest urban centers—the city of Homestead and Florida City. U.S. Highway 1 is the major north-south arterial that serves traffic coming south from Miami or north from the Florida Keys. On US-1 at Homestead, highway signs direct visitors east to Biscayne National Park via SW 328 Street, a recently widened four-lane road initially and narrowing to a rural two-lane road that passes by Homestead Miami Speedway and through extensive agricultural areas.

The park's main entrance road leads visitors directly to the parking area behind the Dante Fascell Visitor Center and headquarters complex. This visitor center was completed in 1997. The visitor center is on the upper level of the complex and provides visitors views of the bay and Convoy Point. Inside the center, people can speak with park staff; obtain park information; purchase sales items through The Everglades Association; and experience a variety of interpretive exhibits, films, and programs.

Adjacent to the visitor center is a commercial operator who may continue to provide the following authorized visitor services through a concessions contract: a small retail store where visitors can buy sandwiches, soft drinks, practical/convenience vacation items, and souvenirs; the rental of canoes, kayaks and paddle boats; snorkeling and scuba diving equipment; snorkeling and diving trips to the park's coral reefs and submerged cultural resources; boat tours to view the coral reefs without getting in the water, boat trips to park islands for guided tours and hikes, and a transport service to and from the mainland and Elliott or Boca Chita Keys for visitors who want to hike independently or camp. A small docking area in front of the visitor center complex provides mooring for park patrol boats and concessioner boats and a few slips for public docking. Convoy Point has picnic tables and grills, a launching area for nonmotorized craft, a boardwalk, and

shoreline fishing. However, no public powerboat launch is provided. Convenient access to boat launch facilities is found nearby at Homestead Bay Front Marina, just South of Convoy Point.

## VISITATION LEVELS

Severe damage to the park by Hurricane Andrew in 1992 significantly reduced park visitation from late 1992 and through 1994. Since then, annual visitation levels have returned to a more normal pattern. In recent years, hurricanes have resulted in short-term closures (such as Hurricanes Ivan and Jeanne in 2004 and Wilma in 2005) and have periodically affected summer/fall visitation levels. In 2008, the region saw few bad storms, which may have led to the dramatic visitation increase from the 2007 number.

The park's visitation varies by season, with about one-third of the visitation in the summer (June, July, and August). There is also

high visitation in October and around the Christmas and New Year's holidays.

In visitor survey conducted in 2009, Bryanne Senor found that most local visitors (61.7%) participated in land-based activities such as walkin, picnicking, or fishing from shore. A minority (38.3%) engaged in water-based activities.

This survey found that the main motivations for visiting the park were based on its convenient location; a third of respondents cited such factors as free entrance and close proximity to where they live. Other purposes local visitors use the park for include fishing, family time and bonding, picnicking, and general relaxing. A third of respondents mentioned the park as a place to snorkel but not dive (Senor 2010).

**TABLE 9: ANNUAL VISITATION 1998–2010**

Annual Visitation		
Year	Total Visits	% Change from Previous Year
2010	467,612	-3.1%
2009	482,631	-1.65%
2008	490,743	-5.16%
2007	517,442	-15.01%
2006	608,836	8.00%
2005	563,728	17.86%
2004	478,304	-2.39%
2003	490,031	-4.55%
2002	513,397	4.92%
2001	489,343	24.47%
2000	393,151	-11.17%
1999	442,585	9.76%
1998	403,239	2.8%

This data has been compiled from the NPS Public Use Statistics Office information at <http://www.nature.nps.gov/stats/park.cfm?parkid=104>

**TABLE 10: MONTHLY VISITATION 2003-2010**

Monthly Visitation								
	2003	2004	2005	2006	2007	2008	2009	2010
January	31,919	46,072	36,890	41,208	44,672	23,086	34,397	17,535
February	36,473	25,368	29,993	34,520	34,284	38,107	31,241	18,381
March	44,155	35,138	35,935	39,131	45,363	41,725	31,964	29,620
April	42,650	40,813	49,550	50,254	45,652	49,551	41,313	46,593
May	53,018	50,978	50,283	50,464	40,736	55,351	55,053	60,484
June	30,740	61,395	61,005	65,065	52,932	48,754	53,902	61,808
July	60,014	68,247	87,592	83,212	62,126	75,299	60,824	59,771
August	56,524	43,648	45,859	47,226	52,222	45,413	50,435	54,211
September	33,197	17,178	26,186	34,903	41,955	31,468	33,115	32,666
October	56,771	40,851	75,962	97,418	31,017	26,439	43,430	43,032
November	21,475	24,255	26,160	31,227	32,998	26,557	24,922	23,102
December	23,095	24,361	38,313	34,208	33,485	28,993	22,035	20,409
<b>TOTAL</b>	<b>490,031</b>	<b>478,304</b>	<b>563,728</b>	<b>608,836</b>	<b>517,442</b>	<b>490,743</b>	<b>482,631</b>	<b>467,612</b>

The official NPS statistics website lists two sets of data for annual/monthly visitation to Biscayne National Park. Current data may be found at <http://www.nature.nps.gov/stats/park.cfm?parkid=104>.

## VISITOR INFORMATION, INTERPRETATION, AND EDUCATION

Visitors can obtain information about the park from a variety of sources, such as the park website, travel guides, area visitor centers, marinas, dive shops, etc. Other sources included newspapers and magazines; marinas; tackle, bait or dive shops; other websites; broadcast programs, visitor's bureau; Chamber of Commerce; and fishing guides.

Many park interpretive programs and classes are held at the visitor center and elsewhere in the park, exposing visitors to a variety of learning opportunities related to park resources, conservation, boating safety, and outdoor skills. To help increase children's awareness of the park, park interpreters go to the local schools and conduct special programs about the park and its natural and cultural resources.

Also, the park has offered an environmental education program to area students since 1976. The program has been held on Elliott Key since 1992 when Hurricane Andrew damaged facilities on Adams Key. The program is held from November through March and is a three-day, two-night field trip for 5th through 8th graders (and occasionally high school groups). The students camp on the island and study park habitats such as the mangrove shoreline, coastal transition forest, hardwood hammock, intertidal zone, and seagrass beds. Ranger-led activities may include shoreline "wet" walks, hammock explorations, night walks, and campfire programs. For indoor activities, the students use what was originally the Elliott Key visitor contact facility. It has been adapted for use by this program and for park operations offices. Approximately 200-250 students participate in the park's camping program each year.

In the 2009 survey, only half of respondents could correctly identify and explain the ecological importance of Biscayne's marine resources, though nearly all valued the natural resources and conditions highly. Thirty-five percent of respondents would state the importance of park resources but could not name any resources within the Park or explain why they thought they were important. Also, 27% of respondents were observed littering, were surrounded by trash, or were disobeying regulations (i.e. fishing off a well-marked restricted area of the jetty) even while they were explaining how they viewed the natural resources to be important (Senor 2010).

## RECREATIONAL ACTIVITIES

Visitors to the park participate in a wide range of recreational activities that are primarily oriented to the marine environment. Activities include powerboating, sailing, canoeing and kayaking, windsurfing, kiteboarding, fishing, nature viewing, swimming, hiking, camping, interpretive programs, nature walks, picnicking, and stargazing. Many people scuba dive and snorkel to see coral, fish, and underwater artifacts. The use of personal watercraft (commonly referred to as jet skis, wave-runners, sea-doo's, etc.) is banned in Biscayne National Park as well as most other national park system areas.

Based on the 2009 local visitor survey, the activity valued the most was wildlife viewing. Local visitors also expressed high importance values for picnicking, fishing, and swimming (Senor 2010). Interestingly, motor-boating ranked 8th out of the 10 activities listed by importance. Many visitors may participate in more than one of these activities.

South Biscayne Bay, with its many small islands and remote lagoon, is very popular for nature viewing, photography, canoeing and kayaking, and experiencing solitude. The more open expanses typical of North Biscayne Bay are used primarily for powerboating, although sailing and nature viewing also occur there. The large shoal complex in the north-east corner of the bay, known as the Safety

Valve, is popular for fishing, powerboating, and sailing. The larger keys, such as Boca Chita, Elliott, and Adams, and their immediate waters, are very popular locations for nature viewing, hiking, camping (both boat and island), picnicking, photography, swimming, fishing, sailing, powerboating, and solitude. The north coral reef is a popular area for snorkeling, diving, boat camping, powerboating, picnicking, swimming, fishing, and photography. The south coral reef is popular primarily as a destination for snorkeling, scuba diving, and fishing.

**Opportunities on the Keys.** At the north end of Boca Chita Key is the island's harbor, a historic ornamental lighthouse, a public campground with picnic tables and grills, a separate picnic pavilion, and a saltwater restroom. Overnight docking is permitted, and many people camp on their boats. Pets are not allowed on the island or on vessels attached to the island. There is no fresh water available. A 0.5-mile trail loops through the island. The lighthouse is open to visitors when park staff are available. Boca Chita Key also has several beaches, the most popular is the one that faces the old pilings on Ragged Key #5.

On the west side of Elliott Key, adjacent to its harbor, is the main visitor use area. This developed area includes a public campground with grills and picnic tables, drinking water, restrooms with cold showers, a ranger station/environmental education facility, and a buoyed-off swim area. Overnight docking is permitted, and many people camp on their boat. Pets are allowed on a leash. A mile-long hiking trail starts on the bay side of the island at the north end of the campground. The trail leads east across the island and then south, where it meets with a handicap-accessible boardwalk. This short, 1,200-foot boardwalk, which was reconstructed after Hurricane Wilma, features six wayside exhibits and leads to the group campsite and campfire circle. The widened hiking trail then continues west across the island to the harbor. Hurricane Irene destroyed the handicap-accessible boardwalk that once connected this trail to the island's eastern shoreline in 1999; it has

been rebuilt at least twice, most recently in 2009. Another about 6-mile trail runs nearly the length of the island. That trail is on the location of Spite Highway, a road that was started but never completed before the park's establishment.

Adams Key is a day use area only. There is a pavilion with picnic tables and barbecue grills close by. There is a short hiking trail north of the open grass area. Bathrooms have saltwater toilets only. No fresh water is available, and overnight docking is not permitted.

Soldier Key, Arsenicker Key, West Arsenicker Key, and Sands Key are closed to the public to protect turtle and bird life. Ragged Key #1 is closed from May through mid-September to protect nesting birds.

**Boating.** The boating community can be divided into two major groups—powerboaters and sailors. They use different kinds of vessels and different portions of the park.

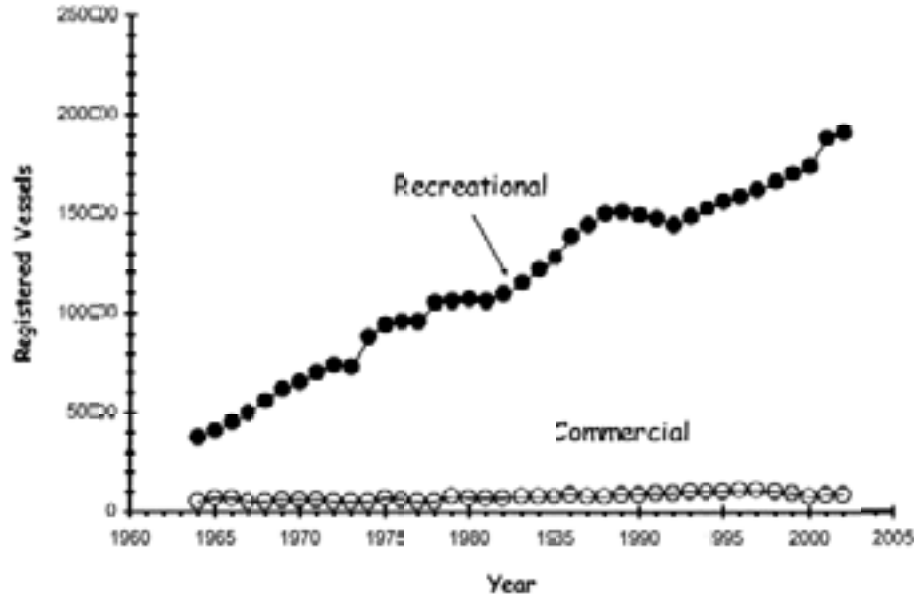
Most powerboat enthusiasts at Biscayne are local residents and come from a wide range of socioeconomic classes. Their boats usually range from 18 feet to 30 feet in length and have relatively large, two-stroke, outboard motors. Powerboaters often simply cruise around inside and outside Biscayne Bay and take in the sights. Other times they have special fishing and diving destinations. Sometimes boaters hike and/or explore the islands. Frequently, boaters visit favorite anchorages and coves such as the “sandbar” (Safety Valve) near Stiltsville, Boca Chita Key, Sands Cut, and Adams Key. At the Safety Valve and Sands Cut, boaters often raft up, sit in lawn chairs in the shallow water, play music, wade around, and socialize. In recent years at Sands Cut, there has been a tremendous increase in visitation and crowding-related incidents such as public intoxication, fights, and drug use. On busy weekends as many as 200–500 boats and thousands of people have been observed there. The sheer number of individuals and boats at the “sandbar” make it extremely difficult to patrol and manage for visitor safety and resource protection.

Boat registration data for the tri-county area of Miami-Dade, Monroe, and Broward shows a consistent upward trend in the number of registered recreational Class 1 and 2 boats (16-foot to 40-foot boats) in the past 10 years. Given the continuing trend in population growth in this region, boat ownership is anticipated to continue to grow. The following figure from the research report “An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park During 2003–2004” shows additional data of recreational boat registrations in the region.

Powerboaters often run aground on various shoals in the park, including Biscayne Channel, the Featherbed Banks, and Cutter Bank. Boaters also run aground on shallow coral reefs. Considerable damage to seagrass meadows and reefs occur when they attempt to power out. Stranded boaters often call a tow boat operator for assistance, who then contacts the park, and together the park staff and tow operator decide on the best approach to remove the boat with minimal damage to the resource. Frequently the park charges the responsible party for the damages and cost to rehabilitate the damaged site. Commercial boats and ships have also run aground in the park. A 1996 reef grounding of the *Igloo Moon* resulted in the courts awarding the park \$1 million in damages to cover the costs of assessing, monitoring, and restoring reef damage.

For visitors who do not have their own powerboat, the park's concessioner offers boating opportunities. At Convoy Point visitors can rent a canoe, paddleboat, or kayak, take a glass-bottom boat tour, or sign up for a snorkel or scuba diving trip. The concessioner also offers transportation to the keys and regularly scheduled guided trips.

Biscayne also offers sailing opportunities. Sailboats range from small dinghies to craft more than 50 feet long. Most sailing in the park is day sailing, even though many of the boats are designed for overnight use. Sailors who were interviewed said they frequently sail in the park and through to offshore waters, but do not use park facilities very often.



**FIGURE 2: THE NUMBER OF RECREATIONAL AND COMMERCIAL REGISTERED VESSELS IN SOUTH FLORIDA (5 COUNTIES: BROWARD, COLLIER, MIAMI-DADE, MONROE, PALM BEACH) FROM 1964 TO 2002**

Taken from "An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park during 2003-2004." (figure 2, page 3)

They mentioned that Biscayne is a good place to sail because of the warm air and water, good wind, and beautiful scenery

The Columbus Day Regatta, initiated in 1954, may be Florida's oldest sailing race and features numerous classes and trophies. Until recently, this event was held in park waters; now it is held just outside the park boundary. It is not a heavily sponsored event, and is geared toward families and casual sailors. This event has become unintentionally associated with a large, raucous, boat party that occurs in the park boundary at the same time. This party has overshadowed the regatta and caused law enforcement and public health and safety concerns for the park. The following photo (figure 3) from the research report "An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park During 2003-2004" shows the powerboats at the Columbus Day Regatta.

There are other, smaller groups of nonmotorized boaters in the park. These are

mostly canoers and kayakers who seek more secluded or shallow, protected waters away from powerboats, such as along the mangrove shoreline and the south bay in and around Jones Lagoon.

Based on surveys and associated boat trailer counts conducted by park staff and others, it was found that small powerboats less than 30 feet in length account for most (50%–80 %) of the vessels in park waters regardless of the day of week or season. Surveyed boats fell primarily into three categories—cruising, anchored, and fishing. Persons on anchored vessels generally engage in picnicking, sunbathing, swimming, and the like. Notable concentrations of these vessels are observed near Elliott Key and at Sands Cut on most weekends and holidays during spring, summer, and fall.

Those vessels engaged in fishing were most prevalent during the week (30%–45%) from

spring through fall. Diving and snorkeling activities are highest in the summer.

The primary purpose of the aerial and boat trailer survey was to check and adjust the formula the park uses to estimate boating use in the park. The research revealed that for every season there is a very reliable linear relationship between the number of boat trailers at the nearby marinas and the number of boats in the park; however the survey also revealed that during special high-use events like the Columbus Day Weekend event or the Florida Sport Lobster Season opening event, this linear relationship does not hold true. For these special occasions researchers recommend that boat estimates be taken directly from aerial surveys. The 2004 aerial survey contains data on the composition and spatial distribution of the park visitor fleet that will assist the park in future studies to evaluate the biological and socioeconomic aspects of visitor use. The following figure from the research report “An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park During 2003-2004” shows the relative frequency of vessel use categories.

**Snorkeling and Diving.** Snorkeling and scuba diving are popular activities in the park, particularly from December through August, with June and July being the most popular times because of warmer waters and underwater clarity. Most scuba divers are South Florida residents. Divers may access the park using a commercial operator or their own vessels. Most diving groups come as part of dive club activities or dive-shop-sponsored trips.

Snorkeling is a popular activity. Snorkelers tend to go to shallow dive spots like One-Mile Reef, One-Half-Mile Reef, and Marker 3. During bad weather, snorkelers and divers alike will move into the protection of the bay. A number of recreational boaters may go

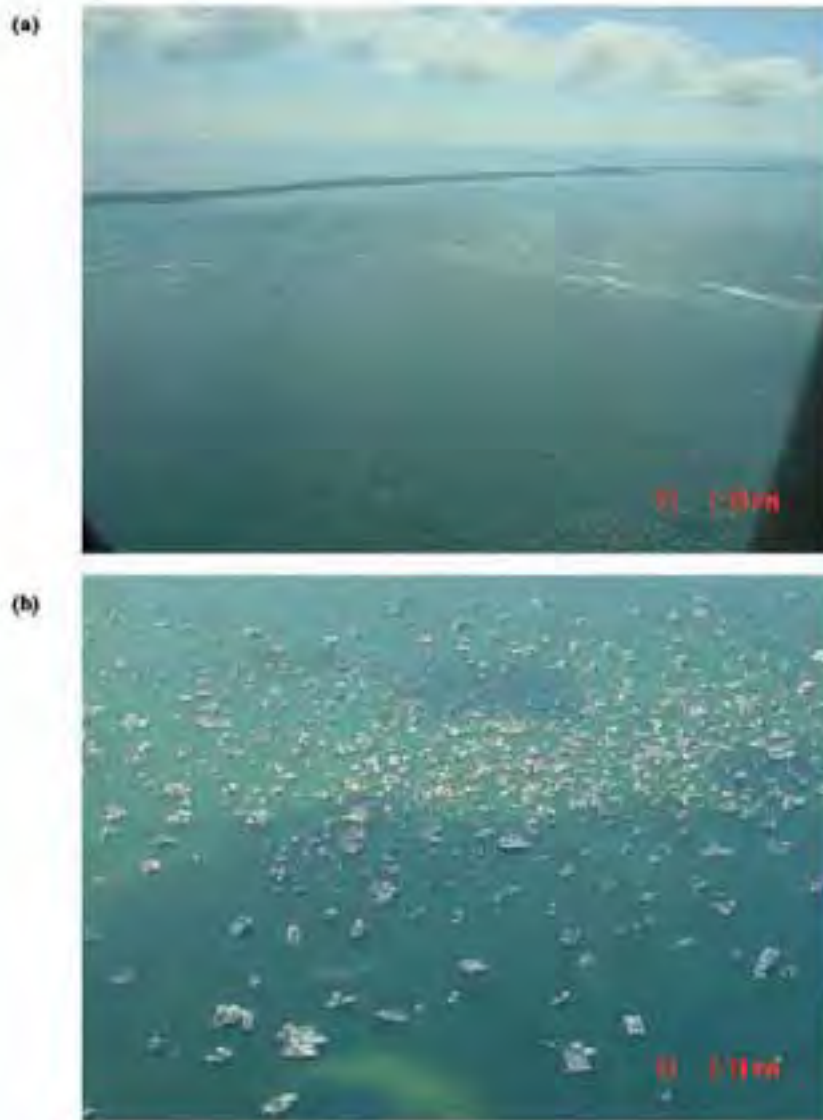
snorkeling as an adjunct to other activities, such as picnicking or socializing.

**Maritime Heritage Trail.** Biscayne National Park’s Maritime Heritage Trail provides opportunities for exploring the remains of some of the park’s many shipwrecks. Six wrecks, spanning nearly a century and a wide variety of sizes and vessel types, have been prepared for public viewing. The six sites include *Arratoon Apcar* (sank 1878), *Erl King* (sank 1891), *Alicia* (sank 1905), *Lugano* (sank 1913), *Mandalay* (sank 1966), and 19th century wooden sailing vessel. These preparations include mapping, the installation of mooring buoys, and the production of waterproof site cards for each of the wrecks.

Access to the wrecks is by boat only, and all but the *Mandalay* are best suited to scuba divers. The *Mandalay* offers an unparalleled opportunity for snorkelers to experience a wreck. Information regarding the wrecks may be found on the park’s website.

**Climate change.** The impacts of climate change on visitor experience may range from altered timing of visitation to restrictions on public access. Longer, hotter summers may shift visitation to the spring and fall seasons, and visitation may decline during the hottest summer months or during months with increased storms. Visitor facilities may need to be upgraded or moved to withstand severe weather and floods. Energy expenditure for temperature control for buildings may increase in the summer and decline in the winter. Pollen-based allergies and outbreaks of mosquito-borne diseases may also increase. Visitation for wildlife viewing and fishing may change if new species from the south shift northward into the park or if extant species move northward or have dramatic declines in population, as might occur with the manatee. Sea level rise and erosion, or the need to protect certain areas, may alter visitor access to certain parts of the park.

Aerial photos taken during Columbus Day Regatta weekend: (a) view looking eastward at concentration of anchored vessels near Elliot Key; (b) closer view of concentration of vessels near Elliot Key. Photo credit: Steven G. Smith

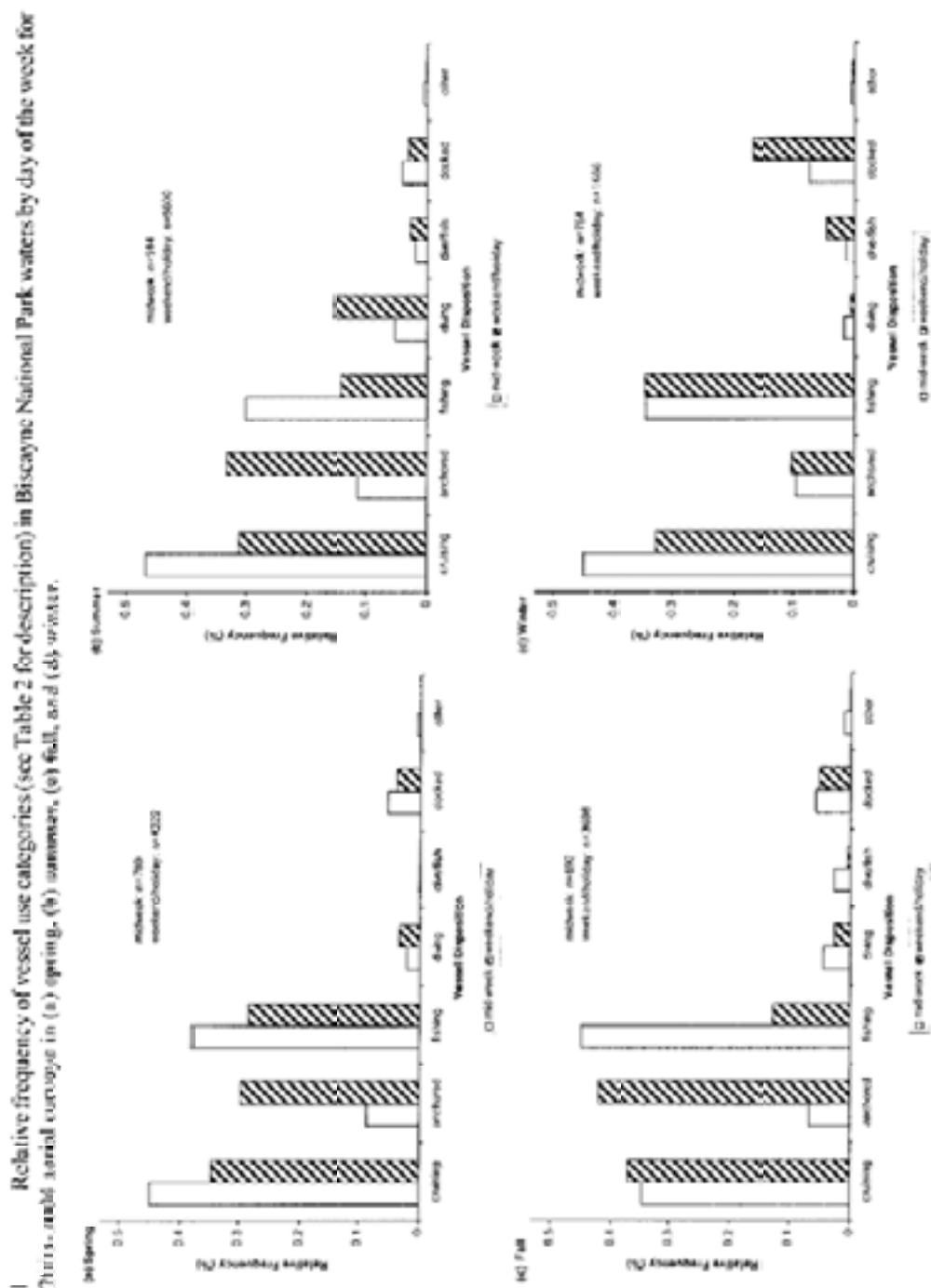


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**FIGURE 3: AERIAL PHOTOS TAKEN DURING COLUMBUS DAY REGATTA WEEKEND: (A) VIEW LOOKING EASTWARD AT CONCENTRATION OF ANCHORED VESSELS NEAR ELLIOTT KEY; (B) CLOSER VIEW OF CONCENTRATION OF VESSELS NEAR ELLIOTT KEY**

Photo credit: Steven G. Smith. Taken from "An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park during 2003-2004." (figure 6, page 14)





**FIGURE 4: RELATIVE FREQUENCY OF VESSEL USE CATEGORIES**

Taken from "An Aerial Survey Method for Estimation of Boater Use in Biscayne National Park during 2003-2004." (figure 5, page 13)

**Recreational Fishing.** Recreational fishing is among the most popular activities at the park. A Florida recreational saltwater fishing license is required. Most recreational fishermen are anglers, although about 20% engage in spearfishing. The popularity of spearfishing has increased substantially from the 8% documented in 1997.

One of the most popular types is known locally as the bonefish fishery. Bonefish are found in shallow water areas in the bay and are highly prized for their size (other shallow water fish are also targeted). Some anglers hire local bonefish guides for half- or full-day trips. The more popular areas are the flats on the east or west sides of the bay, and the east side of Elliott Key. Small boats with outboard motors are used. Once on the fishing grounds, the motor is turned off and the boat is moved by a push pole.

Although fishing occurs everywhere in the marine areas of the park, some fishers report their favorite areas include the northeastern corner and the southern portion of the park. The common catch includes snappers, grunts, and spiny lobster. Up to several dozen offshore fishing boats operate in the park. These are larger (30 to 50 feet), diesel powered boats that may consume 100 to 150 gallons of diesel per day. Many of the offshore boats may only pass through the park or stop in the park to get bait. These boats may go up to 25 miles offshore. Offshore fishing guides usually work full time, and fishing parties usually consist of small groups of people.

**Shipping and Other Through Transit.** The park is used by many people who transit through on the way to other destinations. The Intracoastal Waterway is a major north-south route used by the maritime industry, including tugs and barges destined for the Turkey Point Power Plant just south of Convoy Point. Many boaters and fishermen go through the park to get to more distant offshore locations.

## Visitor Perceptions

The National Park Service conducts periodic servicewide visitor surveys. The feedback visitors provided gives park managers a snapshot in time of how visitors perceived their park experience.

Using survey results from 2000 to 2010, 90% to 100% of the visitors surveyed were satisfied overall with the appropriate facilities, services, and recreational opportunities available at the park. Breaking these statistic down further, the surveys revealed that a high percentage of those who responded rated the following categories of visitor services provided as “good” to “very good”:

- 97% assistance from park staff;
- 94% campground/ picnic areas
- 72% commercial services
- 85% exhibits
- 91% learning about nature, history, and culture
- 90% outdoor recreation
- 95% park map/brochure
- 93% ranger programs;
- 94% restrooms
- 98% visitor center
- 94% walkways, trails, roads

Visitors were asked some questions concerning fishing at Biscayne National Park, including the most important factors that result in a successful fishing experience. The most important factors were the size, number, and type of fish caught. Of slightly less importance were such factors as the number of legal-sized fish that can be taken home, boat ramp conditions, or the number of other anglers encountered.

Visitors were asked what they liked most about their visit and the park received more than 500 comments. The most frequently noted qualities were the park’s natural beauty (137 comments) and peacefulness (56 comments). Other qualities that received a dozen or more comments included clean facilities, the water, fishing, the visitor center, helpful staff, solitude, and weather.

# NPS OPERATIONS

## ADMINISTRATION

Biscayne National Park is administered by a park superintendent and 56 staff who are headquartered in the park at Convoy Point, near Homestead, Florida. Park staff are responsible for managing 172,971 acres of land and water and more than 500,000 visitors annually with a budget of \$4,310,500 (2010 figure).

Management of the park is organized into five divisions—administration, visitor protection, resource management, interpretation, and maintenance. Forty-five full-time staff are allocated among these divisions. Park staff believe that the number of current employees would need to be increased by 25% to stay current with resource protection and facility maintenance and to make adequate contacts with visitors.

Personnel in each division are duty-stationed at Convoy Point; however, some maintenance, interpretation, and visitor protection staff travel from the mainland to the keys daily. Park employees regularly visit Elliott, Boca Chita, Sands, and Adams keys. In addition, two employees live on Elliott Key and two employees live on Adams Key. The other keys in the park, as well as the coral reef platforms and bay shoals, are visited during routine patrols or as research and maintenance needs dictate.

The superintendent of Biscayne National Park is responsible for the overall management of the park, and the assistant superintendent functions as the chief of operations. An administrative staff of five has responsibility for payroll, budget, procurement, contracting, and human resources management.

Biscayne also operates a dive program. The program operates under the Superintendent and currently consists of 23 divers that use the function as a tool for various park duties and

operations. The team will likely increase in numbers under all alternatives.

## Visitor Protection Division

Laws and regulations at Biscayne National Park are enforced under concurrent jurisdiction. This means that other agencies with law enforcement capability in the region are invited to assist national park rangers in enforcing state and federal laws within the park. The park has a memorandum of understanding with the U.S. Coast Guard whereby the Coast Guard provides maintenance of navigational equipment and markers on the Intracoastal Waterway within the park.

The visitor protection staff is responsible for resource protection, managing visitor safety and experience, boating safety, contacting visitors on vessels and on the keys, recreational and commercial fisheries inspections, search and rescue activities, emergency medical services, fire protection, and managing campgrounds on Elliott and Boca Chita keys. Visitor protection staff duties include vessel and safety equipment upkeep and assistance to other law enforcement agencies. The visitor protection staff is composed of eight commissioned law enforcement rangers.

Resource protection duties include responding to hazardous materials spills in the park. In the past, hazardous materials spills have released fuel oils into park waters. The visitor protection staff participate in incident command system scenarios with other land and water management agencies in the region to plan for response to hazardous spills; however, additional training is needed for staff handling these materials.

With boating as the most prevalent visitor activity in the park, the primary focus of the law enforcement staff is resource protection and visitor safety on the water and on the

keys. Because Miami-Dade County has the most registered vessels of any county in Florida, an important aspect of visitor protection responsibilities are boating safety and fisheries inspections. Weekends in the park are crowded, and special events can attract as many as 5,000 boats in Biscayne Bay. For example, Columbus Day Weekend attracts multitudes of vessels, many of which tie together in rafts of up to five boats. Another crowded time in the park occurs in July with the lobster mini-season.

Conducting patrols in the park is another duty that rangers perform. The park receives a variety of visitors, including commercial fishing boats. Rangers contact park users to inform them of park regulations and to check vessels for safety or resource violations such as illegal fishing or removal of resources. Radar is used primarily to ascertain vessel positions and track storms. Radar can help determine the position of boats in the park; however, it is not regularly used as a tool to pursue resource violations.

Patrol operations are directed at specific areas and activities based on day of work, season, weather, and other factors, frequently focusing on specific resource problems such as recreational fishing, boat groundings, or traffic issues. Enforcement of prohibited activities is also a duty of patrol rangers. Sensitive areas are patrolled when other staff observes or receives notice of suspicious activities. Patrols are also conducted on Convoy Point for traffic, noise, and fishing violations. The lack of adequate staff becomes a safety issue when a ranger must patrol and board a vessel alone.

The park needs a reliable radio communications system for patrolling rangers, especially when they might be dealing with drug or smuggling operations or performing search and rescue operations. The park has converted to narrow-band radio frequency radios. Radio transmitters or repeaters are at Convoy Point and on Elliott and Adams keys. In addition the park uses a radio transmitter at Cape Florida (Key Biscayne). Law enforce-

ment rangers use radio dispatch services provided by Everglades National Park.

Potential safety hazards in the park for employees and visitors include contacting and sustaining injuries from marine life such as coral and jelly fish; sunburn; falls off boats and from boat bridges onto boat decks; abrasions from fishing knives and fishhooks; and the potential for drowning.

### **Resource Management Division**

The Resource Management Division conducts inventory, monitoring, restoration, and other investigative studies for managing the cultural resources of the park as well as the coral reef and the estuarine and terrestrial environments that make up the complex natural ecosystem of the park. The Resource Management Division also has an active cultural resource management program and a damage assessment and recovery program (which includes restoration of damaged habitats). This division is charged with preserving and protecting an estuarine system adjacent to one of the northernmost extensions of pristine coral reefs in the United States. The permanent, full-time, resource management staff are routinely supplemented by temporary and term employees, as well as interns and volunteers who assist with resource projects and program support. The Resource Management Division conducts studies and research internally through the efforts of staff biologists, ecologists, and archeologists and/or in conjunction with other cooperators.

The primary focus for the natural resources management program of Biscayne National Park concerns the areas of water quality and quantity, fisheries and wildlife management, integrated pest management, damage assessment and recovery associated with vessel groundings, inventory and monitoring of sensitive terrestrial and marine resources, and cultural resource management. Programs assessing the condition and status of corals, threatened and endangered species, and seagrass communities are used to compile baseline data and measure impacts on these resources, but many issues including the

dynamics of the reef community and current hydrological influences on reef resources are not fully understood.

Responsibility for surveying and documenting cultural resources, including archeological sites, historic structures, ethnographic resources, and museum collections, is also the domain of the Resource Management Division. Cultural resources in Biscayne National Park document more than 2,000 years of history. These resources are rich with the physical remains that portray an international maritime history located at the crossroads of exploration and world maritime trade since the arrival of the first Europeans at the beginning of the 16th century. The primary focus of the cultural resources management program is to minimize degradation to historic structures and archeological sites through field assessment, mapping and monitoring; identify sites eligible for the National Register of Historic Places; and develop strategies for visitor use of historic sites that optimizes visitor experience while minimizing visitor-use impacts.

The Resource Management Division also coordinates the park's participation in the Comprehensive Everglades Restoration Plan. The Resource Management Division tracks projects, participates as members of an interagency steering committee, meets with Everglades National Park program coordinators, and represents Biscayne National Park's vested interests within the overall comprehensive plan.

Resource management is responsible for managing the park's geospatial data and maintaining a geographic information system (GIS) containing cultural and ecological data, as well as a variety of base maps. The evolution of GIS software and associated digital data management is providing ever-increasing opportunities for research and environmental and cultural modeling.

The Resource Management Division also closely coordinates with the local NPS Inventory and Monitoring Network and the South Florida Caribbean Network, which

provides inventory and monitoring on a variety of organisms in the network parks.

The Resource Management Division also reviews and issues permits to conduct research in the park. A number of ongoing research projects are designed to systematically explore and study the natural and cultural resources of the park. To date, one of the primary focuses of the Resource Management Division has been on natural resource data collection, especially in regard to the coral reef and its associated biological communities. Conducting research and obtaining data on the benthic communities in the park, including seagrass and hardbottom communities; as well as inventories of threatened and endangered species, is also of primary concern. Resource management staff also inventory and research cultural resources in the park.

## Interpretation Division

Interpretation and educational outreach play an integral part in accomplishing the park's mission of conserving resources, advocating stewardship, and enabling visitors to experience and appreciate tranquility, scenic vistas, compatible recreation, and the underwater environment. Ten permanent interpreters and typically two to four seasonal staff provide orientation and interpret the natural and cultural aspects of the park for visitors. The interpretive staff conduct outreach programs for the local communities, provide curriculum-based educational programs for school groups, and organize special events that focus on an understanding and appreciation of park resources and that promote and foster stewardship of the unique interrelationship between the marine and the terrestrial environments. The range of interpretive programs include glass-bottom boat tours to the coral reefs coordinated with the park concessioner, guided walks on the keys, snorkel orientations at Convoy Point, special topic talks, and slide shows. Working with local schools, primarily 4th through 8th grade students, a full-time park interpreter coordinates an active environmental education program that provides an on-site three-day/two-

night environmental learning experience on Elliott Key. This program uses the Elliott Key visitor contact station for indoor environmental education activities in inclement weather.

The interpretive staff also coordinates special events, both onsite-and offsite.

Exhibits at the Dante Fascell Visitor Center include natural and cultural history displays, illustrations, and text to orient and educate park visitors. Numerous short audiovisual programs are shown in the visitor center to orient visitors to the park and its resources. The visitor center also houses the Everglades Association's bookstore and a small concession retail store where visitors can make reservations for boat tours; rent a variety of water sports equipment; and purchase prepackaged food, souvenirs, and convenience items. The visitor center and concession operation hours are 9:00 a.m. to 5:00 p.m. daily (and open from 12 noon to 5pm on Christmas Day).

Every year, about 550 volunteers support the interpretive function at Biscayne National Park. The bulk of this volunteer effort is associated with annual, large-scale events such as "Baynanza," which is a park-sponsored bay cleanup and recycling effort. A smaller number of scheduled volunteers directly support the interpretive operation by providing information at the Dante Fascell Visitor Center.

### **Maintenance Division**

The Maintenance Division is responsible for the operation and maintenance of all park facilities and equipment, including utilities (water storage, wastewater, electrical generating systems, and solid waste systems), buildings, grounds, roads, trails, campgrounds, comfort stations, employee housing, docks, boats, and other historically significant structures.

Fifteen full-time employees and up to four temporary employees maintain and manage the physical assets of the park. Besides the

facility manager and two facility specialists (one being an regional network position), the maintenance staff includes mainland supervisor, island supervisor, two marine mechanics, two maintenance mechanics, a utility systems mechanic, a small craft operator, two deck hands, a maintenance worker and an equipment operator. Maintenance staff is duty-stationed at Convoy Point, but some maintenance personnel visit the keys and other locations in the park daily in the performance of their duties.

## **FACILITIES**

### **Water Systems**

Convoy Point on the mainland coast is served by the city of Homestead municipal water supply. Potable water for visitors is available only at Convoy Point. Visitors are required to bring enough water to meet their needs when visiting areas of the park other than Convoy Point. The water available on Boca Chita is not potable.

Biscayne National Park operates potable water systems on Elliott and Adams keys, primarily for resident park staff and administrative use; there is also potable water for visitors at the restroom building. Four structures are associated with these water systems. The fresh water system on Elliott Key is a 1,100-foot well with brackish water made potable with a reserve osmosis system. The potable water source on Adams Key is a rainwater catchment system with two cisterns and two 16,000-gallon water storage tanks. Associated with the water systems on Elliott and Adams keys are two water treatment plants and 5,382 feet of water lines.

Florida regulations require water quality monitoring of potable water systems. To meet this and federal Environmental Protection Agency requirements, the park conducts bacteriological testing twice each month for drinking water. Chlorine residual tests are logged daily at all systems. Storage tanks as well as water taps are tested according to a water-testing plan on file at the park. The

water systems on Elliott and Adams keys are tested daily.

## Utilities

Electrical power for housing and administrative needs at Convoy Point is supplied by an investor-owned public utility, Florida Power and Light Company. The park operates three in-park electrical systems on the keys. A small-scale solar system supplies power at Boca Chita Key. Elliott Key is served by two 60-kilowatt diesel generators (but may change to primarily solar power by 2012), and Adams Key electrical needs are provided by 15 kilowatt photovoltaic system with a 45 kilowatt diesel generator for charging batteries when the sun is not keeping the batteries charged or a total system failure. The bulk of the electric demand is lights, refrigeration, and air-conditioning for the employee housing. Since June 2010, less than 10% of power demand on Adams Key is supplied by diesel generators.

## Septic Systems and Solid Waste

The park operates four septic systems. The most complicated septic system is at Convoy Point where a septic/leach field system with one lift station serves the Dante Fascell Visitor Center and the maintenance and administrative buildings. At Boca Chita Key, a septic/leach system is in place. Elliott and Adams keys are each served by septic/sand filtration systems.

All of the septic systems currently in operation at the park meet current state codes and regulations. The park has made an agreement with its neighboring Homestead Bayfront County Park and Marina. This park is owned and operated by Miami-Dade County. With this agreement, Biscayne National Park's effluent will be pumped through a forced main from Convoy Point's sewage system and treated in the county park's newly constructed sewage treatment plant. The park is also seeking U.S. Public Health Service recommendations on the appropriateness of leachfield septic systems in the sensitive limestone environment of the keys that have significant water quality issues. There is no direct

discharge of wastewater from any of the park systems.

Altogether there are 2,775 feet of sewer lines on Boca Chita, Elliott, and Adams keys. Elliott Key has a water treatment plant attached to a covered storage area, and Adams Key has a water treatment plant associated with the cistern, generator building, and toilet facilities. The park does not operate a solid waste landfill. There are no public trash collection facilities on the keys, and island visitors are asked to take their trash with them. Residential trash from the keys is collected by the maintenance staff. Solid waste is transported to Miami-Dade County landfills. Vegetative debris is burned, but the park is exploring the purchase of a chipper as an alternative. The park recycles public and administrative cardboard, aluminum, glass, plastic, batteries, metals, waste oil, and office paper.

## Fuel Storage

The park has six fuel storage tanks. Convoy Point has a 6,000 gallon gas and a 4,000 gallon diesel underground storage tanks; Elliott Key has two 2,000 gallon aboveground diesel storage tanks; and Adams Key has two 1,000 gallon aboveground diesel storage tanks. Adams Key is 90% solar-powered as of June 2010. The largest fossil fuel use in the park is the operation of the diesel generators on the keys. Park boats are also major consumers of petroleum-based fuels. There is one diesel engine vessel in use at the park; however, gasoline is used to propel most park boats. Gasoline is also used for lawn mowers, all-terrain vehicles, and utility carts. The park uses a diesel-powered tractor for mowing, lifting, and digging. Motorized equipment is used and located at Convoy Point and on Boca Chita, Elliott, and Adams keys. The park is making a considerable effort to be free of petroleum-based fuels for electrical generation and exterior lighting. Biscayne is switching over to solar-powered energy sources (with diesel backup) whenever possible. The park has looked into synthetic lubricants and will use them in the manufacturer-recommended manners, and when their use does not void the equipment

manufacturers' warranty. The park is also planning to replace gasoline utility carts with electric models.

### **Buildings and Structures**

There are 24 park-owned and managed buildings in Biscayne National Park. Six administrative/public use buildings are on the mainland at Convoy Point—the Dante Fascell Visitor Center, the park administration building, the park maintenance building, a duplex housing unit, a hazardous materials storage building, and a fuel pump building. Six of the remaining 18 park buildings are on Boca Chita Key, seven are on Elliott Key, and six are on Adams Key. One campground is on Boca Chita Key, and one is on Elliott Key. Picnic facilities are available at Convoy Point and on Adams Key. There are five park residences—one duplex at Convoy Point and four single-family residences on the keys.

**Convoy Point Buildings and Structures.** The 11,400-square-foot, two-story, Dante Fascell Visitor Center at Convoy Point was constructed in 1993. The 6,240-square-foot second floor provides exhibit and visitor orientation space, a sales area for the park association bookstore, a concessioner office and store, and offices for park interpretive staff. A portion of the 5,160-square-foot lower level has been enclosed and includes restrooms, educational learning space, and several small lockable storage areas. Visitors can obtain park information, purchase materials in the bookstore, and see interpretive exhibits and a video describing the park's history and natural resources. There are picnic facilities at Convoy Point.

The 7,900-square-foot park headquarters building is adjacent and connected to the Dante Fascell Visitor Center by a pedestrian causeway bridge. The two-story headquarters building was completed in 1993 and has 6,400 square feet of enclosed office and meeting room space on the second floor and 1,500 square-feet of enclosed space on the first floor.

A 4,600-square-foot maintenance shop at Convoy Point was completed in 1993.

**Convoy Point Housing** — A stilt-structure duplex housing unit is near the maintenance shop on Convoy Point. The unit has 4,600 square feet of living space on the second floor. One side of the duplex is assigned to a permanent law enforcement ranger, and the other side accommodates seasonal employees or volunteers. The unit was constructed in 1997.

**Convoy Point Marinas / Docks** — There is one boat marina with two docks directly in front of the Dante Fascell Visitor Center. One dock has eight boat slips; the other stationary dock is used by the park concessioner. The stationary dock has no slips so four to six vessels could be accommodated there at one time depending on the size of the boats. However, three vessels typically use this stationary dock. The Convoy Point marina is used mainly by park staff for administrative purposes, although the boat docks are also used by park cooperators conducting scientific research in the park. Visitors have access to two boat slips at Convoy Point, which are available from 8:00 a.m. to 5:30 p.m. Public use of the Convoy Point docks is infrequent because most visitors access the area by car. The level of accommodation for visitor boats appears to be adequate because Convoy Point is adjacent to a large county marina, Homestead Bayfront Park, which accommodates hundreds of vessels.

**Keys Buildings and Structures.** Five of the six park buildings on Boca Chita are contributing features of the Boca Chita Key Historic District. These buildings are the lighthouse, chapel, picnic pavilion, garage or barn, engine house, and cistern. The sixth building at Boca Chita is a public comfort station. Other structures on Boca Chita that are contributing features of the Boca Chita Key Historic District include a simple arched concrete bridge spanning a dry canal, remnants of a limestone wall that originally enclosed the primary structures in the Boca Chita complex, dry-laid retaining walls, a



cannon resting in a stone base, and a concrete walkway.

Buildings on Elliott Key include the two-story 1,366-square-foot environmental education center, the east and west housing units, comfort station/generator building, water treatment plant with attached storage area, and a maintenance building. Constructed between 1978 and 1980, the environmental education center on Elliott Key is used for a few months of the year.

On Adams Key are two employee residences, the pavilion (a square structure originally designed as an environmental camp but currently used as a shade structure and storm shelter), a water treatment plant and cistern, a generator building, and a comfort station.

**Keys Housing**—Housing units on Elliott and Adams Keys are single-family units designed and built by the National Park Service. There are two houses on Elliott Key and two houses on Adams Key. The residences on Elliott Key are concrete stilt construction. Built in 1981, each house has two bedrooms and one bath. A concrete stilt construction residence on Adams Key was constructed in 1997 to replace a wooden house destroyed by Hurricane Andrew in 1992. The other residence on Adams Key is a wooden stilt construction residence that was built in about 1984. Housing on the keys is required occupancy for visitor protection staff.

**Keys Marinas / Docks**—There are public docks and mooring facilities at Boca Chita, Elliott, and Adams keys. Visitors mooring a boat at Boca Chita and at Elliott keys pay a per-night fee. Docking facilities at Adams Key are for day use only, and there is no mooring fee.

There are no docks at Boca Chita Key, but a dredged boat basin or harbor on the north end of Boca Chita has cleats for securing boats on the sea wall. The kidney-shaped harbor is lined with a concrete bulkhead. A concrete slab walkway surrounds the harbor and extends south to the engine house. Harbor capacity at Boca Chita is determined by vessel

length. The boat harbor at Boca Chita is available for public use 24 hours per day.

Elliott Key Marina has two stationary docks. The public dock at Elliott Key marina has 66 boat slips for public use available 24 hours per day. A dock south of the marina is only for NPS vessels.

One T-shaped dock at Adams Key can handle 10 vessels. The Adams Key dock has four reserved spaces for NPS vessels and for vessels belonging to park personnel housed on Adams Key. Public use of the Adams Key dock is day use only. Visiting boats are moored on the outside of the dock. The park follows the marine tradition of granting safe harbor—granting free and open access to the protected areas at the keys during storms or emergencies.

## Campgrounds

There are two campgrounds in Biscayne National Park—one on Elliott Key and one on Boca Chita Key. Individual campsites are not formally designated; however, campsites are generally defined by the presence of a picnic table, and most campsites have fire grills. The Elliott Key campground offers about 20 campsites, and the Boca Chita campground has 25 campsites. Camping fees are per night. Up to two tents and six people are allowed at each campsite. The camping fee includes overnight mooring for private vessels. Visitors must bring in all supplies, including fuel, water, ice, food, and convenience items, and carry out all trash and garbage when they leave. Campgrounds are available on a first-come, first-served basis, and there are no camping overflow facilities. There is also no campground reservation system for individual sites; there is a reservation system for group sites. During peak periods, such as spring and autumn weekends, the campgrounds are often crowded.

## MARINE OPERATIONS

### Vessels

Biscayne National Park operates and maintains 20 vessels. Eight of these vessels are law enforcement vessels assigned to individual rangers (although any ranger staff can use any boat and may ride on any boat). Boat maintenance for law enforcement craft is done on a regular schedule by the rangers and by the park's marine mechanic.

Four vessels are used by the maintenance staff, four are used by resource management staff to conduct research and monitor resource conditions in the park, and the Interpretation Division uses two. Although funding is limited for boat upkeep and related navigational and safety gear, maintenance on these vessels is performed by the park's marine mechanic. The park is developing a cyclic maintenance program to improve the efficiency of vessel repair and maintenance.

### Anchorage and Buoys

Anchoring is permitted throughout most of the park, and overnight anchoring is allowed. Overnight anchoring occurs primarily within the sheltered waters of Biscayne Bay. Anchors are dropped on the seagrass bottom.

On the north and south sides of the park, the park boundary is marked with nine buoys. Some of these boundary buoys are illuminated at night. On the north an illuminated "N" buoy marks the park boundary and lighted "A" "B" and "C" markers show the boundary corners. The southern boundary is further identified with I-beam markers, which are not lighted. There is a whistle buoy at the park's southeast corner. Lighted towers and regulatory day markers mark the closed area of Legare Anchorage on the Florida Reef. Annual maintenance on park buoys is performed. Navigation aids on the Intracoastal Waterway are positioned and maintained by the U.S. Coast Guard.

## Navigation Channels / Public Marinas

Miami-Dade County has more registered boats than any other county in Florida. In 1990, 47,082 recreational vessels were registered in the county, and by 1997 the number had increased to 50,213 (Department of Highway Safety and Motor Vehicles Bureau of Vessel Titles and Registrations, Miami-Dade County). Boat owners and operators from the greater Miami metropolitan area use the waters surrounding Miami and are often within the park boundaries. Boat traffic enters the park on the Intracoastal Waterway or on waterways or channels marked on National Oceanic and Atmospheric Administration (NOAA) charts 11463, 11449, and 11445. Other than the Intracoastal Waterway, the waterways in the park are not congressionally authorized navigation channels and are not surveyed for channel depth information by the Army Corps of Engineers (Atlantic Intracoastal Waterway, Florida Inland Navigation District, 2002). Seven channels pass either through the park, penetrate the park from the mainland coast, or obliquely approach the park boundary from the mainland coast. Hawk Channel is a natural channel on the seaward side of the keys. Ocean yachts and other watercraft ply the waters of Hawk Channel pursuing north-south routes between ports on the U.S. Atlantic seaboard and ports in the Caribbean, Mexico, and South America.

Several natural channels lead from Hawk Channel in the Florida Straits to Biscayne Bay on the west side of the keys. In Biscayne National Park these east-west channels are Biscayne Channel, Caesar Creek, and Broad Creek. Biscayne Channel cuts through the northern shoals in the park known as the Safety Valve. Close to the Port of Miami and Miami-Dade County marinas, Biscayne Channel is a popular route from the more protected waters of Biscayne Bay to Hawk Channel and the Florida Straits. National Oceanic and Atmospheric Administration (NOAA) charts indicate the approximate controlling depth of Biscayne Channel is 7 feet. Biscayne Channel is marked with lighted buoys at both west and east approaches, and

with starboard and port day markers along its length.

Caesar Creek, at the southern end of Elliott and Adams keys, is used by boats traveling between Biscayne Bay and Hawk Channel as well as to the Florida reef platform. NOAA charts describe an approximate 4-foot controlling depth of Caesar Creek Channel. A lighted buoy marks the eastern approach to Caesar Creek, and the length of Caesar Creek Channel is posted with starboard and port day markers. At the extreme southern boundary of the park, Broad Creek south of Swan Key is a very shallow passage with an approximate controlling depth of only 2 feet.

Bisecting Biscayne Bay from north to south, the Intracoastal Waterway (ICW) is a segment of the Atlantic Intracoastal Waterway that extends from New England to Key West. The Intracoastal Waterway is maintained by the U.S. Army Corps of Engineers working in concert with the Florida Inland Navigation District. The Florida Inland Navigation District was created by the Florida legislature in 1927 in response to the River and Harbor Act approved by Congress in 1920. The Florida Inland Navigation District enables a partnership between the United States government and the state of Florida, whereby the United States agrees to construct and maintain the Intracoastal Waterway and the Navigation District agrees to furnish the necessary rights-of-way and spoil deposit areas (Atlantic Intracoastal Waterway, Florida Inland Navigation District, 2002). The Florida Inland Navigation District consists of the 11 counties along the east coast of Florida from Duval to Miami-Dade. The route of the Intracoastal Waterway from Miami south through the park is protected by the keys from high winds and rough waters, other than during severe storms (with the exception of an exposed reach of open water 11 miles in length in Biscayne Bay between Cape Florida and the Ragged Keys). Because of frequent shoaling along its length, repeated dredging is needed to provide the minimum channel for the Intracoastal Waterway. Where the waterway passes through the park, it is dredged to a controlling depth of 7 feet and is

about 75 feet wide. The waterway is marked with lights where it enters the park at the north and western park boundaries. There are also lights and day markers on the waterway where the channel crosses the Featherbed Bank. Lights also mark spoil areas.

Miami-Dade County operates and maintains two public marinas with navigational easements through the park from Black Point and Homestead Bayfront marinas. Both navigational channels are 31,000 feet long and 150 feet wide and extend through Biscayne National Park from their respective marina parks on the mainland coast to or towards the Intracoastal Waterway. These channels are dredged to a depth of 4.5 feet. Both the Black Point Marina and the Homestead Bayfront Marina easements were granted by the state to Miami-Dade County in 1970, and both easements are preserved through a 1974 memorandum of agreement between the county and the National Park Service, and through a 1979 deed transferring submerged lands to the U.S. government from the state. Both Black Point Marina and Homestead Bayfront Marina channels are marked with lights at the entrance and are posted with starboard and port day markers.

Homestead Bayfront Marina, managed by the Miami-Dade County Department of Parks and Recreation, is at Convoy Point on the south side of park headquarters and about 1 mile north of the Turkey Point Channel. The marina is 6 miles southwest of ICW channel markers 5 and 6 in the area known as the Featherbeds. Homestead Bayfront Marina can accommodate vessels up to 50 feet in length. Black Point Park Marina is about 4.5 miles from the Featherbeds to the south of Cutler Point. Black Point Marina, managed by the Miami-Dade County Department of Parks and Recreation, can accommodate vessels up to 55 feet in length. North of the park Matheson Hammock Marina is about 3 miles west of the Intracoastal Waterway and almost due west from the tip of Key Biscayne (Miami-Dade County 2002).

Two channels in and near the park boundary are owned and maintained by Florida Power

and Light—Cutler Point and Turkey Point channels. Cutler Point Channel provides a navigable waterway through the relatively shallow waters and shoreline shoals of northern Biscayne Bay to the Cutler Point Power Plant. The Cutler Point Channel passes from the mainland southeast past Chicken Key towards the Intracoastal Waterway. Although outside the park boundary, the alignment of Cutler Point Channel angles towards the park boundary.

In 1973 Florida Power and Light began operation of the nuclear power plant at Turkey Point just south of Convoy Point on Biscayne Bay. To service this facility, Florida Power and Light developed a navigation channel from the Turkey Point plant through park waters towards the Intracoastal Waterway. The Turkey Point Channel is maintained by Florida Power and Light to a depth of 7.5 feet and is marked with a light at the entrance and starboard and port buoys (Florida Power and Light Company 2002).

# SOCIOECONOMIC ENVIRONMENT

## INTRODUCTION

This section examines the social and economic characteristics pertaining to Biscayne National Park. Given the nature of the activities, both recreational and commercial, occurring in the park and bay, it was determined that the most direct economic and social ramifications resulting from these activities is felt within the Miami-Dade County economy. Therefore, for the purpose of this analysis, the socioeconomic study area is defined as Miami-Dade County.

## DEMOGRAPHICS

Historically, the natural environment in South Florida was not conducive to intensive human habitation. Significant population growth did not occur until the early part of the 20th century. Extensive dredging and filling in the Miami Beach area circa 1920 began a decade of explosive growth in the Miami area (Miami-Dade County 2010). The period immediately after World War II signified another period of rapid expansion as construction materials again became available (Miami-Dade County 2010). Since then, both Miami-Dade County and the state of Florida have consistently experienced high rates of population growth.

During the latter half of the 20th century, the county's population expanded because of high levels of immigration. From the 1960s onward, Cuban refugees began to arrive in significant numbers. In the 1990s, many Haitians immigrated to Miami-Dade County. Immigration from Latin America and the Caribbean has led to population growth. During this time, much of the population growth in the county and the state was attributable to immigration (Miami-Dade County 2010).

The percentage of foreign-born residents was 50 in 2006-2008 (U.S. Census Bureau 2008a). Among people at least five years old, 71% spoke a language other than English at home. Of this percentage, 88% spoke Spanish (US Census Bureau 2008a).

The resident population of Miami-Dade County grew by 88.8% between 1950 and 1960, marginally higher than the state growth rate of 78.6% over the same period (U.S. Bureau of the Census 2000). As shown in table 11, during the following decades the rate of growth within the county roughly mirrored that of the state, ranging between 16% and 35%. Between 1960 and 2000 the population of Miami-Dade County increased by 140% from 935,000 to 2.25 million persons.

**TABLE 11: POPULATION OF MIAMI-DADE COUNTY AND FLORIDA 1960-2000**

	<b>Miami-Dade County</b>	<b>Change from previous decade</b>	<b>Florida</b>	<b>Change from previous decade</b>
1960	935,047	88.8%	4,951,560	78.6%
1970	1,267,792	35.5%	6,789,443	37.2%
1980	1,625,781	28.1%	9,746,324	43.5%
1990	1,937,094	19.1%	12,937,926	32.7%
2000	2,253,362	16.3%	15,982,378	23.5%
<b>Projected</b>				
2010	2,551,000	13.2%	18,866,000	18.0%
2020	2,958,000	15.9%	19,634,000	4.1%

Source: U.S. Census Bureau 1960-2000.

**TABLE 12: ESTIMATED POPULATION OF MIAMI-DADE COUNTY AND FLORIDA 2000-2009**

	Miami-Dade County	Percent change from previous year	Florida	Percent change from previous year
2000	2,258,765		16,047,118	
2001	2,294,643	1.59%	16,353,869	1.91%
2002	2,328,122	1.46%	16,680,309	2.00%
2003	2,352,658	1.05%	16,981,183	1.80%
2004	2,381,215	1.21%	17,375,259	2.32%
2005	2,413,583	1.36%	17,783,868	2.35%
2006	2,438,702	1.04%	18,088,505	1.71%
2007	2,453,567	0.61%	18,277,888	1.05%
2008	2,478,745	1.03%	18,423,878	0.80%
2009	2,500,625	0.88%	18,537,969	0.62%
Average percent change		1.14%		1.62%

Source: U.S. Census Bureau, American Community Survey Population Estimates

As of 2009, Miami-Dade County, with an estimated population of 2.5 million, was the most populous county in Florida and constituted 13.2% of the population of the state (Florida Legislature 2010b). Between 2000 and 2009, the county's population increased 10.7%, while Florida's population increased 15.5% to a total of 18.5 million persons. In 2000 the number of persons per square mile in the county was 1,158, while the statewide average was 296 per square mile (US Census Bureau 2008b).

The projected population trend for Miami-Dade County is significant. By 2015, it is projected that the county's population will be 2.7 million persons. It is projected that population will increase to 2.8 million by 2020 and 3.2 million by 2030 (Miami-Dade County 2009). By 2010 it is estimated that Florida's population will have increased about 17.5% from 2000 (Florida Legislature 2010a).

### LOCAL ECONOMIC BASE

The leading industries for Miami-Dade County for 2006-2008 were educational services, health care, and social assistance at 19%; and professional, scientific, and

management, and administrative and waste management services at 12%, for those employed over the age of 16, out of a civilian employed population of 1,109,780 (US Census Bureau 2008a).

About 80% of those employed in Miami-Dade County work for private companies. The most common occupations for Miami-Dade County are: management, professional and related occupations at 30%; sales and office occupations at 29%; service occupations at 19%; construction, extraction, maintenance, and repair at 11%; and production, transportation, and material moving occupations at 10% (US Census Bureau 2008a).

In 2004, Biscayne Bay activities contributed nearly \$12.7 billion in output, \$6.3 billion in income, 137,600 jobs, and \$627 million in tax revenue to Miami-Dade County. These figures represent 158% of total output; 10% of all income; 11% employment; and 11% of taxes, licenses, fees, and similar revenues for the entire county (Hazen and Sawyer 2005).

As shown in table 13, major employers include administration, support, and other services; retail and wholesale trade; health care; lodging and food services; and manufacturing.

Employment in manufacturing and goods-producing industries has historically provided significantly higher wages than those in service-oriented enterprises. The region has experienced rapid growth in the service sector and stagnation or overall decline in the manufacturing sector. While total employment has increased, per capita income has stalled. A coordinated regional economic development plan is necessary to ensure focus and balance in South Florida's growth (Governor's Commission for a Sustainable South Florida 1995).

**TABLE 13: HIGHEST MIAMI-DADE COUNTY EMPLOYMENT SECTORS — 2002**

Industry	Employment
Administration, support, and other services	127,865
Retail Trade	110,975
Health Care and social assistance	110,539
Accommodation and food services	81,610
Wholesale trade	68,987
Manufacturing	50,316

Source: U.S. Census Bureau, 2002 Economic Census

## Income

In 2008 Miami-Dade County had a per capita personal income of \$35,887, 8.85% below the Florida per capita personal income of \$39,064 (Florida Office of Economic and Demographic Research 2010).

The median household income in Miami-Dade County was \$44,364 compared to Florida at \$48,637, and the nation at \$52,175 for 2006-2008, a difference of 17% for Miami-Dade County and the nation (US Census Bureau 2008a).

## Commercial Fishing

Commercial fishing has a long history in the bay and has been permitted in the park since

its inception as a national monument in 1968. The commercial fishing industry in the bay is relatively small scale. The larger commercial fishing vessels are primarily at Black Point Marina, but fishing vessels are also at various other marinas around the bay. The smaller commercial operations in the bay consist of mainly trailered vessels that gain access from other points in or near the park, including Matheson Hammock and Homestead Bay-front marinas. Commercial fishing continues to be an important local maritime activity for some area residents, but it is declining overall.

Biscayne Bay contributes substantially to the commercial fishing industry. Fish and shellfish, particularly pink shrimp, are harvested in the bay. Biscayne and Florida bays are important to the lifecycle of commercially harvested fish species, including ballyhoo, barracuda, several grouper species, snapper, several jack species, several shrimp species, and spiny lobster (Hazen and Sawyer 2005).

The value of bay-dependent commercially harvested species has declined from a 1993 peak of \$8.5 million to the most \$1.9 million in 2002. This value is reflective of volume harvested, not a per unit value (Hazen and Sawyer 2005).

The primary species sought within the park by commercial fishers include finfish (snapper grouper complex, mullet) and invertebrates (stone crab, blue crab, spiny lobster, and bait shrimp). Economically, the most important commercial fishery within the bay is the bait shrimp fishery (NPS 2008).

Spiny lobsters can be trapped from August through March with a permit from the Florida Department of Natural Resources. Without a permit, lobsters must be harvested by hand or with nets. However, no lobster fishing is allowed in the Biscayne Bay-Card Sound Spiny Lobster Sanctuary. This sanctuary is extensive, covering all park waters west of the eastern edge of the park's keys.

Another aspect of commercial fishing within the bay is guided sportfishing, primarily for bonefish. In smaller boats, hired guides take

one or two customers, mainly to the flats on the east or west sides of the bay. The number of guides actively working in the park is estimated at about 12 full-time guides and 36 part-time guides using the area, based on interview data. Full-day rates vary depending on the level of experience of the guide (EDAW 2003). Commercial use authorizations are issued for cruises in the north part of the park.

### **Commercial Boating**

Commercial boating, including waterborne commerce and cruise ship services at the Port of Miami, generated \$8.2 billion in output, \$3.9 billion income, 74,000 jobs, and \$331 million in tax revenues and represents 6.2% of Miami-Dade County's economy during the period 1980 to 2004 (Hazen and Sawyer 2005).

Information pertaining specifically to the revenues associated with commercial boating is limited. Instead, most recent economic analyses focus on the wider economic activities of the marine recreation industry such as sportfishing and scuba diving, within which commercial boating is only one element of the associated overall expenditure. However, a study completed by Johns et al. (2001) detailed the economic value of the activities related to reef visitation in Miami-Dade County by examining the individual components of recreational expenditure. The study concluded that, on average, visitor boaters spent \$75 per person per day on charter boats and \$30 per person per day on party boats while visiting the county's reefs to dive, fish, etc. The report concluded that over a 12-month period during 2000-2001, contributions to the county economy of \$40.8 million and \$343,000 were directly attributable to expenditures for charter/party boat fees and glass-bottom boat operators, respectively.

The study concluded that the total visitor expenditures per person per day while participating in reef-related recreational activities in the county amounted to \$224 (charter boat) and \$194 (party boat) for fishing, and \$125 (charter or party boat) for

scuba diving. The report concluded that visitors who used the reefs in Miami-Dade County had a total expenditure of \$572 million during that same 12-month period.

Another commercial boating use in the bay is represented by towboat companies, several of whom operate in the park. In addition, the Intracoastal Waterway, a commercial shipping channel, traverses the bay and the park.

The commercial boating component of the county's marine industry is considered a relatively minor, though important element given the amount of additional revenue that is consequently generated by the anglers and divers chartering the vessels.

### **Economic Importance of Tourism**

For more than a century, the tourism/visitor industry has been a large employer in Miami-Dade County.

The revenue, employment, and tax aspects of the visitor/tourist industry in Miami-Dade County are very important.

It is estimated that 11.9 million visitors spent at least one night in the Miami area and that overnight visitors spent nearly \$16.6 billion in direct expenditures in 2009. International visitors numbered more than 5.7 million, while domestic visitors reached more than 6.2 million in 2009. There has been a growth of visitors from South America, accounting for 68% of total Latin American visitors (GMCVB 2010). Overall, visitation to the Miami area was down 1.6% in 2009 compared to 2008.

Direct visitor spending decreased in 2009, because of fewer people in travel parties, shorter trip duration, and most likely tighter travel budgets. Spending in entertainment and lodging decreased in 2009 from 2008, suggesting visitors economized spending in the area (GMCVB 2010a). Overall, the average per visitor daily expenditure was \$242.76.

In 2004, recreation activities generated \$3.8 billion in output, \$2.1 billion in income, 57,100



in jobs, and \$257 million in tax revenues in Miami-Dade County (GMCVB 2008).

### **The Economic Contributions of Biscayne National Park**

There are several ways in which the recreational/visitation uses of Biscayne National Park contribute to the economy of the county—park-related employment and expenditure, commercial activities occurring in the park, and recreational visitation (land and water based).

During 2008 the park had 48 full-time employees earning about \$3.15 million in wages. These are positive attributes but of relatively minimal importance to the regional economy (NPS 2009a).

Land-based recreational visitation in the park occurs mostly via the visitor center at Convoy Point near Homestead, Florida. Two other facilities, Homestead Bayfront Park and Marina and Black Point Marina, are commonly used to gain access to the park. Both are county facilities and have fee-based entrance systems, mooring fees, and limited visitor service facilities. Expenditures by anglers, boaters, and divers entering the park from these and other facilities are discussed below in conjunction with total water-based recreational activities.

There is only minimal expenditure-orientated economic value associated with the visitor center. There is no entrance fee to the park, and many of the most popular activities conducted by visitors, including shoreline fishing, picnicking, sailboarding, and bicycling, have little or no revenue associated with them. What commercial activities there are center around the gift/snack shop and one fee-based tour service (operating under a licensed concessioner agreement) that conducts tours and diving/snorkeling trips. About two-thirds of park visitors are estimated to spend several nights in the Florida City/Homestead area. As such, park visitors who stay in a hotel/motel would generate additional secondary economic service-based benefits. Although potentially

significant to the Florida City/Homestead economies, this is of minimal importance to the regional economy. Some visitors may spend the night in Homestead/Florida City area hotels to visit both Biscayne and Everglades national parks during one stay.

Water-based recreational visitation includes fishing, boating, and diving in the park. Recreational fishing is among the most popular activities in the park. In 1997 an estimated 50,000 vessels used the park for a variety of activities. Of that total, it was estimated that almost 30,000 boats participated in fishing activities (NPS 1998b). Pleasure boating and diving are also important recreational activities in the park. Most vessels that use the park are local (i.e., registered within Miami-Dade County).

A 2001 study (Johns et al.) estimated expenditures for recreational fishing and diving at the many reefs in the waters of Miami-Dade County. The reefs of Biscayne National Park situated east of Boca Chita, Elliott, and Adams keys, are part of a 150-mile-long chain of coral reefs extending down through the lower Florida Keys and the Caribbean. Anglers and divers were surveyed regarding many aspects of the expenditures incurred before, during, and after their recreational activities. Typical trip expenditures could include private transportation, groceries, take-out food, restaurants and bars, lodging, boat fuel, party/charter fees, access fees, dock fees, guide fees and charges, and equipment rental and purchases.

Because of the difference in economic power of a visitor dollar compared to a resident dollar, estimated daily expenditures were broken down by resident/visitor status. It was estimated that the average resident daily trip expenditures when fishing or diving/snorkeling totaled \$276 and \$219, respectively. Johns et al. concluded that direct resident fishing and diving expenditures totaled \$165 million and \$110 million, respectively, for the 12-month period of the study (2001). Average visitor daily trip expenditures when fishing totaled \$114 (own/friend's boat), \$225 (charter boat), or \$194 (party boat).

Diving/snorkeling expenditures totaled \$87 (friend's boat) or \$125 (charter boat). Total direct visitor expenditures (fishing, boating, and diving/ snorkeling) totaled \$572 million for the 12-month period of the study. Using the Johns et al. study as a guide to typical daily marine recreation expenditures in the county, and hence the park, in conjunction with the 1997 boat traffic estimates, it is evident that direct marine recreational expenditure in the park is substantial.

Biscayne National Park hosted 437,745 recreation visits in 2009. Visitation to the park decreased substantially from 2008. Visitor numbers of 686, 062 were a 36% decrease in recreation visits. Visitors in 2008 spent about \$47.5 million (NPS 2009a), supporting about

877 jobs in the local economy. On average, visitors spent \$63 per party per night in the park. Total visitor spending was \$14.2 million dollars in 2009 (table 14). This includes spending in sales, income, and jobs in businesses selling goods and services directly to park visitors.

The direct effects of the \$14.2 million spending captured from Biscayne visitors were \$11.6 million in sales, \$4.3 million in personal income (wages and salaries), \$6.5 million in value added, and 234 jobs supported. As visitor spending circulated through the local economy, an additional \$6.4 million in sales, \$2.3 million in personal income, \$4.0 million in value added, and 75 jobs were created in indirect effects (table 15).

**TABLE 14: VISITS AND ESTIMATED SPENDING BY VISITOR SEGMENT, 2009**

	<b>Day Trips</b>	<b>Motel</b>	<b>Camp</b>	<b>Total</b>
Recreation visits	407,103	21,887	7,879	437,745
Visitor party-nights in area	162,841	17,510	6,314	186,665
Average spending per night	\$63	\$193	\$102	
Total Visitor Spending (000's)	\$10,236	\$3,386	\$643	\$14,265
Percent of Spending	72%	24%	5%	100%

Source: NPS Public Use Statistics Office, Money Generation Model Short Form

**TABLE 15: DIRECT AND TOTAL EFFECTS OF VISITOR SPENDING, 2009**

	<b>Day Trips</b>	<b>Motel</b>	<b>Camp</b>	<b>Total</b>
Spending captured	\$8,393	\$2,777	\$527	\$11,697
<b>Direct Economic effects</b>				
Sales (\$000's)	\$8,393	\$2,777	\$527	\$11,697
Personal Income (\$000's)	\$3,092	\$1,023	\$194	\$4,309
Jobs	168	55	11	234
Value added (\$000's)	\$4,692	\$1,552	\$294	\$6,538
<b>Total Economic Effects</b>				
Sales (\$000's)	\$13,009	\$4,304	\$817	\$18,130
Personal Income (\$000's)	\$4,787	\$1,584	\$300	\$6,671
Jobs	222	73	14	309
Value added (\$000's)	\$7,575	\$2,506	\$476	\$10,557

Source: NPS Public Use Statistics Office, Money Generation Model Short Form

The total effects figures shown in table 14 are the sum of the

- direct effects accrued largely to tourism-related business in the area,
- indirect effects accrued to a broader set of economic sectors that serve these tourism businesses, and
- induced effects that are the impacts of household expenditures from the income earned in a directly or indirectly affected industry.

In 2006 economic benefits represented a park benefit-to-cost ratio of more than 4 to 1, meaning that for every dollar spent by the park in its annual budget, more than \$4 were generated in the local economy (NPCA 2006).

### **Economic Effects of Marine Reserve Zones**

Marine protected areas have largely beneficial economic effects on fishing communities as well as local businesses and tourism. Benefits are realized by recreational users, passive users, and commercial and recreational anglers in the long term. Some costs may be incurred by the commercial and recreational fishermen in the short term. There are many marine protected areas around the world, with varying levels of protection for marine habitats and different restrictions on fishing and recreation. Some areas limit fishing entirely (termed “no-take” areas or marine reserves) while allowing recreational use such as boating and diving. Other areas have limitations on fishing by factors such as species, type of gear used, season, or location. Few comprehensive studies have followed the economic effects of marine protected areas because of the associated complex socioeconomic conditions. This, and the variety of protected area designations, makes comparison of economic effects difficult, but some generalizations can be drawn from some of the larger studies that have been carried out.

In the Philippines, a portion of the Sumilon Island, Cebu, was closed to all fishing for 10 years, while swimming and diving were allowed. After that period, fish abundance had

increased three-fold, with the most significant increases among the most highly targeted species (White et al. 2002). Additionally, the yearly fish catch to fishers on the same reef but outside the sanctuary more than doubled, from 14 tons per square kilometer to 36 tons per square kilometer (Russ & Alcala 1996, cited in White et al. 2002). Food security, increased income from tourism, and pride in their protection role were also cited as major benefits of this sanctuary (White et al. 2002). The success of the Sumilon Island sanctuary spurred the creation of numerous other marine protected areas in the Philippines, with similar outcomes. One of the most important results of the Philippines marine protected area program is the leadership by local communities, who are benefiting most from the protected areas. National oversight provides some general consistency among marine protected areas, but local governments and citizens’ groups are leading the procedural and creative development of these areas. Benefits include strong increases in citizens’ satisfaction with the fishery management, household income, knowledge of fisheries, allocation of access rights, and overall participation and influence in community affairs (Katon et al. 1999, cited in White et al. 2002).

Socioeconomic factors tend to be considered later in marine protected area planning, and for this reason, fishermen often feel left out of the planning process. In an effort to implement a different model, a study along the north-central coast of California incorporated the local ecological knowledge of 30 fishermen into a planning effort through interviews and group discussions. Although most of the participants oppose marine protected areas and no-take zones, they acknowledged that these areas were likely to be established due to planning efforts at the nearby Channel Islands National Marine Sanctuary and the California Marine Life Protection Act. The participants tended to believe that natural ocean cycles were a greater determinant of fishery health than human fishing pressure. The participants also felt that their economic well-being would be greatly diminished by Marine Reserve Zones because of the necessity for them to fish in large and diverse areas. However, they

readily participated in discussions to share their local ecological knowledge about historic fisheries, current fishing locations and methods, and areas of different habitat or fishery quality. They indicated that every part of the coast is used by fishermen, making a no-take zone detrimental to some fishermen in any scenario (Scholz et al. 2004).

The large and complex planning for the Channel Islands National Marine Sanctuary prompted a complete socioeconomic study by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (Leeworthy & Wiley 2003). This study investigated both qualitative and quantitative effects of the six "no-take" alternatives that were developed for this sanctuary. In the context of the entire diverse economy of the study area, which included San Diego, Los Angeles, and Orange counties, the authors concluded there would be no significant macroeconomic or fiscal effects from the marine reserves. However, they noted that

local economies may be impacted, and that there may be significant effects on certain individuals or groups. In the short term, negative effects or costs may impact the commercial fishing industry and the recreational fishing community because of displacement and loss of income, including secondary losses to associated industries. In the long term, however, these groups may realize benefits because the improved health of fisheries in the marine reserve would lead to improved fish stocks outside the reserve. The authors found that recreational users who engage in diving, sailing, sightseeing, and wildlife viewing would realize benefits from marine reserves, as would the service providers supporting these activities. The authors note that human response—both from the commercial and recreational fishing sectors and by recreational and passive users—is highly adaptive, and that financial losses are not always realized if these groups adapt quickly to the reserve zones (Leeworthy and Wiley 2003).

## CHAPTER 4

### Environmental Consequences





# INTRODUCTION

The National Environmental Policy Act (NEPA) requires that environmental documents discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided if a proposed action is implemented. In this case the proposed federal action would be the adoption of a general management plan for Biscayne National Park. The following portion of this document analyzes the environmental impacts of implementing the five alternatives on natural resources, cultural resources, the visitor experience, the socioeconomic environment, and park operations. The analysis is the basis for comparing the beneficial and adverse effects of implementing the alternatives.

Because of the general, conceptual nature of the actions described in the alternatives, the impacts of these actions are analyzed in general qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. If and when site-specific developments or other actions are proposed for implementation subsequent to this *General Management Plan*, appropriate detailed environmental and cultural compliance documentation will be prepared in accord with National Environmental Policy Act and National Historic Preservation Act requirements.

This chapter begins with a description of the methods and assumptions used for each topic. Impact analysis discussions are organized by alternative and then by impact topic under each alternative.

Each alternative discussion also describes cumulative impacts and presents a conclusion. At the end of each alternative there is a brief discussion of unavoidable adverse impacts; irreversible and irretrievable commitments of resources; the relationship of short-term uses of the environment and the maintenance and

enhancement of long-term productivity, and energy requirements and conservation potential. The impacts of each alternative are briefly summarized in table 6, at the end of the "Alternatives, Including the Preferred Alternative" section.

## CUMULATIVE IMPACT ANALYSIS

A cumulative impact is described in the Council on Environmental Quality's regulation 1508.7 as follows:

*Cumulative impacts* are incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

To determine potential cumulative impacts, other projects within and surrounding Biscayne National Park were identified. The area included Miami-Dade County and the state. Projects were identified by discussions with the park, federal land managers, and representatives of county and town governments. Potential projects identified as cumulative actions included any planning or development activity that was currently being implemented or would be implemented in the reasonably foreseeable future. Impacts of past actions were also considered in the analysis.

These actions are evaluated in conjunction with the impacts of each alternative to determine if there are any cumulative effects on visitor use or a particular natural, cultural, or socioeconomic resource. Because most of these cumulative actions are in the early planning stages, the qualitative evaluation of



cumulative impacts was based on a general description of the project.

### Past Actions

Tree cutters from the Bahamas logged mahogany trees on the keys for ships. Early settlers on Elliott Key cleared the native forests to plant key limes and pineapples. When Biscayne Bay was being considered for national monument designation, many of the keys were privately owned. At one time, the owner of Elliott Key bulldozed a road down the length of the key. This became known as the “Spite Highway.” The owner of Boca Chita Key built a 65-foot tall structure resembling a lighthouse although it never held a light. Other keys also contain remains of past ownership, such as the Jones home site on Porgy Key and the Sweeting Homestead on Elliott Key.

Establishment of Biscayne National Monument and the subsequent expansion as Biscayne National Park have allowed the majority of the waters and keys of Biscayne Bay to be protected as part of the national park system. This has resulted in beneficial impacts on terrestrial and marine communities and recreational experience opportunities.

### Present Actions

**Maritime Heritage Trail.** The park has recently developed a new cultural history component to its interpretive programs. The Maritime Heritage Trail, an underwater snorkeling/scuba experience, will facilitate visitor access to six historic shipwreck sites within the waters of the park’s proposed Maritime National Historic District. Mooring buoys will be installed under the guidance of the *Mooring Buoy and Marker Plan* (in progress) to reduce visitor impacts, and historic documentation and interpretive materials for each site will be produced. In the future, the park may consider adding additional historic shipwrecks and other maritime sites (such as the Fowey Rocks Lighthouse) or even terrestrial maritime sites such as docks and wharfs.

**Fishing.** Both recreational and commercial fishing is allowed in the park. The park would continue monitoring fish populations, as identified in the *Fishery Management Plan*. All actions concerning fishing in the park would be implemented in accordance with the *Fishery Management Plan* and after consulting with the Florida Fish and Wildlife Conservation Commission regarding all areas except the Marine Reserve Zone where fishing would not be allowed.

**Alternative Energy.** The park has completed the installation of solar power equipment on Adams Key that has reduced the need for diesel-engine generated power by 90%. The park is seeking funding to install solar panels on Elliott Key to reduce the use of diesel powered generators.

**Black Point Jetty.** Adjacent to Black Point Marina County Park, the Black Point Jetty is owned by Biscayne National Park. A memorandum of agreement with the county outlines each party’s responsibilities for facility maintenance.

**Turkey Point Power Plant.** This electrical generating plant operates just outside park boundaries on the mainland south of Convoy Point. Although it has its own cooling ponds, some heated water may be released into Biscayne Bay and park waters and the cooling canals’ evaporation may result in the use of water from the Biscayne Aquifer, reducing the availability of fresh water to coastal and bay communities in the park. It is not known what level of effect this is having on the plant and animal communities in the southwest part of the park.

**Recreational Boating.** Both motorized and nonmotorized boating is recognized as an appropriate and popular use of the park’s waters. Some management issues are associated with this activity. Unintentional groundings and propeller scars cause damage to marine environments when boats are driven into water that is too shallow. There are also some conflicts between motorized and nonmotorized (paddling or sailing craft)



boaters. Motorized boating also has impacts on the soundscapes of the park.

**Park Actions.** There are many actions being undertaken at the park that are improving natural resources, visitor experience opportunities, and park facilities. Examples of funded projects include maintenance of navigational buoys; development of a fishery management plan, manatee plan, and wildland fire plan; rehabilitation of aged infrastructure; scientific studies, and trail work.

Interagency initiatives are also being supported—such as the *South Miami-Dade Watershed Study and Plan*, the *Biscayne Bay Surface Water Improvement and Management Plan*, the *Lower East Coast Regional Water Supply Plan*, the Biscayne Bay Partnership Initiative, the Southeast Florida Coral Reef Initiative, the *Biscayne Bay Coastal Wetlands Plan*, the *USFWS Multispecies Recovery Plan*, reintroduction of rare butterflies, and manatee management.

## Future Actions

Long-range actions that are beginning to be implemented would have future impacts on natural resources. The Comprehensive Everglades Restoration Plan would restore more natural flows of fresh water in southern Florida when completed. Part of this is the Biscayne Bay Coastal Wetlands Project that would concentrate on preserving or restoring the wetlands along the shore of Biscayne Bay. The Coral Reef Initiative would protect corals and coral reefs throughout the region.

The developed area of Miami-Dade County is continuing to grow according to city and county plans, especially north and west of the park. It can be assumed that this growth would lead to additional demand for recreation in the park. An increase in recreational use could result in increased levels of conflict between recreationists and the environment or between different types of recreationists.

## METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analysis and the conclusions in this chapter largely on the review of existing literature and studies, information provided by experts in the National Park Service and other agencies, and park staff insights and professional judgment. The team's method of analyzing impacts is further explained below. It is important to remember that all the impacts have been assessed assuming mitigating measures have been implemented to minimize or avoid impacts. If mitigating measures described in the "Alternatives Including the Preferred Alternative" chapter were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

Director's Order 12, *Conservation Planning, Environmental Impact Analysis, and Decision-Making*, presents an approach to identifying the duration (short or long term), type (adverse or beneficial), and intensity or magnitude (e.g., negligible, minor, moderate, or major) of the impact(s), and that approach has been used in this document. Where duration is not noted in the impact analysis, it is considered long term. Direct and indirect effects caused by an action were considered in the analysis. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther removed from the place, but are still reasonably foreseeable.

The impacts of the action alternatives describe the *difference between* implementing the no-action alternative and implementing the action alternatives. To understand a complete "picture" of the impacts of implementing any of the action alternatives, the reader must also take into consideration the impacts that would occur under the no-action alternative.

The impacts of climate change on the park are not expected to differ among the alternatives, and the lack of qualitative information about

climate change effects adds to the difficulty of predicting how these impacts will be realized in the park. For example, mangroves may be impacted by sea level rise, and storm frequency and intensity may impact cultural resources and visitor amenities. The range of variability in the potential effects of climate change is large in comparison to what is known about the future under an altered climate regime in the park in particular, even if larger-scale climatic patterns have been accurately predicted for South Florida and the Atlantic Coast (Loehman and Anderson 2009; NPS 2009c). Therefore, the potential effects of this dynamic climate on park resources were included in "Chapter 3, Affected Environment." However, they will not be analyzed in detail in "Chapter 4: Environmental Consequences" with respect to each alternative because of the uncertainty and variability of outcomes and because these impacts are not expected to differ among the alternatives.

### NATURAL RESOURCES

The analysis of natural resources was based on research; knowledge of park resources; and the best professional judgment of planners, biologists, hydrologists, and botanists who have experience with similar types of projects. Information on the park's natural resources was gathered from several sources, including the U.S. Fish and Wildlife Service, and site-specific resource inventories for wetlands, wildlife, water quality, and fisheries. As appropriate, additional sources of data are identified under each topic heading.

Where possible, map locations of sensitive resources were compared with the locations of proposed developments and modifications. Predictions about short-term and long-term site impacts were based on previous studies of visitor and facilities development impacts on natural resources.

The definitions below assume that mitigation would be implemented.

### **Fisheries and Seabottom Communities**

**Negligible** — Impacts would be at the lowest levels of detection and would have no appreciable effect on resources, values, or processes.

**Minor** — Impacts would be perceptible but slight and localized.

**Moderate** — Impacts would be readily apparent and widespread and would result in a noticeable change to resources, values, or processes.

**Major** — Impacts would be readily apparent and widespread and would result in a substantial alteration or loss of resources, or processes if adverse.

### **Special Status Species**

Through coordination with the U.S. Fish and Wildlife Service and the Marine Fisheries Service (NOAA), species of special concern were identified that were generally located in or near the park. This included information on each species, including their preferred habitat, prey, and foraging areas. Park staff then collected more specific information such as the absence or presence of each species within the park boundaries. For special status species, including federally listed species, the following impact intensities were used.

*Note:* To fulfill the National Park Service's obligations under the Endangered Species Act, determinations of effect for the listed species retained for analysis are included below using additional language that corresponds to the Endangered Species Act for the purposes of review by the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service of the National Ocean and Atmospheric Administration (NMFS).

**Negligible** — The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a FWS/NMFS “may affect, not likely to adversely affect” determination.

**Minor** — The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable but small and localized and not outside the range of natural variability. This impact intensity equates to a FWS/NMFS “may affect, not likely to adversely affect” determination.

**Moderate** — Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Breeding animals of concern are present; animals are present during particularly vulnerable life stages such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park. This impact intensity equates to a FWS/NMFS “may affect, likely to adversely affect” determination.

**Major** — The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special status species, critical habitat, or the natural processes sustaining them would be detectable. Loss of habitat might affect the viability of at least some special status species. Impacts of this intensity may equate to a FWS/NMFS determination of “take” of individuals or “may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species.”

As explained in detail in Chapter 3, “Affected Environment,” climate change is anticipated

to alter water and air temperature, water quality, severe weather events, and vegetation and wildlife. The National Park Service is required to protect federally listed species, and by policy, supports species listed by Florida. Climate change may cause alterations in listed species' habitat, breeding and nesting timing and success, predator-prey relationships, and the food web that supports these species. Some of these changes may be difficult to distinguish from other natural processes such as barrier island migration. The national park will work with U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the appropriate state agencies to determine and implement new mitigation or management actions to support species health and population stability as the dynamic effects of climate change become apparent over the life of this general management plan.

### **Terrestrial and Submerged Aquatic Vegetation**

**Negligible** — The impact on vegetation (individuals and/or communities) would not be measurable. The abundance or distribution of individuals would not be affected or would be slightly affected. Ecological processes and biological productivity would not be affected.

**Minor** — An action would not necessarily decrease or increase the area's overall biological productivity. An action would affect the abundance or distribution of individuals in a localized area but would not affect the viability of local or regional populations or communities.

**Moderate** — An action would result in a change in overall biological productivity in a small area. An action would affect a local population sufficiently to cause a change in abundance or distribution, but it would not affect the viability of the regional population or communities. Changes to ecological processes would be of limited extent.

**Major** — An action would result in overall biological productivity in a relatively large

area. An action would affect a regional or local population of a species sufficiently to cause a change in abundance or in distribution to the extent that the population or communities would not be likely to return to its/their former level (adverse). Significant ecological processes would be altered.

### **Wetlands**

**Negligible** — No measurable or perceptible changes in wetland size, integrity, or continuity would occur.

**Minor** — The impact would be measurable or perceptible, but slight. A small localized change in size, integrity, or continuity could occur because of short-term indirect effects such as construction-related runoff. However, the overall viability of the resource would not be affected.

**Moderate** — The impact would be sufficient to cause a measurable change in the size, integrity, or continuity of the wetland or would result in a small, but permanent, loss or gain in wetland acreage.

**Major** — The action would result in a measurable change in all three parameters (size, integrity, and continuity) or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable.

### **Soundscapes**

Context, time, and intensity together determine the level of impact of an activity. For example, noise for a certain period and intensity would be a greater impact in a highly sensitive context, and a given intensity would be a greater impact if it occurred more often, or for longer duration. In some cases an analysis of one or more factors may indicate one impact level, while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases, best professional judgment based on a documented rationale was used to determine

which impact level best applies to the situation being evaluated.

**Negligible** — In all zones, effects on natural sound environment would be at or below the level of detection, and such changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources.

**Minor** — Effects on the natural sound environment would be detectable, although the effects would be localized, and would be small and of little consequence to the visitor experience or to biological resources. Natural sounds would predominate in zones where management objectives call for natural processes to predominate, with human-caused noise infrequent and at low levels. In zones where more human-caused noise is tolerated, human-caused noise would not be so constant that natural sounds could not be heard occasionally. Beneficial impacts would reduce the amount of noise or otherwise improve the natural soundscape by a similar degree.

**Moderate** — Effects on the natural sound environment would be readily detectable with consequences over a relatively large area. Beneficial impacts would reduce the amount of noise or otherwise improve the natural soundscape by a similar degree. In zones where management objectives call for natural processes to predominate, natural sounds would predominate, but human-caused noise could occasionally be present at low to moderate levels. In zones where human-caused noise is consistent with desired conditions, this noise would predominate during daylight hours but would not be overly disruptive to visitor activities in the area; in such areas, natural sounds could still be heard occasionally.

**Major** — Effects on the natural sound environment would be obvious and have substantial consequences to the visitor experience or to biological resources in the region. Beneficial impacts would reduce

the amount of noise or otherwise improve the natural soundscape by a similar degree. In zones where management objectives call for natural processes to predominate, natural sounds would be impacted by human-caused noise sources frequently or for extended periods of time. In zones where human-caused noise is more tolerated, the natural soundscape would be impacted most of the day and make enjoyment of activities in the area difficult.

**Duration.** A short-term impact occurs only during the construction period or up to three months. A long-term impact continues for more than three months.

## CULTURAL RESOURCES

### Impacts on Cultural Resources and Section 106 of the National Historic Preservation Act

In this environmental impact statement impacts on cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected National Register eligible or listed cultural resources; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either adverse effect or no adverse effect must also be made for affected National Register listed or eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's Director's Order 12: *Conservation Planning, Environmental Impact Analysis and Decision-making* also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are nonrenewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

Potential impacts are described in terms of type, context (are the effects site-specific, local, or even regional), duration (are the effects short-term [less than one year], long-term [one to five years], or permanent).

A Section 106 summary is included in the impact analysis sections. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

### Archeological Resources

**Negligible** — Impact is at the lowest level of detection. Impacts would be measurable but with no perceptible consequences. For purposes of Section 106, the determination of effect would be no adverse effect.

**Minor** — Disturbance of a site(s) results in little loss of integrity. The determination of effect for Section 106 would be no adverse effect.

**Moderate** — Site(s) is disturbed but not obliterated. The determination of effect for Section 106 would be adverse effect.

**Major** — Site(s) is obliterated. The determination of effect for Section 106 would be adverse effect.

### Historic Structures and Buildings

**Negligible** — Impacts would be at the lowest levels of detection — barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

**Minor** — Impacts would affect character-defining features but would not diminish the overall integrity of the building or structure. For purposes of Section 106, the determination of effect would be no adverse effect.

**Moderate** — Impacts would alter a character-defining feature(s), diminishing the overall integrity of the building or structure to the extent that its National Register eligibility could be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

**Major** — Impacts would alter character-defining features, diminishing the integrity of the building or structure to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be adverse effect.

## **Cultural Landscapes**

**Negligible** — Impacts would be at the lowest levels of detection — barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

**Minor** — Impacts would affect character-defining features or patterns but would not diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be no adverse effect.

**Moderate** — Impacts would alter character-defining features or patterns, diminishing the overall integrity of the landscape to the extent that its National Register eligibility would be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

**Major** — Impacts would alter character-defining features or patterns, diminishing the overall integrity of the landscape to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be adverse effect.

## **VISITOR EXPERIENCE**

### **Methodology for Analyzing Impacts**

This impact analysis evaluated two major aspects of visitor experience — diversity of visitor activities and visitor services and facilities (including information and education). Analysis is conducted in terms of how the visitor experience might vary by applying different management zones in the alternatives. Although some acreage numbers and percentages are used to provide a relative

sense of the amount of area where visitor access and activities might be affected, analysis is primarily qualitative because of the conceptual nature of the alternatives. Consequently, professional judgment was used to reach reasonable conclusions as to the intensity and duration of potential impacts.

**Diversity of Visitor Activities.** The analysis of effects on activities is based on whether there was a complete loss, addition, expansion, or a change in access to or availability of a recreational opportunity, and how proposed management actions and zones would affect visitor opportunities for social interaction, solitude, challenge, adventure, and access throughout the park.

**Visitor Services and Facilities.** This analysis is based on whether there would be a change in the availability of visitor services or facilities provided by the Park Service and commercial services, including information, education, recreation, transport, or other visitor support services resulting from proposed management zone application or other actions.

**Intensity.** The intensity of the impact considers whether the impact on visitor experience would be negligible, minor, moderate, or major.

**Negligible impacts** — are effects considered not detectable to the visitor and would have no discernable effect.

**Minor impacts** — are effects that would be slightly detectable but not expected to have an overall effect on the visitor experience.

**Moderate impacts** — would be clearly detectable by the visitor and could have an appreciable effect on the visitor experience.

**Major impacts** — would have a substantial and noticeable effect on the visitor experience or could permanently alter substantial aspects of the visitor experience.

**Duration.** The duration of the impact considers whether the impact would occur for

a short term and be temporary in nature and associated with transitional types of activities, or if the impact would occur over a long term and have a permanent effect on the visitor experience, such as no fishing in the Marine Reserve zone.

**Type of Impact.** Impacts are evaluated in terms of whether they are beneficial or adverse to visitor experience. Beneficial impacts would provide greater availability of a recreational opportunity or educational program, or other services and types and experiences. Adverse impacts would reduce access or availability to these facets of visitor experience.

## SOCIOECONOMIC ENVIRONMENT

The National Park Service applied logic, experience, professional expertise, and professional judgment to analyze the impacts on the social and economic situation resulting from the implementation of each alternative. Economic data, historic visitor use data, expected future visitor use, and future developments of the national park were all considered in identifying, discussing, and evaluating expected impacts.

Assessments of potential socioeconomic impacts were based on comparisons between the no-action alternative and each of the action alternatives.

### Methodology for Analyzing Impacts

**Duration of Impact.** The evaluation of impacts also included an assessment of duration. Distinguishing between short-term and long-term duration was necessary to understand the extent of the identified effects. In general, short-term impacts are temporary in duration and typically are transitional effects associated with implementation of an action (e.g., related to construction activities) and are less than one year. In contrast, long-term impacts might have a permanent effect on the socioeconomic environments, and their effect extends beyond one year (e.g., operational activities).

**Intensity of Impact.** The evaluation of impacts includes an assessment of the intensity of the impacts, as follows.

**Negligible** — Effects on socioeconomic conditions would be below or at the level of detection. There would be no noticeable change in any defined socioeconomic indicators.

**Minor** — Effects on socioeconomic conditions would be slight but detectable.

**Moderate** — Effects on socioeconomic conditions would be readily apparent and result in changes to socioeconomic conditions on a local scale.

**Major** — Effects on socioeconomic conditions would be readily apparent, resulting in demonstrable changes to socioeconomic conditions in the region.

**Type of Impact.** With respect to economic and social effects, few standards or clear definitions exist as to what constitute beneficial changes and those considered adverse. For example, rising unemployment is generally perceived as adverse, while increases in job opportunities and average per capita personal income are regarded as beneficial. In many instances, however, changes viewed as favorable by some members of a community are seen as unfavorable by others. For example, the impact of growth on housing markets and values may be seen as favorable by construction contractors and many homeowners, but adverse by renters and by local government officials and community groups concerned with affordability. Consequently, some of the social and economic impacts of the alternatives may be described to allow the individual reviewer to determine whether they would be beneficial or adverse (impact is indeterminate with respect to “type”).



## **NPS OPERATIONS AND FACILITIES**

### **Methodology for Analyzing Impacts**

The impact evaluation was based on a qualitative evaluation of the effects on park operations and facilities from changes in providing visitor and administrative facilities, services, or programs under each of the alternatives. Impacts were determined by examining the effects of changes on staffing, infrastructure, facilities, and services. The analysis is more qualitative rather than quantitative because of the conceptual nature of the alternatives. Consequently, professional judgment was used to reach reasonable conclusions as to the intensity, duration, and type of potential impact.

**Duration of Impact.** Short-term impacts would be less than one year in duration. Long-term impacts would extend beyond one year.

**Intensity of Impact.** The intensity of the impact considers whether the impact would be negligible, minor, moderate, or major. Impact intensities for park operations and facilities are defined as follows:

**Negligible** — Park operations and facilities would be affected at or below the lower levels of detection, or there would be no measurable change in park operations or facilities.

**Minor** — Changes in park operations and facilities would be perceptible, although the changes would be slight and localized and would not be expected to have an appreciable effect on the ability of the park or concessioner to provide desired services and facilities.

**Moderate** — Changes in park operations and facilities would be readily apparent and would have appreciable effects on park operations that are noticeable to the staff and the public.

**Major** — Changes in park operations and facilities would be readily apparent and result in substantial changes in park operations that are noticeable to the staff and public and are markedly different from existing operations.

**Type of Impact.** Beneficial impacts would improve park operations and facilities. Adverse impacts would negatively affect park operations and facilities and could hinder the park's ability to provide adequate services, equipment, and facilities to visitors and staff. Some impacts could be beneficial for some operations or facilities and adverse or neutral for others.

# IMPACTS OF IMPLEMENTING THE NO-ACTION ALTERNATIVE

## NATURAL RESOURCES

### Fisheries

Fisheries management in the park would continue to be governed by state and park specific regulations, NPS mandates, and legislation. Commercial and recreational fishing would continue throughout the park. Fisheries management in Biscayne National Park would continue to balance the existence of recreational and commercial fishing in park waters with its mandate and responsibility to manage fishery resources in a way that such resources remain unimpaired.

Under the no-action alternative, fishing would continue to be managed according to state regulations in conjunction with park, NPS mandates, and legislation. In addition to state regulations, there would continue to be a ban on lobster harvest within the waters of the bay and a reduced bag limit for lobsters in waters outside the bay during the two-day sport season. Harvesting sponges, ornamental fish, and invertebrates would continue to be banned in all waters throughout the park.

Species in both the bay and the reefs would continue to experience substantial pressures from both commercial and recreational fishing. Some species would continue to be subject to overfishing. These impacts would continue to be adverse and minor to moderate in the long term.

Under this alternative there would be no change in management of boating in the park. The 1,000-foot slow speed area along the mainland would continue to provide some protection to the seagrass beds, which are an important habitat area for both juvenile and adult fish populations. Boating would continue to have an adverse impact on seagrass beds in all other areas of the park. The adverse impacts include sea bed scarring and localized

turbidity that reduces the productivity of the seagrass beds. The long-term adverse impacts on fisheries habitat would likewise have an adverse impact on fish populations. These impacts on habitat would continue to be adverse and minor to moderate in the long term.

**Cumulative Impacts.** In 2002 the National Park Service and the Florida Fish and Wildlife Commission initiated a *Fishery Management Plan and Environmental Impact Statement*, which is being finalized and will be presented to the public in 2011.

Once completed, the *Fishery Management Plan* would involve changes in current management strategies for both recreational and commercial fishing activities. These changes could include establishment of a permit system for both recreational boating and commercial fishers, limits on the type of spearfishing equipment that can be used in the park, a moderate decrease in fisheries harvest, and elimination of the lobster-sport season. With implementation of the *Fishery Management Plan*, the park anticipates the current condition of fisheries stocks would improve and the adverse impact of fishing on habitat within the park would be reduced. The long-term impacts of the *Fishery Management Plan* on fisheries in the park would be beneficial. The adverse impacts on fish habitat associated with current management of boating in the park would continue. Under this alternative the beneficial impacts on fisheries associated with the *Fishery Management Plan* could be reduced.

The population of communities and cities around the park is expected to continue to increase. This could cause additional fishing pressure on fish populations in the park—a long-term adverse impact.

The United States Coral Reef Task Force created in 1998 was established to lead U.S. efforts to protect, restore, and promote the sustainable use of coral reef ecosystems. These efforts include but are not limited to reducing and mitigating coral reef degradation from pollution, overfishing, and other causes. The task force has identified fundamental themes to guide immediate and sustained national action. These themes include quickly reducing the adverse impacts of human activities on coral reefs and associated ecosystems. Specific actions that could be taken have not been proposed. However if the initiatives of the task force are fully implemented, the impacts of these activities would likely be beneficial for the coral reef system in the park. Full implementation of the task force's recommendations would also likely cause the park to modify current management approaches to incorporate the recommendations. Until any recommendations take effect, coral reefs would still be subject to recreational activities that are harmful to the ecosystem. These impacts would continue to be long term, adverse, and minor to moderate.

The no-action alternative would result in the continuation of adverse impacts on fish and fish habitats but would not result in any new/additional impacts. Because there would be no project-related contribution to the impacts of other past, present, and future actions, this alternative would have no cumulative effects.

**Conclusion.** Under the no-action alternative adverse impacts on fisheries and fish habitat in the park would continue to be adverse, minor to moderate, and long term, but there would be no additional impacts caused by implementing this alternative. There would be no project-related cumulative impacts.

### **Threatened and Endangered Species**

Management actions under the no-action alternative would continue to support populations of threatened and endangered species in the park. The park would continue to coordinate with the U.S. Fish and Wildlife Service and National Marine Fisheries Service

regarding management actions related to the following threatened and endangered species as necessary.

**Manatee.** The 1,000-foot-wide slow speed area that extends along the entire mainland coast within the park would remain as a manatee protection area. This setback distance was established in cooperation with the state and Miami-Dade County and is consistent with setback distances outside park boundaries. Slow speed areas are designed to provide boat operators sufficient time to react when manatees are observed, reducing the potential of striking the animals. The slow speed area would continue to have a long-term, beneficial impact on the population of manatees in the park.

**Sea Turtles.** Threats to sea turtles related to collisions with boats would remain unaffected by any actions under this alternative. Known nesting beaches on Elliott Key would not be closed, but these beaches receive little use during nesting season. Park staff would continue to install mesh screening over nests to protect the nests from predation, particularly by raccoons. These management activities would continue to have a long-term, beneficial impact on nesting turtles in the park.

**American Crocodile.** Most of the mangrove shoreline would continue to be managed primarily to protect wildlife habitat areas including crocodile habitat. Visitor services and infrastructure would continue to be concentrated at Convoy Point and would remain at or near current levels with the visitor center, designated paths, boardwalk, and jetty. These areas are outside the designated critical habitat. No development within the designated critical habitat would be proposed under this alternative. Impacts on crocodiles from current management approaches, development, and visitation patterns would continue to be adverse but negligible in the long term.

**Smalltooth Sawfish.** No actions that would occur under Alternative 1 would be expected to affect sawfish in the park.

**Schaus Swallowtail Butterfly.** Adams Key would continue to have a developed area that includes a dock, trail, picnic and restroom facilities, a ranger station, and park residential area. The developed area would remain on the southern shore and largely outside of the hardwood hammock. There would be no new impacts on the butterfly on Adams Key; negligible adverse impacts would continue. On Elliott Key, the trail that runs the length of the island also runs through the hardwood hammock. Under this alternative, no development would be proposed that would impact the butterfly habitat on Elliott Key. There would be a continuation of negligible adverse impacts on the butterfly population and habitat on this key.

Old Rhodes and Totten Keys would continue to be managed to preserve natural resources with minimal human-caused impacts. Swan Key would continue to be a sensitive resource area and managed to protect critical ecosystems, habitats, and natural processes. Access to Swan Key would be tightly controlled and limited to permitted research activities.

The continued potential for disturbance to either the butterfly or its habitat would be negligible. Weather-related phenomena would remain the greatest risk to the butterfly under this alternative.

**Acroporid Corals.** The use and maintenance of navigational markers and mooring buoys would continue to protect Acroporid corals from unintentional vessel and anchor damage. The Legare Anchorage would continue to be closed to in-water activities, providing protection to Acroporid corals that may be located in this area. Fishing and recreational boating would continue in Acroporid coral habitat in most of the park, allowing for the possibility of ecological and physical damage to Acropora from overfishing, fishing debris, anchoring, and/or vessel groundings. Management activities under this alternative would continue to have negligible impacts on these species, and there would be no new project-related impacts on Acroporid corals.

**Cumulative Impacts.** Habitat disturbance or loss is the most common reason for a species to be listed. The establishment of Biscayne National Park has provided a protective refuge for terrestrial and marine listed species resulting in long-term beneficial impacts.

The *Florida Manatee Recovery Plan* and the site-specific county plans are designed in part to reduce boat-related manatee injury and mortality as well as protect habitat areas. These measures are consistent with protection measures incorporated into the proposed actions in this general management plan. There would continue to be a beneficial impact on manatee recovery efforts because there would be no changes to the existing system, and this encourages compliance with the plans.

Catches of smalltooth sawfish by recreational fishers could increase if overall fishing effort increased. Since sawfish are so rare in Biscayne, the likelihood of increased catches is very low.

The no-action alternative would not result in any additional impacts on federally listed species. Because there would be no project-related contribution to the impacts of other past, present, and future actions, this alternative would have no cumulative effect.

**Conclusion.** Management under the no-action alternative would continue to support populations of threatened and endangered species in the park. Under this alternative there would be no new actions that would impact these species and, therefore, it would have a Section 7 determination of no effect. There would be no project-related cumulative effects and no impairment.

### **Special Status Species, including State Listed Species**

**Birds.** West Arsenicker Key is a sensitive resource area for bald eagles, and would remain closed to visitors. Actions under this alternative would have no new effect on the bald eagle population and nesting activity on West Arsenicker Key. Nesting activity has

been observed on the southern end of Sands Key and the ocean side of Elliott Key. Under this alternative, Sands Key would remain closed to visitors; therefore the long-term impact on the bald eagle population and nesting activity in the park would continue to be beneficial. Under this alternative, no new facilities would be developed on Elliott Key, and visitation would be expected to continue at current levels. Visitation to the ocean side of the island is currently low and would not be expected to increase. If visitation increases to the point that eagles could be discouraged from nesting on the island, the park could close part of the beach south of Petrel Point during nesting season to reduce impacts on the birds. Under this alternative the long-term impact on the bald eagle population and nesting activity in the park would continue to be beneficial. There would be no new actions that would affect bald eagles.

For other state-listed birds, the potential for disruption to nesting, roosting, foraging, and/or loafing remains. For birds using infrequently used areas, such as the difficult-to-access Jones Lagoon area, the potential for disturbance remains low. Birds using coastal areas adjacent to high use areas (such as Elliott Key, Sands Key, and Boca Chita Key), however, would continue to be exposed to potential disturbances of the noise of boat engines and close approaches by people. This exposure could result in an alteration of natural behaviors, including the potential for nesting birds to inadvertently crush their eggs while fleeing or to temporarily or permanently abandon their nests, thereby exposing the eggs to predators and extreme temperatures. Under this alternative the long-term impact on state-listed birds in the park would continue to be adverse yet negligible. There would be no new actions that would affect state-listed bird species.

**Miami Blue Butterfly.** Under the no-action alternative, no new facilities would be developed on Elliott Key and visitation would be expected to continue at current levels. There would be no new actions that would affect this butterfly.

**Cumulative Impacts.** These species were listed because of the adverse impacts of habitat disturbance or loss caused a severe reduction in their numbers. The establishment of Biscayne National Park has provided increased protection of eagle and butterfly habitat in the park.

Reintroduction efforts of Miami blue butterflies have occurred on Elliott Key in an attempt to restore this species as an experimental population. If successful, this would be a long-term beneficial impact. The monitoring and recovery plan would continue to be implemented.

At the time this plan was started, bald eagles were federally listed as endangered. They have since been delisted because of population recovery, indicating a long-term beneficial impact on this species.

The no-action alternative would not result in any additional impacts on state listed species. Because there would be no project-related contribution to the impacts of other past, present, and future actions, this alternative would have no cumulative effect.

**Conclusion.** Under this alternative there would be no new actions that would impact bald eagles or other listed birds. There would be no new impacts on the Miami blue butterfly. There would be no project-related cumulative effects.

## **Terrestrial Vegetation**

Under this alternative, no new development would be proposed that would impact terrestrial vegetation. Current visitor facilities and park infrastructure would remain within their current footprint. Some vegetation in the park would continue to be adversely impacted by social trails and trampling. These impacts would continue to be long term and negligible to minor.

**Cumulative Impacts.** Nonnative invasive plant species can change the structure and function of native plant communities. These changes can have an adverse impact on habitat

for native species that rely on the native plant communities. Soil and vegetation disturbances encourage growth of invasive species. An exotic plant management plan has been developed for Biscayne Bay National Park and eight other national park system units in the region. Removal of the exotic species would provide better conditions to reestablish native vegetation in disturbed areas, which could help to mitigate the adverse impacts associated with social trails in the park. Implementation of this management plan would have a long-term beneficial impact on terrestrial vegetation in the park and the habitat it provides.

*A Fire Management Plan* was developed that includes the park's upland areas. This plan helps guide resource management efforts in the park in the vegetation communities that are fire adaptive. Because these plant communities are fire adaptive, controlled burning would be beneficial and would reduce unnatural fuel buildup that could lead to catastrophic fires. Implementation of this fire management plan would continue to have a long-term beneficial impact on the terrestrial vegetation in the park and the habitat that it provides.

The no-action alternative would result in the continuation of adverse impacts on vegetation but would not result in any new impacts. Because there would be no project-related contribution to the impacts of other past, present, and future actions, this alternative would have no cumulative effects.

**Conclusion.** Under the no-action alternative, existing adverse impacts on terrestrial vegetation in the park would continue, but there would be no additional impacts caused by implementing this alternative. There would be no project-related cumulative impacts.

### Submerged Aquatic Communities

Under this alternative, no new limits on recreational activities are proposed. The current high levels of unrestricted boat use in the bay as well as other recreational activities would continue to cause adverse impacts on

the function and productivity of the submerged aquatic communities in the park.

In most areas of the bay, submerged aquatic communities would continue to be vulnerable to impacts from recreational activities, primarily boating. As visitor numbers increase over time, more areas of the park, would experience increased frequency of motorboaters running aground.

Management for these areas has a tolerance for moderate resource impacts. There are minimal controls on boating activity, and the controls focus primarily on visitor safety. Because the bay is shallow, boat activity has been associated with increased turbidity in all the aquatic communities. Turbidity decreases the productivity of these communities by reducing photosynthesis. The long-term impact on the submerged aquatic communities from increases in turbidity would continue to be adverse and minor to moderate depending on the size of the area impacted.

**Cumulative Impacts.** Damage to seagrass beds from boat groundings and anchors has degraded habitat for manatees, crustaceans, and echinoderms that inhabit these areas.

Boat groundings (propeller and hull impacts) and inadvertent placement of anchors have damaged the dense soft corals, sea fans, and sponges in the hardbottom communities, which in turn have an adverse impact on the fish and invertebrates that seek refuge in these areas.

Coral reefs are complex ecosystems and sensitive to disturbances. Fishing, snorkeling, and diving can also have adverse impacts on coral reef systems. The damage caused by these activities includes scarring from boat propellers and inadvertent placement of anchors, as well as breakage caused by snorkeling and diving. Debris from recreational and commercial fishing (e.g., fishing tackle and lines from crab and lobster traps) left on the reef can wrap around the coral and damage it. Fishing also results in removal of predators and the removal of herbivorous fish that keep algae minimized (contributes to reef

health). Damage to the coral reefs also adversely impacts other species that rely on the reefs for food and shelter. Damage to the seagrass beds, hardbottom communities, and coral reefs have resulted in long-term, minor to moderate, adverse impacts.

The no-action alternative would result in the continuation of adverse impacts on submerged marine communities but would not result in any new impacts. Because there would be no project-related contribution to the adverse impacts of other past, present, and future actions, this alternative would have no cumulative effect.

**Conclusion.** Under the no-action alternative, existing adverse impacts on submerged aquatic vegetation in the park would continue, but there would be no new impacts caused by implementing this alternative. There would be no project-related cumulative impacts.

## **Wetlands**

Wetlands, indicated by mangroves, are located along the mainland coast and the fringes of the keys in the park. Under this alternative, wetlands in the park would continue to serve as an important habitat area for a wide variety of terrestrial and aquatic species. Currently, access for visitors into the mangroves is limited. No new access into the mangroves would be developed under this alternative on the mainland or on the keys so there would be no change in the current size, integrity, or continuity of the wetland areas in the park. There would be no impacts on wetlands in the park as a result of implementing the no-action alternative.

**Cumulative Impacts.** The Biscayne Bay Coastal Wetlands Project of the Comprehensive Everglades Restoration Plan includes pump stations, spreader swales, stormwater treatment areas, flow ways, levees, culverts, and backfilled canals in southeast Miami-Dade County and covers 13,600 acres from the Deering Estate south to the Turkey Point Power Plant. The purpose of this project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. If implemented, the

proposed project would replace lost overland flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The proposed redistribution of freshwater flow across a broad front is expected to restore or enhance freshwater wetlands, tidal wetlands, and near-shore bay habitat. Sustained lower-than-seawater salinities are required in tidal wetlands and the near-shore bay to provide nursery habitat for fish and shellfish. This project is expected to create conditions that will be conducive to the reestablishment of oysters and other components of the oyster reef community.

Diversion of canal discharges into coastal wetlands is expected not only to reestablish productive nursery habitat along the shoreline, but also to reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets. The impact of implementing these actions would be beneficial for wetlands inside and outside the park.

These other past, present, and future actions, in conjunction with the ongoing management actions in the park, would result in beneficial impacts on wetlands in the park. However, this alternative would not result in any new actions that would contribute to these impacts, so there would be no project-related cumulative effects.

**Conclusion.** There would be no new impacts on wetlands under this alternative. There would be no project-related cumulative effects.

## **Soundscapes**

The types and amount of visitor use is not anticipated to change substantially from current levels. Thus, the level of human-related noise in all areas of the national park would not change from existing levels as a result of implementing the no-action alternative. Consequently no new impacts would be anticipated.

**Cumulative Effects.** Natural soundscapes have been degraded from activities on land and water portions of the park such as vehicle engines, boat traffic, agricultural or industrial activity, and occasional construction. Because most of the park is open water, noise from motorized boats is the most prevalent disruption to natural soundscapes. Increases in motorboats leads to an increased noise level and results in short-term, minor to moderate, adverse impacts.

The concentration of cars and visitors around the visitor center and parking lot also affects the natural soundscape at Convoy Point. NPS staff mowing the grass and blowing leaves with motorized equipment causes short-term localized adverse impacts on the soundscapes in this area. This noise is generally tolerated in the Visitor Services/Park Administration Zone, so the related impacts would be adverse but negligible.

Implementing this alternative would not contribute to the long- and short-term adverse impacts of other past, present, and reasonably foreseeable future actions, so there would be no cumulative impacts on soundscapes resulting from implementing this alternative.

**Conclusion.** Implementing alternative 1 would have no new effects on natural soundscapes. Because this alternative would not have any new effects on the natural soundscape, there would be no project-related cumulative effects.

## CULTURAL RESOURCES

### Archeological (including Submerged Maritime) Resources

**Analysis.** Under the no-action alternative, archeological (including submerged maritime) resources would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria of evaluation to determine their eligibility for listing in the National Register. All ground-disturbing activities would be preceded by site-specific archeological surveys and, where

appropriate, subsurface testing to determine the existence of archeological resources and how best to preserve them. Known archeological resources would be avoided whenever possible and only negligible to minor adverse impacts would be anticipated.

Although ongoing and expanded archeological site monitoring programs would be initiated and efforts would be undertaken to minimize or mitigate potential impacts from human activities and natural causes, an unknown number of archeological sites in Biscayne National Park would continue to be impacted by current and ongoing human activities. These ongoing activities would continue to cause localized, long-term or permanent, minor to moderate adverse impacts.

Treasure hunting, looting, and amateur collection, which have had an impact on the park's archeological resources over the years, would continue to be a threat to the park's submerged cultural resources. Although such activities are not permitted in the park, and forbidding underwater access to visitors in the Legare Anchorage (which only covers a portion of the Offshore Reefs Archeological District) would continue to provide some protection for some submerged cultural resources, the park is still affected by these activities. Continuance of these activities in the park and surrounding waters promotes the commercial value of artifact selling to tourists and makes it lucrative for artifact hunters to visit the park. Much of the local public condones such activity in the park, although recognizing that it is illegal or requires permitting in other areas, such as the Florida Keys National Marine Sanctuary and other state waters. Continued looting, depending on its severity, would be a minor to moderate adverse impact on submerged archeological resources.

Submerged cultural resources would also continue to be impacted by activities associated with commercial and sport fishing, such as accidental net snagging. Recreational and commercial boating would continue to impact submerged archeological sites through the erosive processes of waves caused by their



passage as well as activities such as dropping anchors. Impacts on cultural resources from fishing and boating would be long term to permanent, adverse, and of minor to moderate intensity depending on the frequency and intensity of these activities.

Although not as numerous or as threatened, Biscayne National Park's terrestrial archeological sites on the mainland and keys would continue to be subjected to similar concerns as those of the submerged sites. Most of the known terrestrial archeological sites, however, are not readily accessible to the public because of natural barriers and their isolation, and thus most human impacts on such resources would result from inadvertent or accidental use of park lands. Most of the significant prehistoric and historic sites on the islands are well protected by their distance from areas commonly used by the public and dense vegetation that makes them difficult to reach. Continued closure of Arsenicker and West Arsenicker keys would help protect potential archeological resources on these islands. Because of their inaccessibility, any adverse impacts on terrestrial archeological resources would be negligible to minor and permanent.

**Cumulative Effects.** In the past the relative isolation of the national park and the lack of sufficient resource monitoring and protection programs have provided opportunities for treasure hunters, amateur collectors, and looters to engage in hunting artifacts and intentional pilfering of submerged archeological resources. Visitors have contributed to inadvertent disturbance of submerged and terrestrial archeological resources. Because much of the park has not been surveyed and inventoried for archeological resources, decisions about site development, such as visitor facilities, and permitted activities, such as recreational and commercial boating and commercial and sportfishing, have sometimes been made that in hindsight may have resulted in disturbance of archeological sites in the park. These impacts have been primarily adverse, permanent, and minor to moderate.

Ongoing NPS activities, such as expanded archeological site monitoring programs and archeological survey and inventory efforts, would provide better understanding and protection of the park's submerged and terrestrial archeological resources—a beneficial impact. Other current or reasonably foreseeable planning endeavors to protect Biscayne Bay resources—such as the *Florida Keys National Marine Sanctuary Final Management Plan*, *Comprehensive Everglades Restoration Plan*, Southeast Florida Coral Reef Initiative, Biscayne Bay Partnership Initiative, and the *Biscayne Bay Strategic Access Plan*—could also potentially contribute to these beneficial impacts on the park's archeological resources.

As described above, implementation of the no-action alternative would result in permanent, negligible to moderate, adverse effects and some beneficial impacts. The impacts of the no-action alternative, in combination with both the minor to moderate permanent adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a permanent, negligible to moderate, adverse cumulative effect. The adverse effects of the no-action alternative, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Under this alternative, there would be primarily localized, negligible to moderate, adverse, short-term to permanent impacts on submerged archeological resources, while impacts on terrestrial archeological resources would be in the negligible to minor range. Some benefits would result from survey and inventory of both submerged and terrestrial properties potentially eligible for National Register listing. Generally, both submerged and terrestrial archeological resources would continue to be surveyed, inventoried, and evaluated, and all ground-disturbing activities would be preceded by site-specific archeological investigations to ensure that archeological resources would not be damaged or lost as a result of NPS actions.

Actions under this alternative would contribute to any overall cumulative impact on

terrestrial and submerged archeological resources. The adverse and beneficial impacts on archeological resources generally, however, would be a relatively small component of any overall cumulative impact.

### Historic Structures and Buildings

**Analysis.** Under the no-action alternative historic structures and buildings in the park would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria to determine their eligibility for listing in the National Register as staff and funding permit. The surveys and research necessary to determine the eligibility of a structure or building for listing in the National Register are a prerequisite for understanding the resource's significance, as well as the basis of informed decision making in the future regarding how the resource should be managed. Such surveys and research would have a beneficial long-term impact.

To appropriately preserve and protect National Register-listed or eligible historic buildings and structures, all stabilization, preservation, and rehabilitation efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995). Because the repair and replacement of historic fabric associated with the preservation or rehabilitation of historic buildings and structures would be undertaken in accordance with those standards, any adverse impacts would be of negligible to minor intensity and long term.

Under this alternative, the Fowey Rocks Lighthouse could be transferred from the Coast Guard to another organization/agency in accordance with the National Historic Lighthouse Preservation Act (2000). Provisions of the act stipulate that the organization or entity receiving the lighthouse preserve and maintain it in accordance with the *Secretary's Standards*. Preservation of the lighthouse in accordance with the *Secretary's Standards* would have a long-term, beneficial impact on the lighthouse.

Historic structures and buildings, such as those in the Boca Chita Key Historic District, could suffer wear and tear from increased visitation, and unstaffed or minimally staffed structures could be susceptible to vandalism. To minimize potential negligible to minor adverse impacts, the possible monitoring of the user capacity of historic structures could result in the imposition of visitation levels or constraints that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors, and continued ranger patrol and emphasis on visitor education would discourage vandalism or inadvertent impacts and minimize adverse impacts. Any adverse impacts would be long-term and of negligible to minor intensity.

**Cumulative Effects.** In the past the lack of appropriate preservation treatments and the loss of historic fabric resulting from visitor use and vandalism have resulted in minor, long-term, adverse impacts on the historic structures and buildings of the Boca Chita Key Historic District. Other recent, current, and reasonably foreseeable future planning endeavors or undertakings to preserve historic structures or buildings in the surrounding region could potentially contribute to some beneficial impacts on historic structures and buildings.

As described above, implementation of the no-action alternative would result in long-term, negligible to minor, adverse effects and beneficial impacts on historic structures and buildings. The impacts of the no-action alternative, in combination with the minor, long-term, adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a long-term, negligible to minor, adverse cumulative effect. The adverse effects of the no-action alternative, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Actions under alternative 1 would generally have localized, long-term, beneficial and long-term negligible to minor adverse impacts on historic structures and

buildings. Actions under this alternative would attempt to minimize the continued loss of historic fabric to historic structures and buildings in the Boca Chita Key Historic District through law enforcement efforts and cyclic maintenance and preservation treatment. Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the *Secretary's Standards*.

Actions under this alternative would generally contribute to beneficial impacts and the negligible to minor adverse impacts related to any overall cumulative effect on historic structures and buildings. Overall the cumulative effect would be negligible to minor and adverse. The adverse and beneficial effects on historic structures and buildings, however, would be a relatively small component of any overall cumulative effect.

## Cultural Landscapes

**Analysis.** Under the no-action alternative the cultural landscape at the Boca Chita National Historic District would continue to be managed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. Potential cultural landscapes in Biscayne National Park would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria to determine their eligibility for listing in the National Register as NPS staff and funding permit. Ongoing studies would continue inventory and evaluation of the following potential cultural landscapes in the national park:

- Sweeting Homestead—Elliott Key
- Jones Home site—Porgy Key
- Maritime Cultural Landscape—parkwide

Pending the results of these evaluations the National Park Service would recommend listing of the national park's significant cultural landscapes in the National Register.

The National Park Service would implement resource management policies that preserve the natural resource values of the listed, or determined eligible, landscapes as well as their culturally significant character-defining patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The surveys, inventories, and evaluation of cultural landscapes and their character-defining patterns and features are the basis of informed decision making in the future regarding how National Register eligible or listed resources should be managed, which would be a beneficial impact.

Continued and increasing use of Boca Chita Key as a visitor destination point could continue to have some negligible to minor, adverse, short-term to long-term impacts on the integrity of the historic district's cultural landscape, and continued use of Elliott Key for docking, picnicking, hiking, and camping could continue to have some negligible to minor, adverse, short-term to long-term impacts on the integrity of the potential cultural landscape associated with the Sweeting Homestead. The relatively remote and inaccessible location of Porgy Key would afford protection to the potential cultural landscape associated with the Jones home site. The continued management of Porgy Key in its isolation would have a beneficial impact.

**Cumulative Effects.** In the past, lack of awareness for the preservation of potential cultural landscapes in the park has resulted in decisions about site development and resource management that, in hindsight, may have not have been best for the preservation of cultural landscape values and preservation. Such decisions include the placement and location of restroom building, wooden boardwalk, and concrete paths that have compromised some of the character-defining patterns and features of the Boca Chita cultural landscape by adding prominent, nonhistoric structures and features to the landscape and covering or damaging historic walking paths. These past impacts could be a long-term, minor, adverse impact.

Other recent, current, and reasonably foreseeable future planning efforts to protect Biscayne Bay resources—such as the *Florida Keys National Marine Sanctuary Final Management Plan* (comprehensive protection of diverse marine environments of the keys), and *Comprehensive Everglades Restoration Plan* (restoration and preservation of the Everglades and the South Florida ecosystem)—could potentially contribute to the preservation of character-defining patterns and features of cultural landscapes. Impacts on cultural landscapes associated with such preservation efforts would be beneficial.

As described above, implementation of the no-action alternative would result in long-term, negligible to minor, adverse effects and beneficial impacts on cultural landscapes. The impacts of the no-action alternative, in combination with the minor, long-term, adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a long-term, minor, adverse cumulative effect. The adverse effects of the no-action alternative, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Actions under alternative 1 would have beneficial impacts on the landscape at the Boca Chita National Historic District, as well as other potential cultural landscapes because park properties would continue to be surveyed, inventoried, and evaluated under National Register criteria of evaluation to determine their eligibility for listing in the National Register. Listed and eligible cultural landscapes would be managed to preserve their natural resource values and culturally significant character-defining patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. Some unidentified cultural landscapes might experience long-term, minor, adverse impacts. Under alternative 1 potential cultural landscapes would experience mostly beneficial, short-term to

long-term impacts. Actions under this alternative would generally contribute to cumulative, long-term, beneficial impacts on cultural landscapes.

## VISITOR EXPERIENCE

### Analysis

**Diversity of Visitor Activities.** Visitors with boats would continue to have unrestricted access to most (approximately 97%) of the park's waters. Visitors would be able to participate in a full range of activities, such as motorboating, sailing, canoeing, swimming, scuba diving, snorkeling, fishing, and nature study.

Some operators who lack information and/or navigation skills would continue to have the negative experience of running aground in shallow areas, potentially damaging their equipment and park resources and incurring fines and towing fees. Also, the wide range of mixed use would continue to result in visitor conflicts in some locations, such as safety conflicts between swimmers and motorboaters and speed and noise conflicts between motorboaters and nonmotorized boaters.

As visitor numbers increase over time, more areas of the park, especially during peak use times, would experience more conflicts and increased frequency of motorboaters running aground. For some visitors who enjoy a more social experience and the ability to travel and recreate throughout the park, increased numbers of visitors would not necessarily be perceived as a problem. However, it is likely that as incidents of conflict and groundings increase, many powerboaters would perceive the change in their experience over time to be a long-term, minor to moderate, adverse impact on the quality and safety of their visit.

Visitors with boats who are seeking solitude and the natural sights and sounds of the park's bay and ocean waters would find it increasingly difficult to experience these qualities as visitor numbers increase. Also, safety would be an increasing problem because of the

limited speeds and maneuverability of non-motorized boats. This change in conditions would likely be perceived over time as a long-term, minor, adverse impact on these visitors' ability to navigate safely in park waters and achieve opportunities for quiet, solitude, and nature study.

There are areas of the park where visitors would continue to have official restrictions on their activities. This includes the slow speed area along the mainland and at Sands Cut (by Sands Key), which would continue to restrict visitor use of about 3,295 acres of park waters. These restrictions would continue to enhance visitor safety along the often crowded Sands Cut area and manatee protection near the mainland, adding value to visitor opportunities to see these rare animals. Arsenicker Key, West Arsenicker Key, and adjacent waters within 200 feet from shore would continue to be closed to visitors for resource protection. Also, visitors would continue to be prohibited from stopping in the Legare Anchorage or leaving their boat to swim or dive. These restrictions in the Legare Anchorage (in its current configuration) would continue on about 2,360 acres of park waters. Because all of these restrictions are well established, their continuation would have negligible, long-term, adverse impacts on visitor experiences.

**Visitor Services and Facilities.** Visitors would continue to have access to most of the park's land areas and would be able to participate in a range of land-based recreation, such as hiking, picnicking, shore fishing, camping, nature study, and visiting historic sites. The level of access would generally continue to be limited by (1) the natural limitations of mangrove and tropical hardwood hammock habitats and (2) the existing limits of facility development such as docking capacity and trail development. In this alternative, these conditions would continue relatively unchanged. As a result, visitor numbers on the keys would continue to be low to moderate. However, as visitor levels in the park increase there would be an increasing likelihood that docking facilities at the keys would reach capacity more frequently and that some

visitors who want access to the keys would not have anywhere to dock. This would potentially be a long-term, minor to moderate, adverse impact on some visitors' opportunities to access and experience these coral keys, especially during peak use periods.

For visitors who arrive at Convoy Point by car, they would continue to have easy access to visitor information and interpretation services at the Dante Fascell Visitor Center. The visitor center-based programs would continue to provide opportunities for visitors to learn about the significance and value of the park that are not available elsewhere. This would continue to be a beneficial impact on visitors' understanding and appreciation of the South Florida coastal marine environment. Visitors would continue to be able to use the services of the park concessioner at Convoy Point to rent canoes, kayaks, or scuba equipment or pay for a glass-bottom boat tour or guided scuba and snorkeling trips. The concessioner would continue to provide occasional transport service to Elliott Key and Boca Chita Key for visitors interested in hiking, camping, and guided tours. Visitors who do not have the time, resources, or ability to use concessioner services would continue to be able to recreate in the Convoy Point area, including picnicking, fishing, and walking along the boardwalk. However, for many visitors, access to park waters and the keys beyond Convoy Point would remain very limited, which would continue to be a long-term, minor to moderate, adverse impact on the quality of some visitors' experiences.

## **Cumulative Effects**

The growing population of the Miami-Dade region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. To this end there are a number of ongoing studies and partnership efforts underway in the Biscayne Bay area to improve and protect water quality and quantity, wetlands, fisheries, and coastal viewsheds. Projects include the *Fishery Management Plan for Biscayne National Park*; the *South Miami-*

*Dade Watershed Study and Plan*; the *Biscayne Bay Surface Water Improvement and Management Plan*; the *Lower East Coast Regional Water Supply Plan*; the Biscayne Bay Partnership Initiative; the Southeast Florida Coral Reef Initiative; and the *Biscayne Bay Coastal Wetlands Plan*. The projects all could contribute to improvements in the visitor experience, especially related to quality fishing opportunities and other resource-based recreational activities. The intensity and duration of the cumulative effect of the above planning efforts would depend on the actual number and type of actions taken to implement them.

Adjacent state parks (such as Bill Baggs Cape Florida State Park, Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park) and the Florida Keys National Marine Sanctuary offer services, facilities, and recreational opportunities that enable visitors to experience and learn about the natural and cultural resources of the Biscayne Bay and reef area. Also, current efforts through the Stiltsville plan and the public access plan for Biscayne Bay (“Get Your Feet Wet”) provide opportunities for enhanced visitor access, education, and recreation related to the Biscayne Bay area. These nearby and available recreational and interpretive resources would result in a beneficial effect on visitor understanding and opportunities in the Biscayne Bay area.

Alternative 1 would have adverse impacts, and when added to the beneficial impacts caused by these other actions, the result would be beneficial cumulative effects. Alternative 1 would contribute a slight adverse increment to these beneficial cumulative effects.

## Conclusion

Continued speed limitations along the mainland and at Sands Cut and closures of certain keys under this alternative would have negligible, long-term, adverse impacts on current visitor use patterns or opportunities. The potential for increased crowding and conflict, especially during peak use times and between different user groups, would likely increase.

This would result in increased, short-term, minor to moderate, adverse impacts on visitor experiences. There would be beneficial cumulative effects. Alternative 1 would have a slight contribution to these cumulative effects.

## NPS OPERATIONS AND FACILITIES

### Analysis

Actions under alternative 1 would provide for continuation of current visitor opportunities, resource management practices, and law enforcement activities with current levels of personnel, facilities, and equipment. The national park’s developed area, which covers approximately 35 acres, would continue to be used for park operations and to provide recreational opportunities and visitor services. Mainland visitor services and infrastructure, including a visitor center, designated paths and trails, a boardwalk, and jetty, would remain at or near current levels at Convoy Point. Facilities on the keys would also continue to remain at or near current levels as follows:

- Boca Chita Key — boat dock, harbor, historic structures, picnic areas, rest rooms, and primitive campground
- Elliott Key — boat dock, trail, picnic and restroom facilities, environmental education center, ranger station, employee residences, and maintenance facilities
- Adams Key — boat dock, trail, picnic and restroom facilities, and employee residences
- visitor contact points outside the park — limited contact information and signs at public sites

Channels, harbors, and areas with restrictions, such as the slow speed, minimum-wake area (3,295 acres) and Legare Anchorage (2,360 acres), in the park would continue to be marked by existing navigation aids and buoys.

Because of the park’s growing visitation, the park’s staff has estimated that the number of

current employees would need to be increased by 25% to stay current with the needs of law enforcement, visitor protection, resource preservation, facility maintenance, interpretation, and adequate contacts with visitors. However, no staffing increase is anticipated.

Additionally, to provide for effective visitor protection and resource preservation, the park needs updated communications equipment and additional vessels, but such needs would continue to be largely unmet. Special events, such as the Columbus Day Weekend, would likely continue to grow in size, thus resulting in increasing strains on the park's overburdened staff. Visitor destination points, such as day use areas and campgrounds, would continue to be frequently congested and overcrowded during peak visitation periods, challenging the ability of NPS staff and existing facilities to provide an acceptable level of desired services. Thus, this alternative would have long-term, minor to moderate, adverse impacts on park operations and facilities.

### **Cumulative Effects**

Past and ongoing cooperative planning and development projects in the Biscayne Bay region, such as the *Biscayne Bay Partnership Initiative*, *Miami-Dade County Comprehensive Development Master Plan*, and *Biscayne Bay Strategic Access Plan*, and NPS special resource studies, such as those for Miami Circle and Virginia Key Beach Park, have resulted in some long-term beneficial effects on park operations and facilities. NPS participation in such collaborative efforts has enabled the Park Service to engage in constructive dialogue with park neighbors regarding park operations and facilities. Such efforts have provided the Park Service with better information on Biscayne Bay-wide visitor trends, services, and facilities, thus enabling NPS managers to make more informed decisions regarding appropriate park operations and facilities as well as enhancing the park's ability to provide desired services. However, these beneficial effects are almost impossible to measure.

This alternative's long-term, minor to moderate, adverse impacts, in combination with the aforementioned beneficial effects of past and ongoing cooperative planning and development projects in the Biscayne Bay region, would result in long-term adverse cumulative effects. However, this alternative's contribution to these effects would be small.

### **Conclusion**

Overall, actions under alternative 1 would result in continuing, long-term, minor to moderate, adverse impacts on park operations and facilities. The overall cumulative effects would be long term and adverse; this alternative's contribution to these effects would be small and adverse.

## **SOCIOECONOMIC ENVIRONMENT**

### **Analysis**

The no-action alternative would not result in any change to current contributions that park operations and visitation have on the regional economy. Visitors would continue to visit the national park in the same manner and experience the same social conditions. This alternative would not be expected to alter the number of visitors or length of stay in the region. Park operations or development would not change appreciably, so the no action alternative would have no new effect on the socioeconomic environment.

### **Cumulative Effects**

The social and economic situation in Miami-Dade County is affected by a combination of many factors, including the presence of units of the national park system. Some of the \$15.5 billion in federal spending in the county is generated by Biscayne National Park in the forms of employee wages, purchase of supplies, and construction contracts. The livelihoods of service-related businesses in the region rely on the inflow of tourist dollars, especially restaurants and motels.

The total direct economic value of public recreation areas also includes two sets of values: (1) the user benefit that people receive from their visit and (2) the values of land near the recreation area. Economic studies have shown that the value of land can increase with the number of outdoor recreation opportunities and the proximity to outdoor recreation space (Clawson and Knetsch 1966). Therefore, the continued presence and operation of Biscayne National Park provides a long-term, minor, beneficial impact on the residents and property values in the vicinity.

The no-action alternative would have no new contribution to the above beneficial impacts of past, present, and future actions on socioeconomic conditions and, therefore, would not result in any project-related cumulative impact.

### **Conclusion**

Implementing the no-action alternative would have no new impact on the regional economy. There would be no project-related cumulative effects.

### **UNAVOIDABLE MODERATE OR MAJOR ADVERSE IMPACTS**

There would be no unavoidable moderate or major adverse impacts expected as a result of implementing the no-action alternative.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

There would be no change in irreversible or irretrievable commitments of resources as a result of implementing the no-action alternative because there would be no new development occurring in previously undeveloped areas.

### **NATURAL OR DEPLETABLE RESOURCES AND ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

No change in resource consumption, energy requirements, or conservation potential is expected as a result of implementing the no-action alternative.



## IMPACTS OF IMPLEMENTING ALTERNATIVE 2

### NATURAL RESOURCES

#### Fisheries

Under this alternative there would be additional management actions designed to protect fish habitat in the park by reducing the potential negative impacts of boating on seagrass beds such as scarring and localized turbidity. The 1,000-foot slow speed area along the mainland shore would be modified so that the 500 feet nearest the shore would be designated as a Noncombustion Engine Use Zone and the remaining 500 feet would be designated as a Slow Speed Zone. Featherbed and East Featherbed banks and the waters on the northwest side of Elliott Key would be designated a Slow Speed Zone (see Alternative 2 map). A Noncombustion Engine Use Zone (poling and trolling only) would be established in the waters surrounding Totten and Rubicon keys, Jones Lagoon, and the Cutter Bank Shallows. Both the Slow Speed and Noncombustion Engine Use zones would reduce boat traffic overall in these waters as well as reduce the impacts associated with high-speed boat traffic in shallow water such as seabed scarring and localized turbidity. These actions would result in long-term beneficial impacts.

This alternative would provide a greater benefit to fisheries habitat in the seagrass than alternative 1, but these actions do not apply to all habitat areas and do not address adverse impacts on coral reefs. The long-term adverse impacts on fish habitat throughout the park would be less than the no-action alternative but would still continue at a reduced level.

There could be an increase in the number of people fishing from the shoreline from the creation of a new boardwalk at Convoy Point. This would be expected to have a long-term negligible to minor adverse effect on fisheries. Species in both the bay and the reefs would continue to experience substantial pressures from both commercial and recreational

fishing. Some species would continue to be subject to overfishing. These impacts would continue to be adverse and minor to moderate in the long term.

**Cumulative Impacts.** In 2002 the National Park Service and the Florida Fish and Wildlife Commission initiated a *Fishery Management Plan and Environmental Impact Statement*.

Once completed, the *Fishery Management Plan* would involve changes in current management strategies for both recreational boating and commercial fishing activities. These changes could include limits on the type of spearfishing equipment that can be used in the park, a moderate decrease in fisheries harvest, and elimination of the lobster-sport season. With implementation of the *Fishery Management Plan* the park anticipates the current condition of fisheries stocks would improve and the impact of fishing on habitat within the park would be reduced. The long-term impacts of the *Fishery Management Plan* on fisheries in the park would be beneficial. Because proposed management actions under this alternative are more protective of fish habitat than under alternative 1, there would be more benefits on fisheries realized from combining actions under this alternative with the implementation of the *Fishery Management Plan* than implementing the *Fishery Management Plan* alone (as in alternative 1).

The United States Coral Reef Task Force was created in 1998 to lead U.S. efforts to protect, restore, and sustainably use coral reef ecosystems. These efforts include but are not limited to reducing and mitigating coral reef degradation from pollution, overfishing, and other causes. The task force has identified fundamental themes to guide immediate and sustained national action. These themes include quickly reducing the adverse impacts of human activities on coral reefs and associated ecosystems. No specific actions to

achieve these themes have been proposed. However, if the initiatives of the task force are fully implemented, the impacts of these activities would likely be beneficial for the coral reef system in the park. Until any recommendations take effect, coral reefs would still be subject to recreational activities that are harmful to the ecosystem. These impacts would continue to be adverse and minor in the long term.

This alternative would contribute a beneficial impact and continuation of a minor adverse increment to the beneficial and adverse impacts of other past, present, and future actions resulting in beneficial cumulative effects. The magnitude of this contribution of this alternative would be slight.

**Conclusion.** Adverse impacts now occurring on fisheries and habitat in the park would be reduced under this alternative, resulting in a long-term beneficial impact and continuation of a minor to moderate adverse impact. Cumulative effects would be beneficial. The magnitude of this contribution of this alternative would be slight.

### Threatened and Endangered Species

**Manatee.** If the proposed boardwalk at Convoy Point is constructed so that it would have a shading impact on seagrass, it would result in long-term negligible adverse impacts to manatee habitat. Manatees are more likely to be found in the warm waters closest to shore, so as in alternative 1 there would continue to be a manatee protection area in the waters closest to the shoreline. The manatee protection area would be modified so that the 500 feet nearest the shoreline would be designated a Noncombustion Engine Use Zone and the remaining 500 feet would be designated a Slow Speed Zone. Within the Noncombustion Engine Use Zone, management would focus on protecting water-based resources and minimizing visitor use impacts. This zone would provide additional protection to the manatee by reducing the potential for boat-related injuries and mortality in the areas where manatees are most likely to occur. The Slow Speed Zone

and Noncombustion Engine Use Zone would result in fewer boat groundings in seagrass and would reduce collisions with manatees. The modifications to the manatee protection area would have a long-term beneficial impact for manatees in the park.

**Section 7 Determination of Effect** — The impacts on the manatee under this alternative would be small, localized, and beneficial. Measurable beneficial outcomes on individual manatees and the manatee population because of the protective zones are likely. This would equate to a “may affect, not likely to adversely affect” determination.

**Sea Turtles.** Collisions between boats and sea turtles would be expected to be minimized in Slow Speed and Noncombustion engine use zones. However, given the size of these zones compared to the size of the Multiuse Zone, the beneficial impacts from implementing this alternative would be minor.

The hardened trail on Elliott Key could increase the number of visitors that venture over to the beaches where the turtles tend to nest. This could require that the park change the management of this area to minimize disturbance to the turtles. Additional mitigation measures could also include increased visitor education and increased monitoring throughout the park and particularly in areas near where turtles nest. With mitigation, the impacts would be long-term and adverse but negligible.

**Section 7 Determination of Effect** — The impacts on sea turtles under this alternative would long-term and adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination.

**American Crocodiles.** The mainland shoreline between Black Point County Park and Convoy Point would be managed to enhance visitor access and recreational use. Proposed development includes a boardwalk along the mangrove shoreline as well as catwalks across some mangrove canals. These actions would have short-term, minor, adverse impacts on

crocodile habitat during construction. The new access points could also increase the number of visitors to these areas. The potential increase in visitation could disturb the crocodiles and cause the animals to move from their preferred habitat in the mangroves. However because the proposed development would be north of the designated critical habitat area for the crocodiles, and relatively few crocodiles are seen north of Convoy Point, the adverse impacts would be negligible. The remainder of the mainland shoreline would continue to be managed as it is now (alternative 1).

The designated critical habitat includes the eastern shorelines of the keys southwest of the tip of Elliott Key to the park boundary. The critical habitat includes Porgy Key, which would be zoned to provide visitor services as well as a base for some park administration activities. There are limited areas with appropriate habitat on Porgy Key for crocodiles, so the impacts of any proposed development would be minimal and localized. Visitation in this area would be expected to remain at current levels or increase because of the improved facilities and array of activities available on the key. These activities could include canoe rental, which would allow visitors a nearby access point to the water zoned for noncombustion engine use around Old Rhodes and Totten keys. There are dense mangrove areas along the eastern shores of both keys. Currently the impact of increased visitation in this area on either habitat or individuals would be low. Although this area is within the designated critical habitat, few crocodiles have been seen in this area so impacts are expected to be adverse but negligible.

If, because of human population pressure along the mainland, crocodiles increasingly venture across the bay there could be increased interaction between visitors and crocodiles around Old Rhodes and Totten keys. The park would implement an outreach effort to reduce the potential for negative interactions between crocodiles and visitors. The developed area at Adams Key would provide an excellent opportunity to orient

visitors to this area of the park, including appropriate actions when traveling in the crocodile habitat. With mitigation, the impact on this alternative on the crocodile population in this area of the park would be negligible.

**Section 7 Determination of Effect** — The impacts on the American crocodile under this alternative would be adverse but negligible. Mitigation measures would be put in place in the event of more visitor-crocodile interactions from population pressures near the park. Overall, this would equate to a “may affect, not likely to adversely affect” determination for the American crocodile.

**Smalltooth Sawfish.** Construction of a boardwalk and platform in the mangroves would affect a small amount of potential habitat. As in other alternatives, smalltooth sawfish could be affected by any increase in hook-and-line fishing efforts, although any effects are unlikely given the rarity of smalltooth sawfish in Biscayne.

**Section 7 Determination of Effect** — The impacts on the smalltooth sawfish under this alternative would be adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination for the smalltooth sawfish.

**Schaus Swallowtail Butterfly.** The developed area on Adams Key would be expended and would include a new staging area for canoes/kayaks, a dock, primitive campgrounds, improved trails, and possibly a general store. The majority of this development would be likely to be near shore so would have a limited impact on butterfly habitat. Development away from the water could be located to minimize impacts on butterfly habitat. The long-term impacts on the butterfly would be adverse but negligible.

The trail on Elliott Key that runs along the length of the island through the hardwood hammock would remain and would be hardened. Hardening of the existing trail could impact the butterfly, particularly if such hardening requires removal of trees or occurs

during a critical time in its life cycle. These impacts could be mitigated by timing trail work so that it does not coincide with butterfly breeding season, minimizing the number of trees that need to be removed during the hardening process, and minimizing changes in the drainage pattern on the island once the trail is completed. With these mitigation measures, long-term impact on butterfly habitat under this alternative would be negligible to minor.

Management of Old Rhodes, Totten, and Swan keys would remain as in alternative 1 to preserve natural resources with limited visitation. This would continue to have a beneficial impact on the butterfly population on these keys. The greatest threat to the butterfly population and habitat would remain weather-related phenomena.

**Section 7 Determination of Effect** — The impacts on the Schaus swallowtail under this alternative would be adverse but minor. Mitigative measures to protect the species' habitat and breeding season are likely to be successful. Overall, this alternative would result in the determination of “may affect, not likely to adversely affect” the Schaus swallowtail.

**Acroporid corals.** The use and maintenance of navigational markers and mooring buoys would continue to protect acroporid corals from unintentional vessel and anchor damage. Under this alternative the Legare Anchorage would be reduced in size from its current configuration, although it would continue to be closed to in-water activities and would provide protection to Acroporid corals that may be located in this area.

Fishing and recreational boating would continue in Acroporid coral habitat in the park, allowing for the possibility of ecological and physical damage to Acropora from overfishing, fishing debris, anchoring and/or vessel groundings. Management activities under this alternative would continue to have negligible impacts on these species, and there would be no new project-related impacts to Acroporid corals.

**Section 7 Determination of Effect**— The impacts on Acroporid corals under this alternative would be beneficial but negligible and long-term. Overall, this alternative would result in the determination of “may affect, not likely to adversely affect” Acroporid corals.

**Cumulative Impacts.** Habitat disturbance or loss resulting from past actions is the most common reason for a species to be listed. The establishment of Biscayne National Park has provided a protective refuge for listed species resulting in long-term beneficial impacts. The *Florida Manatee Recovery Plan* and the site-specific county plans are designed in part to reduce boat-related manatee injury and mortality as well as protect habitat areas. These measures are consistent with protection measures incorporated into the proposed actions in this general management plan. Implementation of this recovery plan would have a beneficial impact on manatee protection efforts in the park. The impacts of these changes in conjunction with the state setback would continue to have a beneficial impact on manatee protection efforts.

Alternative 2 would result in negligible adverse and beneficial impacts on federally listed species. When combined with the impacts of other past, present, and future actions, the overall cumulative effect would be negligible and beneficial. Alternative 2's contribution to these cumulative impacts would be slight.

**Conclusion.** Implementing alternative 2 would result in protective measures that would provide beneficial impacts on manatees and acroporid corals. There could be negligible impacts on smalltooth sawfish. Under this alternative there would be proposed development that could impact American crocodiles, sea turtles, and Schaus swallowtail butterflies. The park would continue to coordinate with the U.S. Fish and Wildlife Service and National Marine Fisheries Service and work to mitigate any adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect,

listed species in the park. Cumulative effects would be negligible and beneficial. Alternative 2's contribution to these cumulative impacts would be slight.

### **Special Status Species, including State Listed Species**

**Birds.** West Arsenicker Key, used by bald eagles, would be zoned a Sensitive Resource Area and would remain closed. There would be no effect on the bald eagle population or nesting activity on West Arsenicker Key. Under this alternative, Sands Key, which is currently closed to visitors, and the islands surrounding Jones Lagoon would be zoned as Nature Observation Zones. The waters of Jones Lagoon would be designated a Noncombustion Engine Use Zone. Visitation would be allowed to Sands Key and the islands of Jones Lagoon, so there would be some human caused intrusions to birds nesting, roosting, loafing, and/or foraging there; however, resource protection would be emphasized. Actions under alternative 2 would reduce, although not eliminate, the potential for disturbance to birds using the Jones Lagoon area because there is still the possibility that small vessels (e.g., kayaks and canoes) and people coming ashore could closely approach birds. These disturbances could result in disruptions to natural nesting, roosting, loafing, or foraging behaviors of state-listed birds. Given that visitation to both Sands Key and Jones Lagoon would be expected to remain minimal, adverse impacts on the birds and their habitat would be negligible. If visitation increases such that any state-listed birds could be disturbed, management actions could include limiting access during nesting season to areas where birds are known to nest and/or establishing set-back distances following recommendations in scientific literature. Under this alternative, the long-term adverse impact on the state-listed bird populations in the park and potential nesting activity on Sands Key and the Jones Lagoon area would be negligible.

Current visitation to the ocean side of Elliott Key is low. It is likely that the level of visita-

tion on Elliott Key would increase once the additional facilities are developed—including hardening of the trail that runs the length of the island and three primitive campsites near Petrel Point. Birds using coastal areas adjacent to areas developed for visitor recreation (such as Elliott Key) could be exposed to potential disturbances from the noise of boat engines and close approaches by people. This exposure could result in an alteration of natural behaviors, including the potential for nesting birds to inadvertently crush their eggs while fleeing or to temporarily or permanently abandon their nests, thereby exposing the eggs to predators and extreme temperatures. If visitation to the ocean side increases such that the state-listed birds could be discouraged from nesting or disturbed during nesting, the park could enforce no-access set-back distances, and/or close beach areas near Petrel Point during critical nesting season to reduce impacts on the birds.

The proposed Slow Speed Zone on the northern bay side of Elliott Key would be expected to reduce the likelihood of disruptions to birds using the coastal areas immediately adjacent to this zone. As a result, beneficial effects on state-listed birds in the immediate area would be expected.

Under this alternative, birds using coastal habitats along the park's mainland shoreline would receive protection from potential boat-related disturbances from (1) the Noncombustion Engine Use Zone that extends 500 feet east from the mainland (excluding Black Point, Convoy Point, and Turkey Point channels) and (2) a Slow Speed Zone covering the area 500 to 1,000 feet from the shoreline. By essentially reducing the usage of the waters immediately adjacent to the mainland shoreline, these two zones would be expected to reduce potential boat-related disturbances to birds that are roosting, nesting, foraging, and/or loafing along the mainland shoreline.

Overall, under this alternative with any necessary mitigation, the long-term impact on state-listed bird populations and nesting activity in the park would continue to be negligible.

**Miami Blue Butterfly.** Although visitation to most of Elliott Key is currently low, it is likely that visitation would increase once the additional facilities are developed—including hardening of the trail that runs the length of the island and three primitive campsites at Petrel Point. However, there is typically little interaction between visitors and these small butterflies. During installation of the trail and campsites, the area would be checked by a qualified biologist to ensure that no individuals would be disturbed. Under this alternative and with any necessary mitigation, the long-term impact on the Miami blue population in the park would be negligible and not likely to lead to federal listing.

**Cumulative Impacts.** Reintroduction efforts of Miami blue butterflies have occurred on Elliott Key in an attempt to restore this species. If successful, this would be a long-term beneficial impact. The monitoring and recovery plan would continue to be implemented.

At the time this general management plan was started, bald eagles were federally listed as endangered. They have since been delisted because of population recovery due in part to protected nesting habitat, indicating a long-term beneficial impact on this species.

These species were listed because of the adverse impacts of habitat disturbance or loss resulted in dramatic reduction in their numbers. The establishment of Biscayne National Park has provided increased protection of eagle and butterfly habitat in the park.

Alternative 2 would result in negligible adverse impacts on bald eagles and Miami blue butterflies. When combined with the adverse impacts of other past, present, and future actions, the overall cumulative effect would be minor and adverse. This alternative's contribution to the cumulative effects would be small.

**Conclusion.** Under this alternative there would be proposed development that could result in long-term negligible adverse impacts on state listed species. Cumulative effects

would be minor and adverse. This alternative's contribution to the cumulative effects would be small.

## Terrestrial Vegetation

Under this alternative, the adverse impacts on terrestrial vegetation on the keys, particularly the hardwood hammocks, would be greater than for alternative 1. Boca Chita, Elliott, Adams, and Porgy keys would be managed for visitor access and recreation. Visitation to these keys would be expected to increase because visitor services would be concentrated in these areas. Impacts from increased visitation could include trampling of vegetation and social trails. The adverse impacts of increased visitation on vegetation would be negligible to minor in the long term.

The proposed development on Boca Chita, Elliott, Adams, and Porgy keys would be kept within areas that have been previously disturbed to the extent practicable. Access to the Jones home site on Porgy Key would be managed to minimize impacts on sensitive resources. Some localized impacts could occur, but the adverse impacts on vegetation on the keys would be minimal. Any areas cleared during construction would be revegetated to minimize the long-term adverse impacts of the proposed development. The adverse impacts on vegetation on the islands from proposed development would be localized and negligible.

Under this alternative, the hiking trail on Elliott Key would be hardened from Petrel Point north to just past the University Dock, approximately 5 miles. Because the trail already exists, the impacts on the vegetation would be minimized and larger trees near the trail avoided to the extent possible. The trail could also be constructed to minimize changes in drainage that could occur because the trail has been hardened. With mitigation, the impacts on the vegetation would be adverse and negligible to minor in the long term.

Under this alternative, three new primitive campsites would be developed on Elliott Key.

Although the infrastructure to support these campsites would be minimal, there would be hardened trails to the campsites. These trails would be developed to minimize the development of social trails, although they could still occur, and minimize the overall impact on the vegetation. The impacts of these trails would be mitigated through site design. The impacts of vegetation removal for the proposed campsites would be adverse but negligible to minor in the long term. The impacts of vegetation removal for the proposed hardening of trails would be adverse and negligible in the long term because the trails are existing. Some revegetation would occur as well.

Potential development of a food concession on shore at Elliott Key would have adverse impacts on the vegetation. The impacts on the vegetation would depend on the site chosen and the footprint associated with the development. The impact could be minimized by building on areas that have been previously disturbed or where minimal vegetation removal would be required. Because the exact location is not known, it is not possible to evaluate the impacts at this time. Before the development of a food concession on Elliott Key, additional environmental compliance would be conducted to determine the impacts on vegetation and other resources at Elliott Key.

**Cumulative Impacts.** Nonnative invasive plant species can change the structure and function of native plant communities. These changes have an adverse impact on habitat for native species that rely on the native plant communities. Disturbances of native vegetation encourage growth of invasive species. Removal of the exotic species would provide better conditions to reestablish native vegetation in disturbed areas, which could help mitigate the adverse impacts associated with social trails in the park. Implementation of this plant management plan would have a beneficial impact on terrestrial vegetation in the park and the habitat it provides.

A *Fire Management Plan* was developed that includes the park's upland areas. This plan

helps guide resource management efforts in the park in the vegetation communities that are fire adaptive. Because these plant communities are fire adaptive, controlled burning would be beneficial and would reduce unnatural fuel buildup associated with catastrophic fires. Implementation of this fire management plan has a beneficial impact on the terrestrial vegetation in the park and the habitat that it provides.

When the negligible to minor adverse impacts of alternative 2 are combined with the impacts of other past, present, and future actions, the resulting cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative impacts.

**Conclusion.** Implementing this alternative would result in long-term, negligible to minor, adverse impacts on terrestrial vegetation. Cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative impacts.

### **Submerged Aquatic Communities**

There would be fewer adverse impacts on submerged aquatic communities in the park than under alternative 1 because this alternative proposes some control on recreational activities such as boating.

Featherbed and East Featherbed banks would be designated a Slow Speed Zone, as would the area 500 feet to 1,000 feet from the mainland shoreline. The Slow Speed Zone would reduce the potential for scarring the seagrass beds as well as increasing turbidity in the water column, thus minimizing adverse impacts on the productivity of this habitat and water quality in the area. The area from the mainland shoreline to 500 feet and the waters within Jones Lagoon and around Totten Key to Cutter Bank Shallows would be zoned for noncombustion engines only. The aquatic community nearest the mainland shore is seagrass, and the waters in Jones Lagoon to Totten Key and Cutter Bank Shallows have a combination of both the seagrass and hardbottom communities. Compared to alternative 1, the potential for adverse impacts

on these communities would be reduced because there would be fewer boats in the area and boats would be moving relatively slowly. Losses in productivity in these areas would be less because of the reduced potential for scarring and turbidity. The long-term impacts on submerged aquatic communities in these areas would be beneficial. The waters around Porgy Key are exceedingly shallow and have abundant benthic life such as small corals, sponges, and marine plants. As a result of increased visitation to Porgy Key, impacts on this marine benthic community would be minor, adverse, and long term.

**Cumulative Impacts.** Damage to seagrass beds from boat groundings and anchors has degraded habitat for shrimp, crabs, snails, lobster, and echinoderms that inhabit these areas.

Boat groundings (with propeller and hull impacts) and inadvertent placement of anchors have damaged the dense soft corals, sea fans, and sponges in the hardbottom communities, which in turn have an adverse impact on the fish and invertebrates that seek refuge in these areas.

The waters around Porgy Key are exceedingly shallow and have abundant benthic life such as small corals, sponges, and marine plants. As a result of increased visitation to Porgy Key, impacts to this marine benthic community would be minor, adverse, and longterm.

The proposed Convoy Point boardwalk would result in removal of wetland plants and have shading impacts on seagrasses and other aquatic life. Impacts would be adverse, minor, and longterm.

Coral reefs are complex ecosystems and sensitive to disturbances. Fishing, snorkeling, and diving can also have adverse impacts on coral reef systems. The damage caused by these activities includes scarring from boat propellers and inadvertent placement of anchors, as well as breakage caused by snorkeling and diving. Debris from recreational and commercial fishing (e.g., fishing tackle and lines from crab and lobster traps) left on the reef can wrap around the coral and

damage it. Fishing also results in removal of predators and the removal of herbivorous fish that keep algae minimized (contributes to reef health). Damage to the coral reefs also adversely impacts other species that rely on the reefs for food and shelter. Damage to the seagrass beds, hardbottom communities, and coral reefs have resulted in long-term minor to moderate, adverse impacts.

Alternative 2 would result in long-term minor beneficial impacts. When combined with the adverse impacts of other past, present, and future actions, the cumulative impacts would be minor to moderate and adverse. The contribution of this alternative to these cumulative effects would be small.

**Conclusion.** Alternative 2 would result in long-term minor beneficial impacts on submerged aquatic communities. Cumulative effects would be minor to moderate and adverse. The contribution of this alternative to these cumulative effects would be small.

## Wetlands

Wetlands in the park would continue to serve as an important habitat area for a wide variety of terrestrial and aquatic species in the park. Placement of the Nature Observation Zone along the mainland would give greater protection to mangrove shorelines. This would have minor, beneficial, and long-term impacts.

Under this alternative, a shoreline boardwalk would be developed through the mangrove forest to link the canals in the park. Construction of the boardwalk would cause both short-term and long-term impacts on the wetlands along the mainland shoreline. During construction there would be short-term adverse impacts on water quality from increased turbidity. Increased turbidity in the water column would temporarily degrade the habitat for aquatic species, which could also impact terrestrial species, particularly birds. These adverse impacts would be minor to moderate but localized. Long-term impacts would come from the removal of mangroves and other wetland plants and the shading of seagrasses, mangroves, and other vegetation



from the boardwalk that could reduce the type and density of the mangroves near these developments. The localized adverse impacts would be long term and minor.

No additional access into the mangroves that fringe the keys would be developed under this alternative, so there would be no change in the current size, integrity or continuity of the wetland areas in the park. Mangroves are extremely difficult to walk through and so the proposed visitor facility improvements at Porgy, Adams, Elliott, and Boca Chita keys might attract more visitors but are not likely to affect the wetlands.

**Cumulative Impacts.** The Biscayne Bay Coastal Wetlands Project of the Comprehensive Everglades Restoration Plan includes pump stations, spreader swales, stormwater treatment areas, flow ways, levees, culverts, and backfilling canals in southeast Miami-Dade County and covers 13,600 acres from the Deering Estate south to the Turkey Point Power Plant. The purpose of this project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. The proposed project will replace lost overland flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The proposed redistribution of freshwater flow across a broad front is expected to restore or enhance freshwater wetlands, tidal wetlands, and near-shore bay habitat. Sustained lower-than-seawater salinities are required in tidal wetlands and the near-shore bay to provide nursery habitat for fish and shellfish. This project is expected to create conditions that will be conducive to the reestablishment of oysters and other components of the oyster reef community.

Diversion of canal discharges into coastal wetlands is expected not only to reestablish productive nursery habitat along the shoreline but also to reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets. The impact of these actions once implemented would be beneficial for wetlands

inside and outside the park. The actions proposed in the Biscayne Bay Coastal Wetlands Project could improve the overall health of the wetland areas along the mainland shoreline such that the system as a whole is better able to accommodate the stresses associated with the short- and long-term impacts of the development and human use in the area.

This alternative would contribute minor adverse impacts to the beneficial impacts of other present and future actions resulting in a beneficial cumulative impact. The contribution of this alternative to these beneficial cumulative effects would be small and adverse.

**Conclusion.** Under this alternative the proposed development would have an adverse impact on the wetlands along the mainland coast of the park, particularly the mangroves. Short-term impacts associated with construction would continue to be adverse but minor to moderate and localized. The long-term impacts would be mitigated through design and would be adverse but localized and minor. If the Biscayne Bay Coastal Wetlands project is implemented, cumulative effects would be beneficial. The contribution of this alternative to these beneficial cumulative effects would be small and adverse.

## **Soundscapes**

Under alternative 2, there would be areas of the bay zoned for slow speed or noncombustion engine use. Because these restrictions would reduce the level and duration of noise from boats, there would be long-term, minor, beneficial impacts on soundscapes on portions of the bay and adjacent land.

The new construction called for in this alternative would result in short-term, localized, adverse impacts that would be minor in intensity. Long-term impacts from use of new development such as trails and boat launches would be adverse but negligible. Existing natural soundscapes in the interior of the larger keys would continue to be preserved by vegetative screening, a continuing, minor, beneficial impact.

**Cumulative Effects.** Natural soundscapes have been degraded from activities on land and water portions of the park such as vehicle traffic, boat engines, agricultural or industrial activity, and occasional construction. Because most of the park is open water, noise from motorized boats is the most prevalent disruption to natural soundscapes.

The concentration of visitors around the visitor center and parking lot also affects the natural soundscape at Convoy Point. NPS staff mowing the grass and blowing leaves causes short-term, localized, adverse impacts on the soundscapes in this area. This noise is generally tolerated in the Visitor Services/Park Administration Zone, so the related impacts would be adverse but negligible.

Natural soundscapes predominate in the distant portions of the park away from popular boating routes. Increases in visitation on weekends and during special events add to the number of boats at one time on the bay. More boats leads to an increased noise level and results in short-term, minor to moderate, adverse impacts.

The minor beneficial impacts of this alternative, in combination with the adverse impacts of other actions, would result in minor and adverse cumulative impacts on the natural soundscape; however, the relative contribution of this alternative to these impacts would be small.

**Conclusion.** Implementing alternative 2 would have long-term, minor, beneficial impacts on soundscapes and short-term, minor, adverse impacts during construction. The overall cumulative impacts would be minor and adverse; this alternative's contribution to these effects would be small.

## CULTURAL RESOURCES

### Archeological (including Submerged Maritime) Resources

**Analysis.** Under alternative 2 archeological (including submerged maritime) resources in

the national park would continue to be protected as governed by law and policy, but they would be subjected to greater risk of inadvertent or intentional damage by the alternative's provision for expanded recreational use, enhanced services, access to specific areas, and new or enhanced facilities.

Under alternative 2 archeological resources could be adversely impacted by the following specific actions on keys selected as principal visitor destination points:

- expanded recreational development for day use and camping and adaptive use of historic Boca Chita Key
- development and upgrading of new and existing trails, establishment of primitive campsites, and installation of composting toilets and visitor kiosks on Elliott Key
- improved visitor services and facilities and development of a small commercial visitor services facility and staging area for canoes and kayaks on Adams Key
- construction of a dock to facilitate vessel access on Porgy Key

All ground-disturbing activities would be preceded by site-specific archeological surveys and, where appropriate, subsurface testing to determine the existence of archeological resources and how best to preserve them. Known archeological resources would be avoided to the greatest extent possible. Few adverse impacts on archeological resources from construction would be anticipated, but any adverse impacts would be permanent and minor to moderate in intensity.

Although ongoing and expanded archeological site monitoring programs would be initiated and efforts would be undertaken to minimize or mitigate potential impacts from human activities, increased recreational use and access to areas of the park could result in the disturbance of archeological resources because of inadvertent visitor impacts or vandalism. A loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence could result. Continued ranger patrol and emphasis

on educating the general public and diving community regarding the significance and fragility of archeological resources would discourage illicit activities and inadvertent impacts and help minimize adverse impacts. Adverse impacts would primarily be minor and permanent.

Although stabilization/interpretation of the Jones home site historic ruins on Porgy Key would enhance protection of those archeological resources as a beneficial impact, more visitors would be drawn to the area, thus increasing the possibility of disturbance, degradation, or loss of resources as a result of inadvertent human activities or vandalism at a site that was formerly protected by its isolation and relative inaccessibility. The latter would be a long-term, minor, adverse impact.

Provision for a wide variety of expanded recreational activities on most of the park's water acreage, Elliott Key (not including the Visitor Services/Park Administration Zone), and the mainland between Convoy Point and Black Point County Park could result in disturbance, degradation, or loss of resources associated with the Offshore Reefs Archeological District as well as other submerged maritime and terrestrial archeological resources scattered throughout the park.

Archeological (and submerged maritime) resource protection would be a high priority in the Nature Observation Zone that would be managed to limit intensive visitor use. Under this alternative, this includes three mainland areas and Ragged, Sands, Rubicon, Reid, Old Rhodes, Totten, Gold, East Arsenicker, Long Arsenicker, and Mangrove keys. Nevertheless, self-directed visitor activities designed to immerse visitors in relatively remote surroundings would potentially subject known and unknown archeological (terrestrial and submerged maritime) resources in the park to disturbance as a result of inadvertent human activities or vandalism because visitors would be drawn to areas that were formerly closed to visitors or protected by their relative isolation.

Reduction of the Legare Anchorage to about 1 square mile would continue to afford protec-

tion to sensitive underwater archeological resources in the Offshore Reefs Archeological District. Better navigational markings and more logical coordinate-based designation of the protected zone might result in improved public compliance with the regulations in the Legare Anchorage, and closure of the Legare Anchorage to commercial trapping would reduce resource damage from snagged gear. These steps could be expected to provide additional protection that would result in a long-term and localized beneficial impact on archeological resources.

Potential archeological resources on West Arsenicker and Arsenicker keys and in the water extending out 500 feet from them and on Soldier and Swan keys would continue to be protected by keeping them closed to visitors and only permitting research under a permit. This continued protection would provide a long-term and localized beneficial impact on archeological resources.

**Cumulative Effects.** Impacts associated with other past, present and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 2 would result in permanent, negligible to moderate, adverse effects and beneficial effects. The impacts of alternative 2, in combination with both the negligible to moderate permanent adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a permanent, minor to moderate, adverse cumulative effect. The adverse effects of alternative 2, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although they would be subjected to greater potential risk for adverse impacts because of expanded recreational use and increased visitor services, facilities, and access in some areas of the park.

Actions under this alternative would have the same cumulative effects on archeological

resources as those listed under alternative 1. This alternative's contribution to those cumulative effects would be small.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on archeological resources. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

### Historic Structures and Buildings

**Analysis.** Under alternative 2, rehabilitation, preservation, and adaptive use of historic structures in the Boca Chita Key Historic District for visitor services/park administrative purposes would be conducted in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. However, some minor elements of historic fabric could be lost as a result of remodeling/rehabilitation efforts, and anticipated increasing visitation levels could result in loss of some historic fabric from inadvertent visitor use or vandalism. Impacts on historic buildings and structures under alternative 2 would be the same as those listed under alternative 1 (localized, long-term, beneficial and long-term negligible to minor adverse).

Under this alternative the Fowey Rocks Lighthouse could be transferred from the Coast Guard to another organization/agency in accordance with the National Historic Lighthouse Preservation Act (2000). Provisions of the act stipulate that the organization or entity receiving the lighthouse preserve and maintain it in accordance with the *Secretary's Standards*. Preservation of the lighthouse in accordance with the *Secretary's Standards* would have a long-term, beneficial impact on the lighthouse.

**Cumulative Effects.** Implementation of this alternative would have the same cumulative beneficial effects on historic structures and buildings in Boca Chita Key Historic District as those listed under alternative 1.

Actions under this alternative, when combined with other past, present, and reasonably foreseeable future planning endeavors or undertakings to preserve historic structures and buildings in the park and its surrounding region would result in long- and short-term beneficial cumulative impacts. This alternative's contribution to these cumulative effects would be small.

**Conclusion.** Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1. As with alternative 1, impacts on historic structures and buildings would be localized, long term to permanent, and generally beneficial. Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the *Secretary's Standards*.

Actions under this alternative would have the same cumulative effects on historic structures and buildings as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on historic structures and buildings. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## Cultural Landscapes

**Analysis.** Implementation of this alternative would have the same impacts on cultural landscapes in the park as those listed under alternative 1 because potential landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria of evaluation, and the National Park Service would implement resource management policies that preserve the natural resource values and culturally significant character-defining patterns and features of Boca Chita Key or other listed, or determined eligible, landscapes in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*.

Enhancement of Boca Chita Key as a visitor destination point and park administration center could result in some loss to the integrity of the key's cultural landscape, which would be a negligible to minor, long-term, adverse impact. Additionally, some minor elements of the historic scene in the Boca Chita Key Historic District could be impacted by rehabilitation and adaptive use of the historic structures for purposes that are inconsistent with historic use of the area, new facility construction that is incompatible with the district's historic structures, and anticipated increasing levels of visitation, which would also be a negligible to minor, long-term, adverse impact.

Enhancement of recreational opportunities to attract increasing numbers of visitors to Elliott Key through development and upgrading of new and existing trails, establishment of primitive campsites, and installation of composting toilets and visitor kiosks could have some minor long-term adverse effects on the Sweeting Homestead's potential cultural landscape.

Minor elements of the potential cultural landscape at the Jones home site historic ruins on Porgy Key could be compromised because interpretation of and hardened trail access to the ruins would draw growing numbers of

visitors to a remote site that has been largely inaccessible. These impacts would likely be minor, adverse, and short-term to long-term. Construction of a dock on Porgy Key could have short-term to long-term minor adverse impacts on the potential cultural landscape's historic scene.

Enhancement of recreational opportunities and visitor facilities throughout much of the park's lands and waters could result in some additional minor, long-term, adverse impacts on the integrity of the potential parkwide maritime cultural landscape.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 2 would result in negligible to minor, long-term, adverse effects and beneficial effects. The impacts of alternative 2, in combination with negligible to minor, long-term, adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor, long-term, cumulative effect. The adverse effects of alternative 2, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same beneficial impacts on cultural landscapes as those listed under alternative 1, although expanded recreational use; enhanced visitor services, facilities, and access; and increased development could have some minor, adverse, long-term impacts on the integrity of the park's potential cultural landscapes. Actions under this alternative would have the same cumulative effects on cultural landscapes as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on cultural landscapes. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and*

*Guidelines for Documentation and Treatment of Cultural Landscapes* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## VISITOR EXPERIENCE

### Analysis

**Diversity of Visitor Activities.** Under this alternative, visitors would continue to have unrestricted access (as described in the Multiuse Water Zone) to most of the park's waters (approximately 95%) to participate in a wide range of recreational opportunities such as motorboating, sailing, canoeing, swimming, scuba diving, snorkeling, fishing, and nature study. The remaining park waters would have some restrictions or changes (existing and new) that would potentially enhance, modify, limit, or prohibit some visitor access and activities.

This alternative would continue to require visitors to maintain slow speeds along the mainland shore and at Sands Cut. This would continue the long-term beneficial impacts of visitor safety and manatee protection. This alternative would also add a Slow Speed Zone to Caesar Creek and the Featherbed Bank and East Featherbeds area west of Boca Chita Key. This additional Slow Speed Zone would help increase visitor awareness of this relatively shallow and sensitive area of the bay. Slower speeds in the Featherbeds would reduce the frequency and severity of boat groundings, which would be a long-term beneficial impact on the quality and safety of some visitor experiences. Some visitors would have boats with too deep a draft to be able to operate successfully at slow speeds in these areas and would be excluded from access. For some visitors this additional formal restriction would be perceived as a long-term, minor, adverse impact on their visitor experience while boating in the park. The total area of park waters that would have slow speed restrictions would be about 1.2%.

The Noncombustion Engine Use Zone would include two areas—waters within 500 feet of the mainland and the Cutter Bank/Jones

Lagoon area. This zone would have effects that are similar to the Slow Speed Zone but would require boaters to pole or use an electric trolling engine. Some visitors would have boats with too deep a draft to be able to operate successfully at the slow speeds required from using a noncombustion engine and would be excluded from these areas. For some visitors this change would be perceived as a long-term, minor, adverse impact on their visitor experience while boating in the park. Other visitors would benefit over the long term because the resulting decrease in noise, speeds, and number of motorboats would enhance visitor safety and opportunities to quietly explore the mangroves and lagoons by canoe and kayak, observe wildlife, experience the natural sounds of the marine environment, and find solitude. Also, boaters would have less likelihood of grounding in this zone, and flats anglers would have improved conditions for successful catches—long-term beneficial impacts.

Under this alternative, the Legare Anchorage would be rezoned and reduced in size relative to current conditions. This would result in visitors having access to an additional 1,700 acres of reef waters for a full range of recreational activities (in the Multiuse Zone). The Sensitive Underwater Archeological Zone, which would be applied to a smaller area of the Legare Anchorage, would allow for limited visitor access, which is currently the case. The addition of 1,700 acres to the Multiuse Zone would provide visitors enhanced opportunities for access and recreation, which would be a long-term beneficial impact on visitors' abilities to access and recreate in park waters.

The continued closure of West Arsenicker Key, Arsenicker Key, and adjacent waters to visitation would not change. What would change under this alternative would be the application of the Sensitive Resource Zone to 500 feet out from the keys' shorelines. This would be a slight increase over the current 200-foot closure. Also, Swan Key would be closed to visitors. This island is currently lightly used; however, those visitors who enjoy the current unrestricted access might find this

closure to be a long-term, minor, adverse impact on visitor's access to travel throughout the park.

The northern and southern sections of the mainland, most of the southern keys, and all of Sands Key would be in the Nature Observation Zone. The relative inaccessibility of the mangrove forests naturally limits the range of visitor activities. Most visitors to these areas would likely experience few interactions with others and would have opportunities to explore, observe nature, and find solitude. This in general would result in little change over current visitor experience conditions. Also, Sands Key is currently closed to the public. Making it available to the public would be a long-term beneficial impact on visitors' abilities to access and enjoy park resources.

**Visitor Services and Facilities.** The addition of a viewing platform and mangrove boardwalk at Convoy Point would substantially increase visitors' opportunities to walk, fish from shore, see the scenery, and explore and learn about mangrove habitat. These additions would enhance the range and quality of recreational and interpretive opportunities available in the Convoy Point area and potentially extend the length of a person's visit. These facilities would be long-term beneficial enhancements to the visitor experience, especially for visitors who do not have the time, ability, or means to visit outlying park resources.

Both Porgy Key and Adams Key would be zoned for visitor services. Providing a concessioner transport service to either island with opportunities for commercial canoe rentals would substantially enhance opportunities for visitors to safely access and explore the adjacent Noncombustion Engine Use Zone in and around Jones Lagoon and the southern keys. Dock improvements, improved trails, cultural resource stabilization, and interpretation could happen at either Adams Key or Porgy Key. Primitive camping and a general store would be considered for Adams Key. These services, facilities, and enhancements would be a long-term beneficial impact on visitors' recreational opportunities in the

southern sector of the park and enhancing opportunities for education, solitude, and nature observation. Although it is anticipated that this type of service would increase the number of encounters between visitors, the size and character of this area of the park would enable easy dispersal and separation of groups most of the time.

The substantial amount of trail hardening throughout Elliott Key would considerably improve the accessibility of most of the island to visitors and support the broader opportunities available in multiuse zones. Providing primitive campsites at the more remote cove areas would offer additional opportunities for visitors to experience a more rugged, back-country, maritime environment. Provision of visitor services such as toilets, kiosks, and a possible food concession, as well as the amenities above, would in general make Elliott Key much more attractive as a destination within the park. Visitation would likely increase, and there would be an increased frequency of visitor encounters. In general, these changes would have long-term beneficial impacts on the visitor experience. However, the experience of some visitors who are attracted to the island for purposes of solitude and nature study would potentially perceive minor adverse impacts because of the additional activity and visitor levels.

All of Boca Chita Key would be included in the Visitor Services/Park Administration Zone. This alternative would entail a substantial increase in docking and mooring capacity and retaining wall improvements. Increased docking capacity would provide opportunities for more visitors to access and recreate on the island. The improved access would likely result in increased visitor encounters and an overall increase in yearly visitation. Reuse of historic structures in lieu of new construction would be a positive impact on the visitor experience because it would maintain the historic integrity and ambiance of the cultural landscape and opportunities for visitors to learn about and understand past use of the key. Given the popularity of Boca Chita Key, increasing visitor access to and visitor services on this

key would be a long-term beneficial impact on visitor access and use. Construction of docking facilities and accompanying noise would likely cause short-term, minor, negative impacts on visitors.

In this alternative, visitors, especially those with their own boats who normally would not visit Convoy Point, would have substantially increased opportunities to access information about the park before entering. The placement or enhancement of visitor information points at locations outside the park would help visitors learn about the park and any regulations or necessary permits, and would help them plan their visit in advance; thus they could use their time more efficiently and potentially have a more enjoyable visit.

### Cumulative Effects

The growing population of the Miami-Dade region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. To this end there are a number of recent and ongoing studies and partnership efforts underway in the Biscayne Bay area to improve and protect water quality and quantity, wetlands, fisheries, and coastal viewsheds. Projects include the *Fishery Management Plan for Biscayne National Park*; the *South Miami-Dade Watershed Study and Plan*; the *Biscayne Bay Surface Water Improvement and Management Plan*; the *Lower East Coast Regional Water Supply Plan*; the Biscayne Bay Partnership Initiative; the Southeast Florida Coral Reef Initiative; and the *Biscayne Bay Coastal Wetlands Plan*. The actions of this alternative, especially park zoning that could enhance resource conditions, such as the Slow-Speed, Noncombustion Engine Use, Sensitive Resource, and Nature Observation zones, combined with these ongoing regional efforts would have the potential positive cumulative impact of improving the quality of visitor activities in the region, especially related to fishing, nature viewing, and other resource-based recreational activities. There would also be improved visitor opportunities to learn from

various sources regarding the importance and complexity of restoration efforts in a rapidly growing urban environment.

Adjacent state parks (such as Bill Baggs Cape Florida State Park, Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park) and the Florida Keys National Marine Sanctuary offer services, facilities, and recreational opportunities that enable visitors to experience and learn about the natural and cultural resources of the Biscayne Bay and Florida Keys region. Also, current efforts through the Stiltsville plan and the public access plan for Biscayne Bay provide opportunities for enhanced visitor access, education, and recreation related to the Biscayne Bay area.

The actions of this alternative to improve access and recreational opportunities and facilities, as well as the satellite visitor information sites, would have a small beneficial contribution to the impacts of more and better public information about, and access to, the Biscayne Bay area and enhanced opportunities to learn about and recreate there. This alternative, when combined with the effects of other actions, would result in beneficial cumulative effects on visitor experience in the area. Alternative 2 would have a slight contribution to these cumulative effects.

### Conclusion

Additional speed restrictions and new noncombustion engine requirements would potentially exclude some visitors from these areas, which would be a long-term, minor, adverse impact. The Slow Speed and Noncombustion Engine Use zones would help over time to separate conflicting visitor uses, increase boating safety, and increase non-motorized recreational opportunities. These would be long-term beneficial impacts on some visitors' experiences. The upgrade of visitor services and facilities would substantially enhance opportunities to learn about, access, and safely recreate in the park. These would be long-term beneficial impacts on most visitors' experiences. This alternative, when combined with the effects of other



actions, would result in beneficial cumulative effects on visitor experience in the area. Alternative 2 would have a slight contribution to these cumulative effects

## **NPS OPERATIONS AND FACILITIES**

### **Analysis**

Actions under alternative 2, with its emphasis on recreational use by providing a high level of services and facilities and access to specific areas of the park while providing for resource protection, would generally result in construction of new facilities, acquisition of new equipment, continuing maintenance of the new facilities and equipment, and employment of additional law enforcement, resource management, maintenance, and interpretive staff. Construction of new facilities and acquisition of new equipment would generally require additional funding and have short-term, minor to moderate, adverse impacts on the park's budget. Similarly, maintenance of the new facilities and equipment and employment of additional personnel would require additional funding and thus would have long-term, minor to moderate, adverse impacts on the park's budget.

Under alternative 2 as many as 10 potential visitor information points would be developed outside the national park by establishing or upgrading visitor kiosks, signs, and interpretive programs at three county parks, one state park, and five or six other sites still to be determined, including the possibility of constructing a dock for canoe access and storage at Old Cutler Road. Because NPS personnel would be provided at some of these potential sites, and interpretive and educational materials would be needed at the sites, such actions would have long-term minor adverse impacts on the park's budget.

Under alternative 2 new visitor facilities would be constructed at various destination points in the park, and such facilities would require long-term maintenance and thus have both short-term and long-term, minor to moderate, adverse impacts on the park's

budget. These facilities would include the following:

- Convoy Point—construct new viewing platform and boardwalk along mangrove shoreline and catwalks over mangrove forests connecting canals, and reconstruct jetty boardwalk
- Porgy Key—improve and extend dock; improve Jones site for visitation, and develop on-site interpretive media; and consider as potential site for commercial operations such as visitor dropoff from appropriate shallow-draft concessions boats
- Adams Key—provide new staging/storage area for canoes/kayaks and primitive campgrounds; improve trails and dock; and possibly develop a general store
- Elliott Key—harden trail from harbor to Sweeting Homestead for handicap accessibility, construct hardened connecting trail to University Dock, develop three primitive campsite areas and connect campsites to harbor with hardened trails, provide composting toilets and visitor kiosks, and consider as potential site for food concession
- Boca Chita Key—adaptively reuse of more historic structures for park operations and visitor services, accommodate additional boats with mooring buoys, strengthen retaining wall on north side, and provide for shore beaching
- Visitor contact points developed outside the park—kiosks, signs, possibly educational programs, and placement of NPS personnel at marinas and state/local parks

Additional staff would be required to provide enhanced visitor services and interpretive opportunities and to address resource management concerns on Porgy, Adams, Elliott, and Boca Chita keys and on Convoy Point. Although more law enforcement and resource management personnel and equipment would be required to enforce park regulations and protect natural and cultural

resources in the Slow Speed, Nature Observation, Sensitive Resource, and Noncombustion Engine Use zones, it could be assumed that the successful implementation of these special zones would result in fewer groundings and resource damage and thus less commitment of park staff and budget in legal prosecutions and resource rehabilitation. Thus impacts on park operations would be long-term, minor to moderate and adverse.

### Cumulative Effects

As discussed under alternative 1, past and ongoing cooperative planning and development projects in the Biscayne Bay region, such as the *Biscayne Bay Partnership Initiative*, *Miami-Dade County Comprehensive Development Master Plan*, and *Biscayne Bay Strategic Access Plan*, and NPS special resources studies, such as those for Miami Circle and Virginia Key Beach Park, have resulted in some long-term beneficial effects on park operations and facilities. However, these beneficial effects are almost impossible to measure.

This alternative, with its provision for additional facilities at visitor destination points in the national park as well as establishment of potential visitor contact points outside of the park, in combination with the aforementioned beneficial effects of past and ongoing cooperative planning and development projects in the Biscayne Bay region, would generally result in long-term, beneficial cumulative effects on facilities and long-term minor adverse cumulative effects on park operations; however, this alternative's contribution to these effects would be small and beneficial for facilities and modest and adverse for park operations.

### Conclusion

Overall, actions under alternative 2 would result in short-term and long-term, minor to moderate, adverse impacts on park operations and facilities. The overall cumulative effects would be long term beneficial for facilities and long term, negligible, and adverse for park operations. This alternative's contributions to

these effects would be small and beneficial for facilities and small and adverse for park operations.

## SOCIOECONOMIC ENVIRONMENT

### Analysis

Full implementation of this alternative would require the National Park Service to hire 14 additional employees to handle the increased workload for administration, interpretation, law enforcement, and maintenance. This additional employment would bring in about \$1.01 million in wages and an increased demand for housing, utilities, services, and goods, resulting in a long-term benefit for the local economy.

Excluding employee wages, implementing alternative 2 is estimated to cost a total of \$5.8 million above the current level of spending over the next 20 years. Most of this total would equate to an increase in the input of federal dollars into the region in the form of purchases of supplies and construction contracts. This would result in short-term and long-term beneficial impacts as government expenditures enter the local economy.

The number of visitors and average length of visit could increase because of the additional opportunities in the park. Local businesses that rely on the tourist trade would receive a long-term minor benefit. For example, every 1% increase in annual visitation would mean an increase of about \$164,000 to the local economy through direct and indirect visitor spending each year.

### Cumulative Effects

The social and economic situation in Miami-Dade County is affected by a combination of many factors, including the presence of units of the national park system. Some of the \$15.5 billion in federal spending in the county is generated by Biscayne National Park in the forms of employee wages, purchase of supplies, and various contracts. Although tourism is not the most important driving factor in the regional economy, the livelihoods of service-

related businesses in the region rely to some degree on the inflow of tourist dollars, especially restaurants and motels.

The total direct economic value of public recreation areas also includes two sets of values: (1) the user benefit that people receive from their visit and (2) the values of land near the recreation area. Economic studies have shown that the value of private land can increase with the number of outdoor recreation opportunities and the proximity to outdoor recreation space (Clawson and Knetsch 1966). Therefore, the continued presence of Biscayne National Park provides an important benefit to the residents and property values in the vicinity.

Alternative 2 would contribute a modest beneficial increment to the above beneficial impacts of other past, present, and future actions on socioeconomic conditions and, when considered in combination with those other actions, would result in a beneficial cumulative impact.

## **Conclusion**

Implementing alternative 2 would have short-term and long-term beneficial economic impacts in the region. The overall cumulative effects would be beneficial. Alternative 2 would contribute a modest beneficial increment to these cumulative effects.

## **UNAVOIDABLE MODERATE OR MAJOR ADVERSE IMPACTS**

Unavoidable adverse impacts are defined here as moderate to major impacts that cannot be fully mitigated or avoided. There would be no unavoidable moderate or major adverse impacts expected as a result of implementing alternative 2.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Alternative 2 would have a relatively high potential for some commitment of resources

because it would involve new development (e.g., trails, dock, buildings, etc.). However, most of the development being proposed is trails and small facilities with only small areas of potential effect. Most proposed developments would be built in previously disturbed areas and would not result in substantial irreversible or irretrievable commitments of resources. Cultural resources would continue to be protected through active preservation maintenance.

## **NATURAL OR DEPLETABLE RESOURCES AND ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

Whenever feasible, the National Park Service strives to maximize the use of renewable resources and energy and therefore minimize the use of depletable resources. However, it is not possible with today's technologies to cost-effectively avoid all use of depletable resources in building and operating facilities. Because this alternative includes some level of construction, it would impact natural or depletable resources and energy to some extent. Generally, the amount of resources and energy used in a building is related to its size. Other park assets that support visitor use and resource protection, such as parking lots and trails, also potentially use depletable resources to some extent; however the park's practice is to use wood or recycled material (renewable resources) for boardwalks. Increases or decreases to trails would not impact depletable resource or energy use. Only the change in the amount of square footage in buildings is used in this analysis to approximate the level of resource and energy use.

Implementing alternative 2 would involve a small increase in energy requirements because of the proposed buildings that would need energy to operate. This need would be reduced by the proposal to use solar or wind energy for electricity and so would be a minor increase in the park's energy use requirements and a negligible increase in the region.

## IMPACTS OF IMPLEMENTING ALTERNATIVE 3

### NATURAL RESOURCES

#### Fisheries

Under this alternative, management actions designed to protect fish habitat by reducing the potential adverse impacts of boating on seagrass beds would be increased as compared to alternative 2. In addition to the fisheries habitat management activities in alternative 2, a Slow Speed Zone would be designated over the West Featherbeds Bank and two areas accessible by permit only would be established north of Black Point County Park and on the west side of Elliott Key from Billy's Point to Sandwich Cove. Both the Slow Speed and Access-By-Permit zones would limit the type of boats entering these waters and/or reduce boat traffic overall. This would reduce the impacts associated with boat traffic such as scarring and localized turbidity—a long-term, localized, beneficial impact.

A Noncombustion Engine Use Zone would be designated in the waters surrounding Totten and Rubicon keys, Jones Lagoon, and the Cutter Bank Shallows. These zoned areas would result in a long-term beneficial impact because they would limit the speed of boats entering these waters thus reducing some of the impacts associated with boat traffic such as scarring and localized turbidity.

A Marine Reserve Zone where fishing is not allowed would be managed to preserve natural resources with minimal human-caused intrusions. The designation of a Marine Reserve Zone would remove commercial and recreational fishing from about 10,522 acres. This locally reduced fishing pressure, where targeted fish species could grow larger and therefore exponentially increase in reproductive output, would result in a long-term moderate to major beneficial impact on park fishery resources. Even though fishing pressure may increase outside this zone, the expected increase in size and abundance of fish within the Marine Reserve Zone is

expected to have a "spillover" effect outside the zone, as documented in other Marine Reserve Zones worldwide.

With no additional controls on fisheries in other waters of the park, species in both the bay and the reefs would continue to experience substantial pressures from both commercial and recreational fishing. Some fish would continue to be overfished or subject to overfishing. These impacts would continue to be adverse and minor to moderate in the long term.

There could be an increase in the number of people fishing from the shoreline from the creation of a new boardwalk. This would be expected to have a long-term, negligible to minor, adverse effect on fisheries.

**Cumulative Impacts.** In 2002 the National Park Service and the Florida Fish and Wildlife Commission initiated a *Fishery Management Plan and Environmental Impact Statement*.

Once completed, the *Fishery Management Plan* would involve changes in current management strategies for both recreational and commercial fishing activities. These changes could include establishment of a permit system for both recreational boating and commercial fishers, limits on the type of spearfishing equipment that can be used in the park, a moderate decrease in fisheries harvest, and elimination of the lobster-sport season. With implementation of the *Fishery Management Plan* the park anticipates that the current condition of fisheries stocks would improve and the impact of fishing on habitat within the park would be reduced. The long-term impacts of the plan on fisheries in the park would be beneficial. Because proposed management actions under this alternative are more protective of fish habitat than under alternative 1, there would be more benefits on fisheries realized from combining actions under this alternative with the implementation

of the *Fishery Management Plan* than implementing the *Fishery Management Plan* alone (as in alternative 1).

The United States Coral Reef Task Force created in 1998 was established to lead U.S. efforts to protect, restore, and “sustainably” use coral reef ecosystems. These efforts include but are not limited to reducing and mitigating coral reef degradation from pollution, overfishing, and other causes. The task force has identified fundamental themes to guide immediate and sustained national action. These themes include quickly reducing the adverse impacts of human activities on coral reefs and associated ecosystems. No specific actions have been proposed. However, if the initiatives of the task force are fully implemented, the impacts of these activities would likely be beneficial for the coral reef system in the park. Full implementation of the task force recommendations would also likely cause the park to modify current management approaches to incorporate the recommendations.

This alternative would contribute beneficial and adverse increment to the beneficial and adverse impacts of other past, present, and future actions, resulting in beneficial cumulative effects. The contribution of this alternative to these effects would be modest.

**Conclusion.** Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced under this alternative, resulting in a long-term, moderate, beneficial impact overall. Cumulative effects would be beneficial.

### Threatened and Endangered Species

**Manatee.** Manatees are more likely to be found in the warm waters closest to shore, so there would continue to be a 1,000-foot manatee protection area in the waters closest to the shoreline. The manatee protection area would be modified so that the 500 feet nearest the shoreline would be designated a Noncombustion Engine Use Zone and the remaining 500 feet would be designated a Slow Speed Zone. Within the Noncombustion Engine Use

Zone, management would focus on protecting water-based resources and minimizing visitor use impacts. This zone would provide additional protection to the manatee by reducing the potential for boat-related injuries and mortality in the areas where manatees are most likely to occur. The Slow Speed Zone would provide boat operators a greater opportunity to avoid collisions with manatees that are further from shore by increasing their response time. The Slow Speed and Noncombustion Engine Use zones under this alternative would result in fewer boat groundings in seagrass beds, an important habitat/food source for manatees.

The modifications to the manatee protection area and other zoning would have a long-term, beneficial impact on manatees in the park.

**Section 7 Determination of Effect**—The impacts on the manatee under this alternative would be small, localized, and beneficial. Measurable beneficial outcomes on individual manatees and the manatee population because of the protective zones are likely. This would equate to a “may affect, not likely to adversely affect” determination.

**Sea Turtles.** Collisions between boats and sea turtles would be expected to be minimized in the Slow Speed, Noncombustion Engine Use, and Access-by-Permit zones. However, given the size of these zones compared to the size of the Multiuse Zone, the beneficial impacts of implementation of this alternative would be minor. The potential impacts on turtles nesting on Elliott Key could be slightly less under this alternative than alternative 2 because there would not be a primitive campground on Elliott Key and the number of visitors that could stay overnight would be fewer. With fewer overnight visitors on Elliott Key, the park might not need to implement the same array of mitigation measures to protect the turtles and turtle nests from disturbance. Actions taken to reduce disturbance of turtles nesting in the park would have a long-term beneficial impact on sea turtles. The implementation of a Marine

Reserve Zone would result in less derelict fishing gear (monofilament, traps) in this area. This would result in the reduction of threat of entanglement for sea turtles in this zone. This would be a minor, beneficial, long-term impact on sea turtles. This beneficial impact would be offset if fishing pressure increased outside the Marine Reserve Zone.

*Section 7 Determination of Effect*—The impacts on sea turtles under this alternative would long-term and adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination.

**American Crocodiles.** The mainland shoreline between Black Point County Park and Convoy Point would be managed to enhance visitor access and recreational use. Proposed development includes a boardwalk along the mangrove shoreline. These actions would have short-term, minor, adverse impacts on crocodile habitat during construction. Long-term, minor, adverse impacts would also be expected due to loss of mangrove habitat in the location of the boardwalk. The new access points could also increase the number of visitors to these areas. The potential increase in visitation could disturb the crocodiles and cause the animals to move from their preferred habitat in the mangroves. However because the proposed development would be north of the designated critical habitat area for the crocodiles, and relatively few crocodiles are seen north of Convoy Point, the adverse impacts would be negligible to minor. The remainder of the mainland shoreline would continue to be managed as it is now (alternative 1).

The designated critical habitat includes the eastern shorelines of the keys southwest of the tip of Elliott Key to the park boundary. The critical habitat includes Porgy Key, which would be zoned to provide visitor services as well as a base for some park administration activities. There are limited areas with appropriate habitat on Porgy Key for crocodiles, so the impacts of any proposed development would be minimal and localized. Visitation in this area would be expected to remain at current levels or increase slightly because of

the improved facilities and array of activities available on the key. These activities could include canoe rental, which would allow visitors a nearby access point to the water zoned for noncombustion engine use around Old Rhodes and Totten keys. There are dense mangrove areas along the eastern shores of both keys. Currently the impact of increased visitation in this area on either habitat or individuals would be low. Although this area is within the designated critical habitat, few crocodiles have been seen in this area so impacts are expected to be adverse but negligible to minor.

If, because of human population pressure along the mainland or the recent increase in crocodile population, crocodiles increasingly venture across the bay there could be increased interaction between visitors and crocodiles around Old Rhodes and Totten keys. The park would implement an outreach effort to reduce the potential for negative interactions between crocodiles and visitors. The developed area at Adams Key would provide an excellent opportunity to orient visitors to this area of the park, including appropriate actions when traveling in the crocodile habitat. With mitigation, the impact on this alternative on the crocodile population in this area of the park would be negligible.

*Section 7 Determination of Effect* — The impacts on the American crocodile under this alternative would be adverse but negligible to minor. Mitigation measures would be put in place in the event of more visitor-crocodile interactions from population pressures near the park. Overall, this would equate to a “may affect, not likely to adversely affect” determination for the American crocodile.

**Smalltooth Sawfish.** Construction of a boardwalk and platform in the mangroves would affect a small amount of potential habitat in the short term. As in other alternatives, smalltooth sawfish could be affected by any increase in hook-and-line fishing efforts, although any effects are unlikely given the rarity of smalltooth sawfish in Biscayne National Park. While the

establishment of the Marine Reserve Zone in deeper reef habitat is not likely to have a substantial effect on this species that tends to prefer shallow water, it is possible that the implementation of the no-take marine reserve zone could have a small yet positive benefit on smalltooth sawfish by reducing bycatch since reports of this species in reef and deeper water habitats, although uncommon, do exist. No other actions that would occur under this alternative would be expected to affect sawfish in the park.

*Section 7 Determination of Effect* — The impacts on the smalltooth sawfish under this alternative would be adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination for the smalltooth sawfish.

**Schaus Swallowtail Butterfly.** The impacts on the butterfly population and habitat would be the same as for alternative 2. The developed area on Adams Key would be expanded and would include a new staging area for canoes/kayaks, a dock, improved trails, and possibly a general store. Most of this development would be likely to be near shore and would have a limited impact on butterfly habitat. Development away from the water could be located to minimize impacts on butterfly habitat. The long-term impacts would be adverse but negligible.

The trail on Elliott Key that runs along the length of the island through the hardwood hammock would remain and would be hardened. Hardening of the existing trail could impact the butterfly, particularly if such hardening requires removal of trees or occurs during a critical time in their life cycle. These impacts could be mitigated by timing trail work so that it does not coincide with butterfly breeding season and by minimizing changes in the drainage pattern on the island once the trail is completed. With these mitigation measures, long-term impacts on butterfly habitat under this alternative would be negligible to minor.

*Section 7 Determination of Effect*—The impacts on the Schaus swallowtail under

this alternative would be adverse but minor. Mitigative measures to protect the species’ habitat and breeding season are likely to be successful. Overall, this alternative would result in the determination of “may affect, not likely to adversely affect” the Schaus swallowtail.

**Acroporid Corals.** Under this alternative, the Legare Anchorage would be reduced in size from its current configuration, although it would continue to be closed to in-water activities and would provide protection to Acroporid corals that may be located in this area. The creation of a 10,522-acre Marine Reserve Zone would prohibit fishing and anchoring on many of the southern reefs in the park, which include areas known to have healthy populations of Acroporid corals. Because visitors that would otherwise use the area contained within the Marine Reserve Zone to fish would have to fish elsewhere, boat traffic and anchoring throughout this zone could be expected to decrease. Although unlikely, these decreases could be offset if visitation in the zone increased from people using the Marine Reserve Zone for nonextractive activities such as snorkeling and diving. Because the Marine Reserve Zone is expected to reduce fishing and improve ecological balance, reduce fishing debris, reduce vessel groundings, and reduce damage from inappropriate anchoring in Acroporid coral habitat, actions under alternative 3 would be expected to have a moderate and beneficial effect.

*Section 7 Determination of Effect* — The Marine Reserve Zone is expected to have a beneficial long-term effect on Acroporid corals by protecting them from activities that could lead to physical and ecological damage. Thus, this alternative would result in a determination of “may affect, not likely to adversely affect” Acroporid corals.

**Cumulative Impacts.** Habitat disturbance or loss is the most common reason for a species to be listed. The establishment of Biscayne National Park has provided a protective

refuge for listed species resulting in long-term beneficial impacts.

The *Florida Manatee Recovery Plan* and the site-specific county plans contain actions designed in part to reduce boat-related manatee injury and mortality and protect habitat areas. These measures are consistent with protection measures incorporated into the proposed actions in this general management plan. Implementation of the recovery plan would continue to have a beneficial impact on manatee protection efforts in the park. The impacts of the actions in this alternative would continue to have a beneficial impact on manatee protection efforts.

Alternative 3 would result in negligible adverse and beneficial impacts on federally listed species. When combined with the impacts of other past, present, and future actions, the overall cumulative effect would be negligible and beneficial. This alternative would contribute a small amount to the overall cumulative effects.

**Conclusion.** Implementing alternative 3 would result in a beneficial impact on manatees and acroporid corals and a negligible effect on smalltooth sawfish. Under this alternative there would be proposed development that could impact habitat for American crocodiles, sea turtles, and Schaus swallowtail butterflies. The park would continue to coordinate with the U.S. Fish and Wildlife Service and National Marine Fisheries Service and work to mitigate any potential adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park. Cumulative effects would be negligible and beneficial.

### **Special Status Species, including State Listed Species**

**Birds.** West Arsenicker Key, used by bald eagles, would be zoned a Sensitive Resource Area and would remain closed. There would be no effect on the bald eagle population or nesting activity on West Arsenicker Key.

Under this alternative, Sands Key, which is currently closed to visitors, and the islands surrounding Jones Lagoon would be zoned as Nature Observation Zones. The waters of Jones Lagoon would be designated a Noncombustion Engine Use Zone. Visitation would be allowed on Sands Key and the islands of Jones Lagoon, so there would be some human caused intrusions to birds nesting, roosting, loafing, and/or foraging there; however, resource protection would be emphasized. Actions under alternative 3 would reduce, although not eliminate, the potential for disturbance to birds using the Jones Lagoon area because there is still the possibility that small vessels (e.g., kayaks and canoes) and people coming ashore could closely approach birds.

The establishment of a Visitor Service Zone on Porgy Key could encourage visitation to the Jones Lagoon area, although the difficulty in accessing this area, combined with the specialized equipment and knowledge needed to safely traverse Jones Lagoon, would keep the likelihood of this fairly low. Given that visitation to both Sands Key and Jones Lagoon would be expected to remain minimal, adverse impacts on the birds and their habitat would be negligible. If visitation increases such that any state-listed birds could be disturbed, management actions could include limiting access to areas where birds are known to rest during nesting season and/or establishing set-back distances following recommendations in scientific literature.

Under this alternative, the long-term adverse impact on the state-listed bird populations in the park and potential nesting activity on Sands Key and the Jones Lagoon area would be negligible. Currently visitation to the ocean side of Elliott Key is low. The level of visitation on Elliott Key is likely to increase once the additional facilities are developed—including hardening of the trail that runs the length of the island and primitive campsites near Petrel Point. Birds using coastal areas adjacent to areas developed for visitor recreation (such as Elliott Key) could be exposed to potential disturbances of the noise of boat engines and close approaches by people. This



exposure could result in an alteration of natural behaviors, including the potential for nesting birds to inadvertently crush their eggs while fleeing or to temporarily or permanently abandon their nests, thereby exposing the eggs to predators and extreme temperatures. If visitation to the ocean side increases such that the state-listed birds could be discouraged from nesting or disturbed during nesting, the park could enforce no-access set-back distances, close the beaches near Petrel Point during critical nesting season to reduce impacts on the birds.

The proposed Slow Speed Zone and the Access-by-Permit Zone on the bay side of Elliott Key would be expected to reduce the likelihood of disruptions to birds using the coastal areas immediately adjacent to these zones. As a result, beneficial effects on state-listed birds in the immediate area would be expected.

Under this alternative, birds using coastal habitats along the park's mainland shoreline would receive protection from potential boat-related disturbances from (1) the Noncombustion Engine Use Zone that extends 500 feet east from the mainland (excluding Black Point, Convoy Point, and Turkey Point channels) and (2) a Slow Speed Zone covering the area 500 to 1,000 feet from the shoreline. By essentially reducing the usage of the waters immediately adjacent to the mainland shoreline, these two zones would be expected to reduce potential boat-related disturbances to birds that are roosting, nesting, foraging, and/or loafing along the mainland shoreline.

Overall, under this alternative, including any necessary mitigation, the long-term adverse impact on state-listed bird populations and nesting activity in the park would be negligible.

**Miami Blue Butterfly.** Although visitation to most of Elliott Key is currently low, it is likely that visitation would increase once the additional facilities are developed—including hardening of the trail that runs the length of the island. However, there is typically little interaction between visitors and these small

butterflies. During installation of the trail, the area would be checked by a qualified biologist to ensure that no individuals would be disturbed. Under this alternative and with any necessary mitigation, the long-term impact on the Miami blue population in the park would be negligible and would not result in federal listing.

**Cumulative Impacts.** These species were listed because of the adverse impacts of habitat disturbance or loss led to severe declines in population numbers. The establishment of Biscayne National Park has provided increased protection of habitat for bald eagles, other birds, and butterflies in the park.

Reintroduction efforts of Miami blue butterflies have occurred on Elliott Key in an attempt to restore this species. If successful, this would be a long-term beneficial impact. The monitoring and recovery plan would continue to be implemented.

At the time this plan was started, bald eagles were federally listed as endangered. They have since been delisted because of population recovery due in part to protected nesting areas, indicating a long-term beneficial impact on this species.

Alternative 3 would result in negligible adverse impacts on bald eagles and other listed birds and negligible adverse impacts on Miami blue butterflies. When combined with the impacts of other past, present, and future actions, the overall cumulative effects on these species would be minor and adverse. This alternative's contribution to the cumulative effects would be small.

**Conclusion.** Implementing alternative 3 would result in long-term negligible adverse impacts on bald eagles, other listed birds, and Miami blue butterflies. Cumulative effects would be negligible and adverse.

## **Terrestrial Vegetation**

Under this alternative the impacts on terrestrial vegetation on the keys, particularly the

hardwood hammocks, would be the same as for alternative 2. Boca Chita, Elliott, Adams, and Porgy keys would be managed for visitor access and recreation. Visitation to these keys would be concentrated in the developed areas of these keys. Impacts from increased visitation could include trampling of vegetation and social trails. In general these impacts could be mitigated by visitor education efforts and trail design that would keep visitors on the existing trails. With mitigation measures in place, the adverse impacts of increased visitation on terrestrial vegetation would be negligible to minor in the long term.

The proposed development on Boca Chita, Elliott, Adams, and Porgy keys would be kept within areas that have been previously disturbed to the extent practicable. Access to the Jones home site on Porgy Key would be managed to minimize impacts on sensitive resources.

Under this alternative, the hiking trail on Elliott Key would be hardened from Petrel Point north to just past the University Dock, about 5 miles. Because the trail already exists, the impacts on the vegetation would be minimal. Foliage removal on larger trees near the trail would be avoided to the extent possible. The trail would also be constructed to minimize changes in drainage that could occur because the trail has been hardened. With this mitigation, the impacts on the vegetation would be adverse but negligible to minor in the long term.

A food concession developed on shore at Elliott Key would have adverse impacts on the vegetation. The impacts would depend on the site chosen and the footprint associated with the development. The impact could be minimized by developing in areas that have been previously disturbed or where minimal vegetation removal would be required. Because no specific plans have been made, it is not possible to evaluate the impacts at this time. Before the development of a food concession on Elliott Key, additional environmental compliance would be required to determine the site-specific impacts of the development on vegetation and other resources.

Overall, some localized impacts could occur, but the short-term adverse impacts on vegetation on the keys would be minimal. The park would revegetate any areas cleared during construction to minimize the long-term adverse impacts on vegetation. The long-term adverse impacts on vegetation from the proposed development would be minor.

**Cumulative Impacts.** Creation of Biscayne National Park has resulted in long-term benefits to terrestrial vegetation by maintaining some undeveloped areas. An exotic plant management plan has been developed for Biscayne Bay National Park and eight other national parks in the region. Nonnative invasive plant species can change the structure and function of native plant communities. These changes can have an adverse impact on habitat for native species that rely on the native plant communities. Disturbances of native vegetation encourage growth of invasive species. Removal of the exotic species would provide better conditions to reestablish native vegetation in disturbed areas, which could help to mitigate the adverse impacts associated with social trails in the park. Implementation of this general management plan would have a beneficial impact on terrestrial vegetation in the park and the habitat it provides. A fire management plan was developed that includes the park's upland areas. This plan helps guide resource management efforts in the park in the vegetation communities that are fire adaptive. Because these plant communities are fire adaptive, controlled burning would be beneficial and would reduce fuel buildup associated with catastrophic fires. Implementation of the fire management plan has a beneficial impact on the terrestrial vegetation in the park and the habitat that it provides.

When the negligible to minor adverse impacts of alternative 3 are combined with the impacts of other past, present, and future actions, the resulting cumulative effects would be beneficial. This alternative would have a minor reduction to these beneficial cumulative impacts.

**Conclusion.** Implementing this alternative would result in long-term, negligible to minor, adverse impacts on terrestrial vegetation. Cumulative effects would be beneficial. This alternative would have a minor reduction to these beneficial cumulative impacts.

### **Submerged Aquatic Communities**

Under this alternative there would be greater controls on speed and vessel type in areas where there are seagrass beds than are proposed under alternative 2. There would be an additional Slow Speed Zone applied over the West Featherbed Bank. The larger Slow Speed Zone would further reduce the number of boats in the area, the potential for scarring in the seagrass beds, and the turbidity in the water column—thus minimizing adverse impacts on the productivity of this habitat and water quality over a larger area. In addition, the area along the mainland coast from Black Point County Park north approximately 2.5 miles to the park boundary and an area along the bay side of Elliott Key from Sandwich Cove north to Billy's Point would be zoned for access by permit. In this zone the number of vessels as well as vessel type and size could be controlled to protect natural resources in the park such as seagrass beds. With fewer vessels in the area, the potential for scarring of the seagrass beds and turbidity in the water column would be reduced.

The productivity of the seagrass beds would be expected to increase under this alternative because of the increased number of Slow Speed Zones as well as the inclusion of the areas accessible only by permit. The increase in productivity in the seagrass beds would be beneficial over the long term.

As in alternative 2, the waters within Jones Lagoon and around Totten Key to Cutter Bank Shallows would be zoned for noncombustion engine use. This area includes both seagrass and hardbottom communities. Compared to alternative 1, the potential for adverse impacts on these communities would be reduced because there would be fewer boats in the area, boats would be moving relatively slowly, and fewer boats would be

operating an engine with a propeller. Losses in productivity in these areas would be less because of the reduced potential for scarring and turbidity. The long-term impacts on the submerged aquatic communities in these areas would be beneficial.

The waters around Porgy Key are exceedingly shallow and have abundant benthic life such as small corals, sponges, and marine plants. As a result of increased visitation to Porgy Key, impacts to this marine benthic community would be minor, adverse, and longterm.

Under this alternative, a Marine Reserve Zone would be designated from Hawk Channel east to the park boundary. The Marine Reserve Zone would be managed to preserve natural resources with minimal human-caused intrusions. Boat size, type, and speed could be regulated to protect resources in this zone. It would be expected that the adverse impacts on the reef from recreational activities would be reduced under this alternative. In particular, the potential for scarring from boat propellers or anchors would be reduced, but there could still be adverse impacts from other recreational activities such as diving. Implementation of the reserve zone would reduce the impacts of recreational activities in this area of the reef, resulting in a long-term beneficial impact.

Long-term impacts from the proposed Convoy Point boardwalk would include the removal of mangroves and other wetland plants, trimming of mangroves, and have shading impacts on mangroves and other aquatic vegetation. Impacts would be adverse, minor, and longterm.

**Cumulative Impacts.** Damage to seagrass beds from boat groundings and anchors has degraded habitat for shrimp, crabs, snails, lobster, and echinoderms that inhabit these areas.

Boat groundings (damage from propeller and hull impacts) and inadvertent placement of anchors have damaged the dense soft corals, sea fans, and sponges in the hardbottom communities, which in turn have an adverse

impact on the fish and invertebrates that seek refuge in these areas.

Coral reefs are complex ecosystems and sensitive to disturbances. Fishing, snorkeling, and diving can also have adverse impacts on coral reef systems. The damage caused by these activities includes scarring from boat propellers and inadvertent placement of anchors, as well as breakage caused by snorkeling and diving. Debris from recreational and commercial fishing (e.g., fishing tackle and lines from crab and lobster traps) left on the reef can wrap around the coral and damage it. Fishing also results in removal of predators and the removal of herbivorous fish that keep algae minimized (contributes to reef health). Damage to the coral reefs also adversely impacts other species that rely on them for food and shelter. Damage to the seagrass beds, hardbottom communities, and coral reefs would continue to result in long term, minor to moderate, adverse impacts.

Alternative 3 would result in long-term, minor, beneficial impacts. When combined with the adverse impacts of other past, present, and future actions, the cumulative impacts would be minor to moderate and adverse. The contribution of this alternative to these cumulative effects would be small.

**Conclusion.** Alternative 3 would result in long-term, minor, beneficial impacts on submerged aquatic communities. Cumulative effects would be minor to moderate and adverse. The contribution of this alternative to these cumulative effects would be small.

## Wetlands

Wetlands occur throughout the park along the mainland coast and the fringes of the keys. An indicator of wetlands in the park is the presence of mangroves. Wetlands in the park would continue to serve as an important habitat area for a wide variety of terrestrial and aquatic species in the park. Placement of the Nature Observation Zone along portions of the mainland would give greater protection to mangrove shorelines. This would have minor, beneficial, and long-term impacts.

Under this alternative a shoreline boardwalk would be developed over the mangrove forest to link with the canals. With these improvements visitors would have an opportunity to experience the mangroves along the shore north of the visitor center at Convoy Point. Construction of the boardwalk would cause short-term adverse impacts on water quality from increased turbidity. Increased turbidity in the water column could degrade the wetland habitat. These impacts would be minor to moderate but localized. Long term impacts would result from shading from the boardwalk, which could reduce the type and density of the mangroves and, therefore, the wetland health, near these developments. These impacts could be mitigated during the design process to ensure that the structures do not substantially shade the mangroves. With mitigation the adverse impacts would be localized and minor.

No additional access into the mangroves that fringe the keys would be developed under this alternative so there would be no change in the current size, integrity, or continuity of those wetland areas in the park. Mangroves are extremely difficult to walk through, and so the proposed visitor facility improvements at Porgy, Adams, Elliott, and Boca Chita keys might attract more visitors but are not likely to affect the wetlands.

**Cumulative Impacts.** The Biscayne Bay Coastal Wetlands Project of the Comprehensive Everglades Restoration Plan includes pump stations, spreader swales, storm water treatment areas, flow ways, levees, culverts, and backfilled canals in southeast Miami-Dade County and covers 13,600 acres from the Deering Estate south to the Turkey Point Power Plant. The purpose of this project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. The proposed project will replace lost overland flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The proposed redistribution of freshwater flow across a broad front is expected to restore or enhance freshwater wetlands, tidal

wetlands, and nearshore bay habitat. Sustained lower-than-seawater salinities are required in tidal wetlands and the nearshore bay to provide nursery habitat for fish and shellfish. This project is expected to create conditions that would be conducive to the reestablishment of oysters and other components of the oyster reef community.

Diversion of canal discharges into coastal wetlands is expected not only to reestablish productive nursery habitat along the shoreline but also to reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets. The impact of these actions once implemented would be beneficial for wetland inside and outside the park. This alternative proposes to develop a shoreline boardwalk over the mangrove forest to link with the canals. Construction of the boardwalk would cause both short-term and long term impacts on the mangroves along the mainland shoreline of the park. These impacts would be mitigated during the design process to ensure that the structures do not substantially shade the mangroves. With mitigation the adverse impacts would be localized and minor.

Implementation of the Biscayne Bay Coastal Wetlands Project would improve the overall health of the wetland areas along the mainland shoreline such that the system as a whole is better able to accommodate the stresses associated with the short- and long-term impacts of development and human use in the area.

This alternative would contribute minor adverse impacts to the beneficial impacts of other present and future actions resulting in a beneficial cumulative impact. The contribution of this alternative to these cumulative effects would be small.

**Conclusion.** Under this alternative the proposed development would have a minor adverse impact on the wetlands along the mainland coast of the park, particularly the mangroves. Short-term impacts associated with construction would continue to be adverse, minor to moderate, but localized. The long-term impacts would be mitigated

through design and would be adverse but localized and minor. Cumulative effects would be beneficial. The contribution of this alternative to these cumulative effects would be small.

## **Soundscapes**

Under alternative 3, there would be areas of the bay zoned for slow speed or noncombustion engine use. There would also be two Access-By-Permit Zones that would reduce the number of boats at one time in these zones. Because these restrictions would reduce the level and duration of noise from boats, there would be long-term, minor, beneficial impacts on soundscapes on portions of the bay and adjacent land.

The new construction called for in this alternative would result in short-term, localized, adverse impacts that would be minor in intensity. Long-term impacts from use of new development such as trails and boat launches would be adverse but negligible.

Existing natural soundscapes in the interior of the larger keys would continue to be preserved by vegetative screening, a continuing, minor, beneficial impact.

**Cumulative Effects.** Natural soundscapes have been degraded by activities on land and water portions of the park such as vehicle traffic, boat traffic, agricultural or industrial activity, and occasional construction. Because most of the park is open water, noise from motorized boats is the most prevalent disruption to natural soundscapes.

The concentration of visitors around the visitor center and parking lot also affects the natural soundscape at Convoy Point. NPS staff activities such as mowing the grass and blowing leaves causes short-term, localized, adverse impacts on the soundscapes in this area. This noise is generally tolerated in the Visitor Services/Park Administration Zone, so the related impacts would be adverse but negligible.

Natural soundscapes predominate in the distant portions of the park away from popular boating routes. Increases in visitation on weekends and during special events add to the number of boats at one time on the bay. More boats leads to an increased noise level and results in short-term, minor to moderate, adverse impacts.

The beneficial and adverse impacts of this alternative, in combination with the adverse impacts of other actions, would result in minor and adverse cumulative impacts on the natural soundscape; however, the relative contribution of this alternative to these impacts would be small and beneficial.

**Conclusion.** Implementing alternative 3 would have long-term, minor beneficial and negligible adverse impacts on soundscapes and short-term, minor adverse impacts during construction. The overall cumulative impacts would be minor and adverse; this alternative's contribution to these effects would be small and beneficial.

## CULTURAL RESOURCES

### Archeological (including Submerged Maritime) Resources

**Analysis.** Implementation of this alternative would generally have the same impacts on archeological (including submerged maritime) resources in the national park as those listed under alternative 1 because they would continue to be protected as governed by law and policy. However, they would be subjected to greater potential risk by the alternative's provision for expanded recreational use throughout much of the park as well as enhanced services, facilities, and development on Boca Chita, Elliott, Adams, and Porgy keys, which would become principal visitor destination points. The above actions would provide for long-term, minor to moderate, adverse impacts on archeological resources.

Treasure hunting, looting, and amateur collection of submerged archeological resources are not permitted in the park, but much of the

local public condones such activity while recognizing that it is illegal or requires permitting in the Florida Keys National Marine Sanctuary and other state waters. Illicit activities would continue to be a threat to such resources. In addition, increasing visitor access to the park could result in increasing inadvertent disturbance of submerged and terrestrial archeological resources. Continued ranger patrol and the success of law enforcement activities, as well as emphasis on educating the general public and diving community regarding the significance and fragility of such resources, would discourage illicit activities and inadvertent visitor impacts and help minimize adverse impacts. Also, though this alternative increases the potential impact on submerged archeological resources from visitor access threats, the establishment of a Marine Reserve Zone can be expected to lessen the impact damage associated with anchoring and commercial fishing and trapping activities on archeological sites. Adverse impacts associated with increased visitor access would be minor to moderate and permanent; beneficial impacts associated with the establishment of the marine reserve would also be minor to moderate and permanent.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 3 would result in minor to moderate adverse effects and beneficial effects. The impacts of alternative 3, in combination with minor to moderate adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a minor to moderate cumulative effect. The adverse effects of alternative 3, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although they would be subjected to minor to moderate potential adverse impact by the alternative's provision for expanded recreational use and enhanced visitor services,

facilities, and access to some areas of the park. Actions under this alternative would generally have the same cumulative effects on archeological resources as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on archeological resources. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## Historic Structures and Buildings

**Analysis.** Implementation of alternative 3 would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because they would be rehabilitated, preserved, and adaptively used in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. However, some minor elements of historic fabric could be lost as a result of remodeling/rehabilitation efforts and anticipated increasing visitation levels. These adverse impacts could result in a negligible to minor, short-term, impact from inadvertent visitor use or vandalism. However, as with alternative 1, impacts on historic structures and buildings would be primarily localized, long-term to permanent, and mostly beneficial.

Under this alternative the Fowey Rocks Lighthouse could be transferred from the Coast Guard to another organization/agency in accordance with the National Historic Lighthouse Preservation Act (2000). Provisions of the act stipulate that the organization or entity receiving the lighthouse preserve and maintain it in accordance with the *Secretary's Standards*. Preservation of the lighthouse in accordance with the *Secretary's*

*Standards* would have a long-term, beneficial impact on the lighthouse.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 3 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 3, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor cumulative effect. The adverse effects of alternative 3, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1. Actions under this alternative would have the same cumulative effects on historic structures and buildings as those listed under alternative 1. Implementation of this alternative would have a long-term, beneficial impact on the Fowey Rocks Lighthouse because it would be preserved in accordance with the *Secretary's Standards*.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on historic buildings and structures. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## Cultural Landscapes

**Analysis.** Implementation of this alternative would have the same impacts on cultural

landscapes in the park as those listed under alternative 1 because potential landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria, and the National Park Service would implement resource management policies that preserve the natural resource values and culturally significant character-defining patterns and features of Boca Chita Key as well as other listed, or determined eligible, landscapes in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*.

Enhancement of recreational opportunities and development of visitor services, facilities, and access at Boca Chita, Elliott, and Porgy keys could result in some minor adverse impacts on the integrity of the listed and potential cultural landscapes at those visitor destination points. Expansion of recreational opportunities and development of enhanced visitor services throughout much of the park and its waters could also result in some minor long-term adverse impacts on the integrity of the potential park-wide maritime cultural landscape.

**Cumulative Effects.** Impacts associated with other past, present and reasonably foreseeable actions are the same as described under alternative 1. As described above, implementation of alternative 3 would result in minor adverse effects and beneficial effects. The impacts of alternative 3, in combination with minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a minor cumulative effect. The adverse effects of alternative 3, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would generally have the same beneficial impacts on cultural landscapes as those listed under alternative 1, although expanded recreational use, enhanced visitor services, facilities, and access, and increased development in some areas of the park could have some long-term minor impacts on the integrity of the

park's potential cultural landscapes. Actions under this alternative would generally have the same cumulative effects on cultural landscapes as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on cultural landscapes. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Cultural Landscapes* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## VISITOR EXPERIENCE

### Analysis

**Diversity of Visitor Activities.** Under this alternative, visitors would continue to have unrestricted access (as described in the Multiuse Water Zone) to most of the park's waters to participate in a wide range of recreational opportunities such as motor-boating, sailing, canoeing, swimming, scuba diving, snorkeling, fishing, and nature study. About 16% of the park's waters would have some restrictions or changes (existing and new) that would potentially enhance, modify, limit, or prohibit visitor access and activities. This alternative would continue to require visitors to maintain slow speeds along the mainland shore and at Sands Cut. Slow Speed Zones would also be added to Caesar Creek and three Featherbed areas on either side of the Intracoastal Waterway west of Boca Chita Key. These zones would help focus visitor attention to these relatively shallow and sensitive areas of the bay. Slower Speed Zones would be applied over the Featherbed banks and would reduce the frequency of boat groundings, which would be a long-term beneficial impact on some visitors. A Slow Speed Zone on Caesar Creek would protect resources and reduce damage to vessels at Adams Key dock. Some visitors would have boats with too deep a draft to be able to



operate successfully at slow speeds in these areas and would be excluded from access. For these visitors this change would be perceived as a long-term adverse impact on their visitor experience while boating in the park. The total area with slow speed restrictions would be about 1.5% of park waters.

The Noncombustion Engine Use Zone would include two areas—waters within 500 feet of the mainland and the Cutter Bank/Jones Lagoon area, including Rubicon Keys. This zone would have effects that are similar to effects of the Slow Speed Zone but would require boaters to pole or use an electric trolling motor. Some visitors would have boats with too deep a draft to be able to operate successfully at the slower speeds required from using a noncombustion engine and would be excluded from these areas. For some visitors this change would be perceived as a long-term adverse impact on their visitor experience while boating in the park. Other visitors would benefit over the long term because the resulting decrease in noise, speeds, and number of motorboats would enhance visitor safety and opportunities to quietly explore the mangroves and lagoons by canoe and kayak, observe wildlife, experience the natural sounds of the marine environment, and find solitude. Also, boaters would have less likelihood of grounding in this zone, and flats anglers would have improved conditions for successful catches—a long-term beneficial impact. This Noncombustion Engine Use Zone would affect about 2% of park waters.

Under this alternative, the Legare Anchorage would be rezoned and reduced in size relative to current conditions. This would result in visitors having access to an additional 1,700 acres of reef waters for a full range of recreational activities (Multiuse Zone). The Sensitive Underwater Archeological Zone, which would be applied to a smaller area (than alternative 1) of the Legare Anchorage, would allow for limited visitor access, which is currently the case. The addition of 1,700 acres to the Multiuse Zone would provide visitors enhanced opportunities for access and recreation, which would be a long-term beneficial

impact on visitor's ability to access and recreate in park waters.

The Access-By-Permit Zone would affect about 3% of park waters. Included in this zone would be a large area of bay waters in the northwest quadrant of the park and bay waters along Sandwich Cove of Elliott Key. Visitors currently have unlimited access to these areas. Adding this permitting requirement would be perceived by some visitors who have previously used these areas of the park without restriction as a negative impact on their visitor experience. However, for other visitors this access-by-permit opportunity would likely become increasingly valuable as park visitation levels increase because it would allow visitors to have a relatively secluded or at least uncrowded visit of certain areas of the park with limited competing noise or activity from other groups. This would be a long-term beneficial impact on visitor access and opportunities for a range of visitor activities.

The continued closure to visitors of West Arsenicker and Arsenicker keys would not change. What would change under this alternative is the application of the Sensitive Resource Zone 500 feet out from the keys' shorelines. This would be a slight increase over the current 200-foot closure. Also, Swan Key would be closed to visitors. This area is currently lightly used; however, those visitors who are used to having unrestricted access might find this closure to be a long-term, minor, adverse impact on their access throughout the park.

The northern and southern sections of the mainland, most of the southern keys, and all of Sands Key would be in the Nature Observation Zone. The relative inaccessibility of the mangrove forests and tropical hardwood hammocks naturally limits the range of visitor activities. Most visitors to these areas would likely experience few interactions with others and would have opportunities to explore, observe nature, and find solitude. This in general would result in little change over current visitor experience conditions.

An area from Hawk Channel to the eastern park boundary (about 7% of park waters) would be placed in the Marine Reserve Zone. Visitors would continue to be able to engage in a range of recreational activities except fishing or harvesting of living organisms. Management priorities for this zone would be to maintain a more intact and healthy reef ecosystem. This would likely result in more and bigger fish and would contribute positively to visitors' abilities to experience the natural sights of the reef. Visitors no longer able to fish in this area would experience a long-term, minor to moderate adverse impact. This effect could be mitigated by the anticipated spillover effects from the Marine Reserve Zone to adjacent Multiuse Zones (water) where fishers could expect to catch more and bigger fish.

Visitors who snorkel and dive in the Marine Reserve Zone would be able to experience a healthier, more natural coral reef than what is currently present, with larger and more numerous tropical reef fish and an ecologically intact reef system. The increased number of mooring buoys would make the snorkeling and diving experience safer and easier. Therefore, a major beneficial impact would be expected for visitors who snorkel and dive in the Marine Reserve Zone.

Although anchoring would not be allowed in the Marine Reserve Zone, additional mooring buoys would be provided to facilitate access to reefs and historic shipwrecks within this zone according to the Mooring Buoy and Marker Plan.

**Visitor Services and Facilities.** The addition of a viewing platform, mangrove boardwalk, and catwalks at Convoy Point would substantially increase visitors' opportunities to walk, fish from shore, see the scenery, and explore and learn about mangrove habitat. This would enhance the range and quality of recreational and interpretive opportunities available in the Convoy Point area and potentially extend the length of a person's visit. These facilities would be long-term beneficial enhancements to the visitor experience, especially for visitors who do not have the time, ability, or means to visit outlying park resources.

Both Porgy Key and Adams Key would be zoned for visitor services. Providing a concessioner transport service to either island with opportunities for commercial canoe rentals would substantially enhance opportunities for visitors to safely access and explore the adjacent Noncombustion Engine Use Zone in and around Jones Lagoon and the southern keys. These services and facilities, along with other enhancements such as dock improvements, improved trails, cultural resource stabilization and interpretation, primitive camping facilities, and potentially a general store at Adams Key, would have long-term beneficial impacts on expanding recreational opportunities in the southern sector of the park and enhancing opportunities for education, solitude, and nature observation. Although it is anticipated that this type of service would increase the number of encounters between visitors, the size and character of this area of the park would enable easy dispersal and separation of groups most of the time.

The substantial amount of trail hardening throughout Elliott Key would improve the accessibility of most of the island to visitors. Enhanced access to the more remote cove areas would offer additional opportunities for visitors to experience a more rugged, back-country, maritime environment. Provision of visitor services such as toilets, kiosks, and a possible food concession, as well as the amenities above, would in general make Elliott Key much more attractive as a destination within the park. Visitation would likely increase, and there would be an increased frequency of visitor encounters. In general, these changes would have long-term beneficial impacts on the visitor experience. However, some visitors who are attracted to the island for the purposes of solitude and nature study would potentially be adversely impacted over the long term by the additional activity and visitor levels, especially during peak use times.

All of Boca Chita Key would be included in the Visitor Services/Park Administration Zone. Reuse of historic structures in lieu of new construction would be a positive impact

on the visitor experience because it would maintain the historic integrity and ambiance of the cultural landscape and opportunities for visitors to learn about and understand the key's past use. Given the popularity of Boca Chita Key, increasing visitor services on this key would be a long-term beneficial impact on use.

Construction activities associated with facility upgrades discussed above would result in short-term, minor, adverse impacts on visitors trying to access and use these areas.

In this alternative, visitors, especially those with their own boats who normally would not visit Convoy Point, would have substantially increased opportunities to access information about the park before entering. The placement or enhancement of nine visitor information points at locations outside the park would help visitors learn about the park and any regulations or necessary permits, and would help visitors plan their visit in advance; thus they could use their time more efficiently and potentially have a more enjoyable visit.

### Cumulative Effects

The growing population of the Miami-Dade region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. To this end there are a number of recent and ongoing studies and partnership efforts underway in the Biscayne Bay area to improve and protect water quality and quantity, wetlands, fisheries, and coastal viewsheds. Projects include the *Fishery Management Plan for Biscayne National Park*; the *South Miami-Dade Watershed Study and Plan*; the *Biscayne Bay Surface Water Improvement and Management Plan*; the *Lower East Coast Regional Water Supply Plan*; the Biscayne Bay Partnership Initiative; the Southeast Florida Coral Reef Initiative; and the *Biscayne Bay Coastal Wetlands Plan*. The actions of this alternative, especially park zoning that could enhance resource conditions, such as the Slow-Speed, Noncombustion Engine Use, Sensitive Resource, and Nature Observation zones,

combined with these ongoing regional efforts, would have the potential positive cumulative impact of improving the quality of visitor activities in the region, especially related to fishing, nature viewing, and other resource-based recreational activities. There would also be improved visitor opportunities to learn from various sources regarding the importance and complexity of restoration efforts in a rapidly growing urban environment.

Adjacent state parks, such as Bill Baggs Cape Florida State Park, Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park, and the Florida Keys National Marine Sanctuary offer services, facilities, and recreational opportunities that enable visitors to experience and learn about the natural and cultural resources of the Biscayne Bay and Florida Keys region. Also, current efforts through the Stiltsville plan and the public access plan for Biscayne Bay provide potential opportunities for enhanced visitor access, education, and recreation related to the Biscayne Bay area.

The actions of this alternative to improve access and recreational opportunities and facilities would have the potential positive contribution of more and better public information about and access to the Biscayne Bay area and enhanced opportunities to learn about and recreate there, especially enhanced canoeing and kayaking opportunities.

When combined with the beneficial effects of other actions, the actions proposed in alternative 3 would result in a minor beneficial cumulative effect on visitor experience in the area. Alternative 3's contribution to these cumulative effects would be small.

### Conclusion

Additional speed restrictions, new Noncombustion Engine Use and Access-By-Permit zones would potentially exclude some visitors from these areas, which would be a long-term, minor to moderate, adverse impact. The same zones would help over time to separate conflicting visitor uses; increase boating safety; and increase recreational opportunities like

canoeing and kayaking, wildlife viewing, and solitude. These would be long-term beneficial impacts on some visitor experiences. Both longterm, minor, adverse and beneficial impacts would occur to different visitors from implementing the Marine Reserve Zone. Overall, there would be long-term beneficial impacts on most visitors' experiences. The cumulative effect would be minor and beneficial. Alternative 3's contribution to these cumulative effects would be small.

## NPS OPERATIONS AND FACILITIES

### Analysis

Actions under alternative 3, with its emphasis on providing a balance between unrestricted recreational access and enhanced resource protection in the park, would generally have the same impacts on park operations and facilities as those described for alternative 2. Under alternative 3, however, more personnel would be required to enforce park regulations, educate visitors about, and monitor the Marine Reserve Zone and expanded Slow-Speed and Nature Observation zones. The Access-By-Permit Zone would be managed and enforced by a labor-intensive permitting and patrolling system. Thus, this alternative, which would also include establishment of up to nine potential visitor contact points outside the park would result in additional long-term, minor, adverse impacts on the park's budget.

### Cumulative Effects

As discussed under alternative 1, past and ongoing cooperative planning and development projects in the Biscayne Bay region, such as the Biscayne Bay Partnership Initiative, the *Miami-Dade County Comprehensive Development Master Plan*, and the *Biscayne Bay Strategic Access Plan*, and NPS special resource studies, such as those for Miami Circle and Virginia Key Beach Park, have resulted in some long-term beneficial effects on park operations and facilities. However, these effects are almost impossible to measure.

This alternative, with its emphasis on providing a balance between unrestricted recreational access and enhanced resource protection in the park as well as establishment of potential visitor contact points outside the park, in combination with the aforementioned beneficial effects of past and ongoing cooperative planning and development projects in the Biscayne Bay region, would generally result in long-term, beneficial cumulative effects on facilities and long-term, negligible, adverse cumulative effects on park operations; this alternative's contribution to these effects would be small and beneficial for facilities and small and adverse for park operations.

### Conclusion

Overall, actions under alternative 3 would result in short-term and long-term, minor to moderate, adverse impacts on the park's budget for park operations and facilities. The overall cumulative effects would be long term and beneficial for facilities and long term, negligible, and adverse for park operations; this alternative's contribution to these effects would be small and beneficial for facilities and small and adverse for park operations.

## SOCIOECONOMIC ENVIRONMENT

Full implementation of this alternative would require the National Park Service to hire 15 additional employees to handle the increased workload for administration, interpretation, law enforcement, and maintenance. This additional employment would bring in about \$1.1 million in wages and an increased demand for housing, utilities, services, and goods, resulting in a long-term minor benefit for the local economy.

Excluding employee wages, implementing alternative 3 is estimated to cost a total of \$5.58 million above the current level of spending over the next 20 years. Most of this total would equate to an increase in the input of federal dollars into the region in the form of purchases of supplies, materials, and construction contracts. This would be a long-term

beneficial impact as government expenditures enter the local economy.

The number of visitors and average length of visit could increase because of the additional experience opportunities in the park. Local businesses that rely on the tourist trade would receive a long-term, minor, benefit. For example, every 1% increase in annual visitation would mean an increase of about \$164,000 to the local economy through direct and indirect visitor spending each year.

### **Cumulative Effects**

The social and economic situation in Miami-Dade County is affected by a combination of many factors, including the presence of units of the national park system. Some of the \$15.5 billion in federal spending in the county is generated by Biscayne National Park in the forms of employee wages, purchase of supplies, and various contracts. Although tourism is not the most important driving factor in the regional economy, the livelihoods of service-related businesses in the region rely to some degree on the inflow of tourist dollars, especially restaurants and motels.

The total direct economic value of public recreation areas also includes two sets of values: (1) the user benefit that people receive from their visit and (2) the values of land near the recreation area. Economic studies have shown that the value of private land can increase with the number of outdoor recreation opportunities and the proximity to outdoor recreation space (Clawson and Knetsch 1966). Therefore, the continued presence of Biscayne National Park provides an important benefit to the residents and property values in the vicinity.

Alternative 3 would contribute a modest beneficial increment to the above impacts of other past, present, and future actions on socioeconomic conditions and, when considered in combination with other actions, would result in a beneficial cumulative impact.

### **Conclusion**

Implementing alternative 3 would have short-term and long-term beneficial economic impacts in the region. The overall cumulative effects would be beneficial. Alternative 3 would contribute a modest beneficial increment to these cumulative effects.

### **UNAVOIDABLE MODERATE OR MAJOR ADVERSE IMPACTS**

Unavoidable adverse impacts are defined here as impacts that cannot be fully mitigated or avoided. There would be no unavoidable moderate or major adverse impacts expected as a result of implementing alternative 3.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Alternative 3 would have a relatively high potential for some commitments of resources when compared to other alternatives because it would involve new development (e.g., trails, dock, and buildings). However, most of the development being proposed, such as trails and small facilities, would have only small areas of potential effect. Most proposed developments would be built in previously disturbed areas and would not result in substantial irreversible or irretrievable commitments of resources. Cultural resources would continue to be protected through active preservation maintenance.

### **NATURAL OR DEPLETABLE RESOURCES AND ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

Whenever feasible, the National Park Service strives to maximize the use of renewable resources and energy and therefore minimize the use of depletable resources. However, it is not possible with today's technologies to cost-effectively avoid all use of depletable resources in building and operating facilities. Because this alternative includes some level of

construction, it would impact natural or depletable resources and energy to some extent. Generally, the amount of resources and energy used in a building is related to its size. Other park assets that support visitor use and resource protection such as parking lots and trails also potentially use depletable resources to some extent; however, the park's practice is to use wood or recycled material (renewable resources) for boardwalks. Increases or decreases to trails would not

impact depletable resource or energy use. The change in the amount of square footage in buildings is used in this analysis to approximate the level of resource and energy use.

Implementing alternative 3 would involve a small increase in energy requirements compared to alternative 1 because of the proposed new buildings that would need energy to operate.

# IMPACTS OF IMPLEMENTING ALTERNATIVE 4, THE NPS PREFERRED ALTERNATIVE

## NATURAL RESOURCES

### Fisheries

Proposed management actions under this alternative include designating both the East and West Featherbed and Featherbed banks and Caesar Creek bank as Noncombustion Engine Use zones. This zone would limit the speed and type of boats entering these waters, thus reducing boat traffic overall as well as reducing the impacts associated with boat traffic such as scarring and localized turbidity. This would be a long-term beneficial impact.

This alternative would provide a greater benefit to fisheries habitat in the seagrass than alternative 1 because a larger area of seagrass beds in the park would be included in protective zoning designation.

The western coast of Elliott Key from the southwest tip of Sands Key south to Elliott Key Harbor would be designated a Slow Speed Zone. The number of boats entering this area would be reduced because not all boats would be able to travel at slower speeds in the shallow water. The Slow Speed Zone would reduce the potential for scarring in the seagrass beds in this area as well as reduce the potential for turbidity in the water column, thus minimizing adverse impacts on the productivity of this habitat and water quality in the area. The Slow Speed Zone would have a beneficial impact on the quality of the fish habitat in this area.

A Marine Reserve Zone where fishing is not allowed would be managed to preserve natural resources with minimal human-caused intrusions. The designation of a Marine Reserve Zone would remove commercial and recreational fishing from about 10,522 This locally reduced fishing pressure, where targeted fish species could grow larger and therefore exponentially increase in repro-

ductive output, would result in a long-term, moderate to major, beneficial impact on park fishery resources. Even though fishing pressure may increase outside this zone, the expected increase in size and abundance of fish within the Marine Reserve Zone is expected to have a “spillover” effect outside the zone, as documented in other marine reserve zones worldwide.

**Cumulative Impacts.** In 2002 the National Park Service and the Florida Fish and Wildlife Commission initiated a *Fishery Management Plan and Environmental Impact Statement*.

Once completed, the *Fishery Management Plan* would involve changes in current management strategies for both recreational and commercial fishing activities. These changes could include establishment of a permit system for both recreational boating and commercial fishers, limits on the type of spearfishing equipment that can be used in the park, a moderate decrease in fisheries harvest, and elimination of the lobster-sport season. With implementation of the *Fishery Management Plan* the park anticipates the current condition of fisheries stocks would improve and the impact of fishing on habitat within the park would be reduced. The long-term impacts of the *Fishery Management Plan* on fisheries in the park would be beneficial. Because proposed management actions under this alternative are more protective of fish habitat than under alternative 1, there would be more benefits on fisheries realized from combining actions under this alternative with the implementation of the *Fishery Management Plan* than implementing the *Fishery Management Plan* alone (as in alternative 1).

The human population surrounding the park is expected to continue to increase. This could lead to additional fishing pressure on fish populations in the park—a potential long-

term adverse impact that would be partially mitigated by actions in the *Fishery Management Plan*.

The United States Coral Reef Task Force, created in 1998, was established to lead U.S. efforts to protect, restore, and “sustainably” use coral reef ecosystems. These efforts include but are not limited to reducing and mitigating coral reef degradation from pollution, overfishing, and other causes. The task force has identified fundamental themes to guide immediate and sustained national action. These themes include quickly reducing the adverse impacts of human activities on coral reefs and associated ecosystems. Although no specific actions have been proposed, if the initiatives of the task force are fully implemented the impacts would likely be beneficial for the coral reef system in the park. Full implementation of the task force recommendations would also likely cause the park to modify current management approaches to incorporate the recommendations. This would be a long-term benefit to the ecosystem.

This alternative would contribute a beneficial impact to the beneficial impacts of other past, present, and future actions resulting in beneficial cumulative effects. The magnitude of this alternative’s contribution would be modest.

**Conclusion.** Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced under the preferred alternative, resulting in a long-term beneficial impact. Cumulative effects would be beneficial. This alternative’s contribution to these impacts would be modest.

### Threatened and Endangered Species

**Manatee.** Manatees are more likely to be found in the warm waters closest to shore, so there would continue to be a 1,000-foot manatee protection area in the waters closest to the shoreline. The manatee protection area would be modified so that the 500 feet nearest the shoreline would be designated a Noncombustion Engine Use Zone and the

remaining 500 feet would be designated a Slow Speed Zone. Within the Noncombustion Engine Use Zone, management would focus on protecting water-based resources and minimizing visitor use impacts. This zone would provide additional protection to the manatee by reducing the potential for boat-related injuries and mortality in the areas where manatees are most likely to occur. The Slow Speed Zone would provide boat operators a greater opportunity to avoid collisions with manatees that are further from shore by increasing their response time. The Slow Speed and Noncombustion Engine Use zones under this alternative would also result in fewer boat groundings in seagrass beds, an important habitat/food source for manatees. The modifications to the manatee protection area and zoning would have a long-term beneficial impact on manatees in the park.

**Section 7 Determination of Effect** — The impacts on the manatee under the preferred alternative would be small, localized, and beneficial. Measurable beneficial outcomes on individual manatees and the manatee population because of the protective zones are likely. This would equate to a “may affect, not likely to adversely affect” determination.

**Sea Turtles.** Collisions between boats and sea turtles would be expected to be minimized in the Slow Speed and the Noncombustion Engine Use zones. However, given the size of these zones compared to the size of the Multiuse Zone, the beneficial impacts of implementation of this alternative would be minor.

Although this alternative includes primitive campsites on Elliott Key, overall development on Elliott Key would be minimal because only the breezeway loop trail would be improved. There would not be a substantial amount of light from the campsites. Mitigation measures such as education efforts regarding the importance of reducing artificial light, additional monitoring and patrols as visitation increases, and possibly limitations on the number of visitors would reduce the level of adverse impacts. No new development would occur



on Elliott Key so there would be no effect. The implementation of a Marine Reserve Zone would result in less derelict fishing gear (monofilament, traps) in this area. This would result in the reduction of threat of entanglement for sea turtles within this zone. This would be a minor, beneficial, long-term impact on sea turtles. This beneficial impact would be offset if fishing pressure increased outside the Marine Reserve Zone.

**Section 7 Determination of Effect** — The impacts on sea turtles under the preferred alternative would be adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination.

**American Crocodile.** As in alternative 3, visitor services and infrastructure would remain near current levels with the designated paths, a possible viewing platform, boardwalk, and jetty in the vicinity of Convoy Point. This area is north of the designated critical habitat area for the crocodiles where few crocodiles are so would not be expected to impact their activities in the park. The mangrove south of the visitor center would continue be managed primarily to protect the habitat characteristics of the area. No additional development within the designated critical habitat would be proposed under this alternative. The impacts of activities on crocodile habitat and activities along the mainland shore would be negligible for this alternative.

Under this alternative, the development footprint on Porgy Key would remain as it is. The Noncombustion Engine Zone would include the eastern shoreline of Old Rhodes Key and the waters around Totten Key. Few visitors would be expected in this area because of the boating restrictions. Although part of the designated critical habitat, there are relatively few crocodiles in this area of the park.

If, because of human population pressure along the mainland, crocodiles begin to venture across the bay there could be increased interaction between visitors and crocodiles around Old Rhodes and Totten Keys. However, the level of interaction would be about the same as it is currently. The

developed area at Adams Key provides an excellent opportunity to orient visitors to this area of the park, including appropriate actions when traveling in the crocodile habitat. With mitigation, the adverse impact of this alternative on the crocodile population in this area of the park would be negligible.

**Section 7 Determination of Effect** — The impacts on the American crocodile under the preferred alternative would be negligible, localized, and beneficial. Mitigation measures would be put in place in the event of more visitor-crocodile interactions because of population pressures near the park. Overall, this would equate to a “may affect, not likely to adversely affect” determination for the American crocodile.

**Smalltooth Sawfish.** As in other alternatives, smalltooth sawfish could be affected by any increase in hook-and-line fishing efforts, although any effects are unlikely given the rarity of smalltooth sawfish in the national park. While the establishment of the Marine Reserve Zone in deeper reef habitat is not likely to have a substantial effect on this species that tends to prefer shallow water, it is possible that the implementation of the no-take marine reserve zone could have a small yet positive benefit on smalltooth sawfish by reducing bycatch since reports of this species in reef and deeper water habitats, although uncommon, do exist. No other actions that would occur under this alternative would be expected to affect sawfish in the park.

**Section 7 Determination of Effect** — Although no actions in this alternative would adversely affect the sawfish, there could be an increase for the foreseeable future in potential hook-and-line catches affecting individuals’ health. However, given the scarcity of smalltooth sawfish in the park, this would likely result in a negligible effect on sawfish. The Section 7 effect determination would be “May affect, not likely to adversely affect.”

**Schaus Swallowtail Butterfly.** New development on Adams Key would include only the staging area for canoes and kayaks and possib-

ly minimal facilities for the environmental education center. The level of development on the island would occur near the shore and would be unlikely to impact the butterfly population or habitat on the island. The long-term adverse impact on the butterfly population and habitat would be negligible.

On Elliott Key the potential disturbance of the butterfly population or habitat would be slight because only the loop trail would be made universally accessible. The long-term impact of this alternative on the population of the butterfly would be adverse and negligible.

Old Rhodes and the other southern keys would be zoned for nature observation, and Swan Key would be zoned as a sensitive resource area. Impacts on the hardwood hammocks on these keys would not change under this alternative. There would be no short-term or long-term impacts on butterfly populations and habitat caused by this alternative. Weather-related phenomena would remain the greatest risk to the butterfly under this alternative because there would be no development proposed that would impact their habitat.

***Section 7 Determination of Effect*** — The impacts on the Schaus swallowtail under the preferred alternative would be negligible and neutral to adverse in some locations, but mitigation measures to protect the species' habitat and breeding season are likely to be successful. Overall, the preferred alternative "may affect, not likely to adversely affect" the Schaus swallowtail.

**Acroporid Corals.** Under this alternative, the Legare Anchorage would be reduced in size from its current configuration, although it would continue to be closed to in-water activities and would provide protection to the two species of Acroporid corals that may be located in this area. The creation of a 10,522-acre Marine Reserve Zone would prohibit fishing and anchoring on many of the southern reefs in the park, which include areas known to have healthy populations of acroporid corals. Because visitors who would

otherwise use the area in the Marine Reserve Zone to fish would have to fish elsewhere, boat traffic and anchoring throughout this zone could be expected to decrease. Although unlikely, these decreases could be offset if people use the Marine Reserve Zone for nonextractive activities such as snorkeling and diving. Because the Marine Reserve Zone is expected to reduce fishing and improve ecological balance, reduce fishing debris, reduce vessel groundings, and reduce damage from inappropriate anchoring in Acroporid coral habitat, actions under alternative 3 are expected to have a moderate and beneficial effect.

***Section 7 Determination of Effect*** — The Marine Reserve Zone is expected to have a beneficial, long-term, effect Acroporid corals by protecting them from activities that could lead to physical and ecological damage. Thus, this alternative would result in a determination of "may affect, not likely to adversely affect" Acroporid corals.

**Cumulative Impacts.** Habitat disturbance or loss is the most common reason for a species to be listed. The establishment of Biscayne National Park has provided a protective refuge for listed species resulting in long-term beneficial impacts.

The *Florida Manatee Recovery Plan* and the site specific county plans are designed in part to reduce boat-related manatee injury and mortality as well as protect habitat areas. These measures are consistent with protection measures incorporated into the proposed actions in this general management plan. Implementation of this recovery plan would continue to have a beneficial impact on manatee protection efforts in the park. The efforts to protect the manatee would be strengthened under this alternative with the addition of a Noncombustion Engine Use Zone in the 500 feet closest to the mainland shoreline. The impacts of these changes would continue to have a beneficial impact on manatee protection efforts.

Alternative 4 would result in negligible adverse and beneficial impacts on federally

listed species. When combined with the impacts of other past, present, and future actions the overall cumulative effect would be negligible and beneficial. This alternative would contribute a slight amount to the overall cumulative effects.

**Conclusion.** Implementing alternative 4 would result in a beneficial impact on manatees and Acroporid corals and a negligible effect on smalltooth sawfish. Under this alternative there would be proposed development that could impact American crocodiles, sea turtles, and Schaus swallowtail butterfly. The park would continue to coordinate with the U.S. Fish and Wildlife Service and National Marine Fisheries Service and work to mitigate any adverse impacts on these species. Thus, the Section 7 determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park. Cumulative effects would be negligible and beneficial. This alternative would contribute a slight amount to the overall cumulative effects.

### **Special Status Species, including State Listed Species**

**Birds.** West Arsenicker Key, used by bald eagles, would be zoned a Sensitive Resource Zone and would remain closed to visitors. Thus, there would be no effect on the West Arsenicker Key bald eagle population or nesting activity under this alternative. Furthermore, the creation of a Noncombustion Engine Zone extending 500 feet from the Sensitive Resource Zones around West Arsenicker and Arsenicker Keys would further reduce the likelihood of disturbances to bald eagles or any other state-listed birds using these islands.

Under this alternative, Sands Key, which is closed to visitors, and the islands surrounding Jones Lagoon would be zoned as Nature Observation Zones. The waters of Jones Lagoon would be designated a Noncombustion Engine Use Zone. Visitation would be allowed on Sands Key and the islands of Jones Lagoon, so there would be some human

caused intrusions to birds nesting, roosting, loafing, and/or foraging there; however, resource protection would be emphasized. Actions under alternative 4 would reduce, although not eliminate, the potential for disturbance to birds using the Jones Lagoon area because there is still the possibility that small vessels (e.g., kayaks and canoes) and people coming ashore could closely approach birds.

The establishment of a Visitor Service Zone on Porgy Key could encourage visitation to the Jones Lagoon area, although the difficulty in accessing this area and the specialized equipment and knowledge needed to safely traverse Jones Lagoon would keep the likelihood of this fairly low. Given that visitation to both Sands Key and Jones Lagoon would be expected to remain minimal, adverse impacts on the birds and their habitat would be negligible. If visitation increases such that any state-listed birds could be disturbed, management actions could include limiting access to areas where birds are known to nest during nesting season and/or establishing set-back distances following recommendations in scientific literature. Under this alternative, the long-term adverse impact on the state-listed bird populations in the park and potential nesting activity on Sands Key and the Jones Lagoon area would be negligible.

Currently visitation to the ocean side of Elliott Key is low. The level of visitation on Elliott Key is likely to increase once facilities were developed, the trail from the harbor to Sweeting Homestead was hardened for handicap accessibility, and three primitive campsites were developed, including one near Petrel Point. Birds using coastal areas adjacent to areas developed for visitor recreation (such as Elliott Key) could be exposed to potential disturbances of the noise of boat engines and close approaches by people. This exposure could result in an alteration of natural behaviors, including the potential for nesting birds to inadvertently crush their eggs while fleeing or to temporarily or permanently abandon their nests, thereby exposing the eggs to predators and extreme temperatures. If visitation to the ocean side increases such

that the state-listed birds could be discouraged from nesting or disturbed during nesting, the park could enforce no-access setback distances, close areas near Petrel Point during critical nesting season to reduce impacts on the birds.

The proposed Slow Speed Zone on the bay side of Elliott Key would be expected to reduce the likelihood of disruptions to birds using the coastal areas immediately adjacent to this zone. As a result, beneficial effects on state-listed birds in the immediate area would be expected.

Under this alternative, birds using coastal habitats along the park's mainland shoreline would receive protection from potential boat-related disturbances from (1) the Noncombustion Engine Use Zone that extends 500 feet east from the mainland (excluding Black Point, Convoy Point, and Turkey Point channels) and (2) a Slow Speed Zone covering the area 500 to 1,000 feet from the shoreline. By essentially reducing the usage of the waters immediately adjacent to the mainland shoreline, these two zones would be expected to reduce potential boat-related disturbances to birds that are roosting, nesting, foraging, and/or loafing along the mainland shoreline.

Overall, under this alternative, including any necessary mitigation, the long-term adverse impact on state-listed bird populations and nesting activity in the park would be negligible.

**Miami blue butterfly.** Although visitation to most of Elliott Key is currently low, it is likely that visitation would increase once the additional facilities are developed—including hardening the trail from the harbor to Sweeting Homestead for handicap accessibility and adding three primitive campsites. However, there is typically little interaction between visitors and these small butterflies. During construction on the trail and campsites, the area would be checked by a qualified biologist to ensure that no individuals would be disturbed. Under this alternative and with any necessary mitigation, the long-term

impact on the Miami blue population in the park would be negligible.

**Cumulative Impacts.** These species were listed because of the adverse impacts of habitat disturbance or loss that have resulted in alarming drops in population numbers. The establishment of Biscayne National Park has provided increased habitat protection for bald eagles, other listed birds, and butterflies in the park—a long-term beneficial impact.

Reintroduction efforts of Miami blue butterflies have occurred on Elliott Key in an attempt to restore this species. If successful, this would be a long-term beneficial impact. The monitoring and recovery plan would continue to be implemented.

At the time this plan was started, bald eagles were federally listed as endangered. They have since been delisted because of population recovery, indicating a long-term beneficial impact on this species.

Alternative 4 would result in negligible adverse impacts on bald eagles, other listed birds, and Miami blue butterflies. When combined with the impacts of other past, present, and future actions, the overall cumulative effect would be minor and adverse. This alternative would have a small contribution to the overall cumulative effects.

**Conclusion.** Implementing alternative 4 would result in long-term, negligible, adverse impacts on bald eagles, other listed birds, and Miami blue butterflies and would not be likely to lead to federal listing. Cumulative effects would be minor and adverse.

## Terrestrial Vegetation

Under this alternative the impacts on terrestrial vegetation on the keys, particularly the hardwood hammocks, would be less than for alternatives 2 and 3. Although Boca Chita, Elliott, Adams, and Porgy keys would still include areas managed for visitor access and recreation, these areas would be smaller than under alternatives 2 and 3. Access to the Jones home site on Porgy Key would be managed to

minimize impacts on sensitive resources. Visitation to these keys would still be expected to increase over current levels because visitor services would be concentrated in these areas. The adverse impacts from increased visitation could include trampling and loss of vegetation from social trails. In general these impacts could be mitigated by visitor education efforts and trail design to keep visitors on the existing trails. With mitigation measures in place, the adverse impacts of increased visitation would be negligible to minor in the long term. Under this alternative, the “loop” area of the hiking trail (the two east-west segments from the Elliott Key harbor to the north and south entrances of the boardwalk and the north-south segment near the harbor) would be hardened. With mitigation, the impacts on the vegetation would be adverse but negligible in the long term.

Long-term impacts from the proposed Convoy Point boardwalk would include the removal of mangroves and other wetland plants, trimming of mangroves, and have shading impacts on mangroves and other vegetation. Impacts would be adverse, minor, and longterm.

**Cumulative Impacts.** An exotic plant management plan has been developed for Biscayne Bay National Park and eight other national parks in the region. Nonnative invasive plant species can change the structure and function of native plant communities. These changes can have an adverse impact on habitat for native species that rely on the native plant communities. Vegetation disturbances caused by social trails and trampling of native vegetation encourages growth of invasive species. Removal of the exotic species would provide better conditions to reestablish native vegetation in disturbed areas, which could help to mitigate the adverse impacts associated with social trails in the park. Implementation of this plant management plan would have a beneficial impact on terrestrial vegetation in the park and the habitat it provides.

A *Fire Management Plan* was developed that includes the park’s upland areas. This plan helps guide resource management efforts in the park in the vegetation communities that are fire adaptive. Because these plant communities are fire adaptive, controlled burning would be beneficial and would reduce fuel buildup associated with catastrophic fires. Implementation of this fire management plan has a beneficial impact on the terrestrial vegetation in the park and the habitat that it provides.

When the negligible to minor adverse impacts of alternative 4 are combined with the beneficial impacts of other past, present, and future actions, the resulting cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative impacts.

**Conclusion.** Implementing this alternative would result in long-term, negligible to minor adverse impacts on terrestrial vegetation. Cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative impacts.

### **Submerged Aquatic Communities**

Under this alternative there would be greater controls on speed and vessel types in areas where there are submerged aquatic communities, particularly seagrass beds. Featherbed, West Featherbed, and East Featherbed banks would be zoned for noncombustion engine use (poling and trolling only). Boats in this zone would be traveling relatively slowly, and fewer boats would be operating with high-speed propellers so the potential for scarring of the seagrass beds would be substantially reduced. Within the Noncombustion Engine Use Zone, the potential for turbidity in the water column caused by motorboats would also be reduced. Thus, the productivity of the seagrass beds would be higher under this alternative—a long-term beneficial impact.

The bay side of Elliott Key from Sands Cut to Elliott Key Harbor and a strip along the mainland shore from 500 to 1,000 feet out would be zoned as a slow speed area to protect natural marine resources such as seagrass. Because the

boats in these areas would be traveling at a reduced rate of speed, there would be reduced potential for seagrass scarring. Overall, the productivity of the seagrass beds would be expected to increase under this alternative because of the increased areas zoned for slow speeds and noncombustion engines. The increase in productivity in the seagrass beds would be a long-term beneficial impact.

The waters within Jones Lagoon and around Totten Key would be zoned for noncombustion engine use. The potential for scarring of the seagrass and hardbottom communities would be reduced in this area. This would be a long-term beneficial impact on the productivity of the submerged aquatic communities in these areas.

The proposed Convoy Point boardwalk would result in removal of mangroves and other wetland plants, trimming of mangroves, and have shading impacts on mangroves and other aquatic life. Impacts would be adverse, minor, and long-term. Modification of the manatee protection zone in this alternative would also provide some additional protection to the submerged aquatic communities in these areas, particularly the seagrass.

Under this alternative, a Marine Reserve Zone would be designated from Hawk Channel east to the park boundary. The Marine Reserve Zone would be managed to preserve natural resources with minimal human-caused intrusions. Boat size, type, and speed could be regulated to protect resources in this zone. It would be expected that the adverse impacts on the reef from recreational activities would be significantly reduced under this alternative. In particular, the potential for scarring from boat propellers or anchors would be greatly reduced, but there could still be adverse impacts from other recreational activities such as diving. These adverse impacts from diving on the structure and function of the coral reef as habitat would be the same as for alternative 3. Implementation of the reserve zone would reduce the impacts of recreational activities in this area of the reef, resulting in a long-term beneficial impact. Impacts from fishing and

anchoring would continue outside the Marine Reserve Zone.

**Cumulative Impacts.** Damage to seagrass beds from boat groundings and anchors has degraded habitat for shrimp, crabs, snails, lobsters, and echinoderms that inhabit these areas.

Boat groundings (propeller damage and hull impacts) and inadvertent placement of anchors have damaged the dense soft corals, sea fans, and sponges in the hardbottom communities, which in turn has an adverse impact on the fish and invertebrates that seek refuge in these areas.

Coral reefs are complex ecosystems and sensitive to disturbances. Fishing, snorkeling, and diving can also have adverse impacts on coral reef systems. The damage caused by these activities includes scarring from boat propellers and inadvertent placement of anchors, as well as breakage caused by snorkeling and diving. Debris from recreational and commercial fishing (e.g., fishing tackle and lines from crab and lobster traps) left on the reef can wrap around the coral and damage it. Fishing also results in removal of predators and the removal of herbivorous fish that keep algae minimized (contributes to reef health). Damage to the coral reefs also adversely impacts other species that rely on the reefs for food and shelter. Damage to the seagrass beds, hardbottom communities, and coral reefs would continue to be long term, minor to moderate, and adverse.

Alternative 4 would result in long-term beneficial impacts. When combined with the adverse impacts of other past, present, and future actions, the cumulative impacts would be minor and adverse. Actions proposed in alternative 4 would modestly reduce these adverse cumulative impacts.

**Conclusion.** Alternative 4 would result in long-term beneficial impacts on submerged aquatic communities. Cumulative effects would be minor and adverse. Actions proposed in alternative 4 would modestly reduce these adverse cumulative impacts.

## **Wetlands**

Wetlands are located throughout the park along the mainland coast and the fringes of the keys. An indicator of wetlands in the park is the presence of mangroves. Wetlands in the park would continue to serve as an important habitat area for a wide variety of terrestrial and aquatic species. Placement of the Nature Observation Zone along portions of the mainland would give greater protection to mangrove shorelines. This would have minor, beneficial, and long-term impacts.

Under this alternative a boardwalk or viewing platform would be considered to interpret the mangrove forests and the mangrove shoreline north of the visitor center at Convoy Point; also, the visitor center boardwalk and jetty could be upgraded. With these improvements visitors would have an opportunity to experience the mangroves along the shore north of the visitor center at Convoy Point. Construction of the boardwalk and viewing platform would cause both short-term and long-term adverse impacts on the mangroves along the mainland shoreline of the park. During construction there would be short-term adverse impacts on water quality from increased turbidity. Increased turbidity in the water column could degrade the habitat for wetland species, which could impact terrestrial species, particularly birds. These impacts would be minor to moderate but localized.

Long-term impacts from the proposed boardwalk would include the removal of mangroves and other wetland plants, trimming of mangroves, and have shading impacts on mangroves and other aquatic life. Impacts would be adverse, minor, and longterm. These impacts could be mitigated during the design process to ensure that the structures do not substantially shade the mangroves. With mitigation the adverse impacts would be long term but minor.

No additional access into the mangroves that fringe the keys would be developed under this alternative so there would be no change in the current size, integrity, or continuity of these other wetland areas in the park. Mangroves

are extremely difficult to walk through, and while the proposed visitor facility improvements at Porgy, Elliott, and Boca Chita keys might attract more visitors, this is not likely to affect the wetlands.

**Cumulative Impacts.** The Biscayne Bay Coastal Wetlands Project of the Comprehensive Everglades Restoration Plan includes pump stations, spreader swales, stormwater treatment areas, flow ways, levees, culverts, and backfilled canals in southeast Miami-Dade County and covers 13,600 acres from the Deering Estate south to the Turkey Point Power Plant. The purpose of this project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. The proposed project will replace lost overland flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The proposed redistribution of freshwater flow across a broad front is expected to restore or enhance freshwater wetlands, tidal wetlands, and nearshore bay habitat.

Sustained lower-than-seawater salinities are required in tidal wetlands and the nearshore bay to provide nursery habitat for fish and shellfish. This project is expected to create conditions that will be conducive to the reestablishment of oysters and other components of the oyster reef community. Diversion of canal discharges into coastal wetlands is expected not only to reestablish productive nursery habitat along the shoreline but also to reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets. The impact of these actions once implemented would be beneficial for wetland inside and outside the park.

The Biscayne Bay Coastal Wetlands Project could improve the overall health of the wetland areas along the mainland shoreline such that the system as a whole is better able to accommodate the stresses associated with the short- and long-term impacts of the development and human use in the area.

This alternative would contribute minor adverse impacts to the beneficial impacts of other present and future actions resulting in a beneficial cumulative impact. This alternative would slightly reduce these beneficial cumulative effects.

**Conclusion.** Short-term impacts associated with construction under this alternative would be minor to moderate, localized, and adverse. The long-term impacts would be mitigated through design and would be adverse but localized and minor. Cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative effects.

### Soundscapes

Under alternative 4, there would be areas of the bay zoned for slow speed or noncombustion engine use. Because these restrictions would reduce the level and duration of noise from boats, there would be long-term, minor, beneficial impacts on soundscapes on portions of the bay and adjacent land.

There would be a limited amount of new construction in this alternative occurring mostly in the Visitor Service and Park Administration Zone. This would result in short-term, localized, adverse impacts that would be negligible to minor in intensity. Use of the new or upgraded facilities would result in a long-term negligible adverse impact to natural soundscapes.

Existing natural soundscapes in the interior of the larger keys would continue to be preserved by vegetative screening—a continuing, minor, beneficial impact.

**Cumulative Effects.** Natural soundscapes have been degraded by activities on land and water portions of the park, such as vehicle traffic, boat traffic, agricultural or industrial activity, and occasional construction. Because most of the park is open water, noise from motorized boats is the most prevalent disruption to natural soundscapes.

The concentration of visitors around the visitor center and parking lot also affects the natural soundscape at Convoy Point. NPS staff mowing the lawn and blowing leaves causes short-term, localized, adverse impacts on the soundscape in this area. This noise is generally tolerated in the Visitor Services/Park Administration Zone so the related impacts would be adverse but negligible.

Natural soundscapes predominate in the distant portions of the park away from popular boating routes. Increases in visitation on weekends and during special events add to the number of boats at one time on the bay. More boats leads to an increased noise level and results in short-term, minor to moderate, adverse impacts.

The minor beneficial and adverse impacts of this alternative, in combination with the adverse impacts of other actions, would result in minor and adverse cumulative impacts on the natural soundscape; however, the contribution of this alternative to these impacts would be slightly reduce these adverse cumulative impacts.

**Conclusion.** Implementing alternative 4 would have long-term, minor, beneficial impacts on soundscapes and short-term, negligible to minor, adverse impacts during construction. The overall cumulative impacts would be minor and adverse; the contribution of this alternative to these impacts would slightly reduce these adverse cumulative impacts.

## CULTURAL RESOURCES

### Archeological (including Submerged Maritime) Resources

**Analysis.** Implementation of this alternative would have the same impacts on archeological resources as those listed in alternative 1, although the strong emphasis on cultural resource protection could be expected to have some additional beneficial impacts on archeological resources (including submerged maritime) sites. Actions under this alternative, such



as exclusion of visitors from West Arsenicker, Arsenicker, and Swan keys, prohibition of anchoring and recreational and commercial fishing between Hawk Channel and the park's eastern boundary would generally contribute to beneficial impacts on potential terrestrial archeological sites and both potential and known submerged maritime archeological resources. These added protections would provide for less potential for treasure hunting, looting, amateur collection, and inadvertent visitor impacts.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 4 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 4, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor adverse cumulative effect. The adverse effects of alternative 4, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although the strong emphasis on cultural resource protection could be expected to have some additional, long-term beneficial impacts on archeological sites. Actions under this alternative would have the same cumulative effects on archeological resources as those listed under alternative 1. This alternative's contribution to these cumulative effects would be small.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on archeological resources. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of

agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## Historic Structures and Buildings

**Analysis.** Implementation of this alternative would generally have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because the structures and buildings would be rehabilitated, preserved, and adaptively used in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. However, some minor elements of historic fabric could be lost as a result of remodeling/rehabilitation efforts, and anticipated increasing visitation levels could result in loss of some historic fabric from inadvertent visitor use or vandalism. As with alternative 1, impacts on historic structures and buildings would be localized, long-term to permanent, generally beneficial, and of negligible to moderate intensity.

Under this alternative the Fowey Rocks Lighthouse could be transferred from the Coast Guard to another organization/agency in accordance with the National Historic Lighthouse Preservation Act (2000).

Provisions of the act stipulate that the organization or entity receiving the lighthouse preserve and maintain it in accordance with the *Secretary's Standards*. Preservation of the lighthouse in accordance with the *Secretary's Standards* would have a long-term, beneficial impact on the lighthouse.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 4 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 4, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor cumulative effect. The adverse effects of alternative 4, however, would be a

small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because they would be rehabilitated, preserved, and interpreted by the National Park Service in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. As with alternative 1, impacts on historic structures and buildings would be localized, long-term to permanent, and generally beneficial. Implementation of this alternative would have a long-term, beneficial impact on the Fowey Rocks Lighthouse because it would be preserved in accordance with the *Secretary's Standards*.

Actions under this alternative would generally have the same cumulative effects on historic structures and buildings in the park as those listed under alternative 1. Implementation of this alternative would have cumulative beneficial effects.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on historic structures and buildings. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

### Cultural Landscapes

**Analysis.** Implementation of this alternative would have the same impacts on cultural landscapes in the park as those listed under alternative 1 because potential landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria, and the National Park Service would implement resource manage-

ment policies that preserve the natural resource values and culturally significant character-defining patterns and features of Boca Chita Key as well as other listed, or determined eligible, landscapes in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*.

Although this alternative would emphasize strong cultural resource protection, enhancement of recreational opportunities and development of visitor services and facilities on Boca Chita, Elliott, and Porgy keys could result in some minor impacts on the integrity of the listed and potential cultural landscapes at those visitor destination points. Although expansion of recreational opportunities and development of enhanced visitor services throughout much of the park's lands and waters could also result in some minor impacts on the integrity of the potential parkwide maritime and cultural landscape, actions under this alternative, such as the creation of the marine reserve zone would generally contribute to beneficial impacts to a potential marine cultural landscape. .

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 4 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 4, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor cumulative effect. The adverse effects of alternative 4, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same beneficial impacts on cultural landscapes as those listed under alternative 1. Although this alternative would emphasize strong cultural resource protection, provision for diversified recreational opportunities and development of enhanced

visitor services and facilities in some areas of the park could result in minor, adverse, long-term impacts on the integrity of the potential cultural landscapes in the park.

Actions under this alternative would have the same cumulative effects on cultural landscapes as those listed under alternative 1. This alternative's contribution to these cumulative effects would be small.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on cultural landscapes. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Cultural Landscapes* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## VISITOR EXPERIENCE

### Analysis

**Diversity of Visitor Activities.** Under this alternative, visitors would continue to have unrestricted access (as described in the Multiuse Zone) to most of the park's waters (approximately 77%) to participate in a wide range of recreational opportunities such as motorboating, sailing, canoeing, swimming, scuba diving, snorkeling, fishing, and nature study. About 13% of the park would have some restrictions or changes (existing and new) that would potentially enhance, modify, limit, or prohibit visitor access and activities.

This alternative would continue to require visitors to maintain slow speeds near the mainland and Sands Cut. It would also add a Slow Speed Zone to Caesar Creek and the west side of Elliott Key between Elliott Harbor and Sands Cut. These Slow Speed Zones would help visitors focus attention on these relatively shallow, sensitive, and sometimes busy areas of the bay. Slower speeds would help reduce the frequency of boat

groundings, which would be an indirect, long-term, beneficial impact on some visitors. Some visitors would have boats with too deep a draft to be able to operate successfully at slow speeds in these areas and would be excluded from access. For some visitors this change would be perceived as a minor, adverse, impact on their visitor experience while boating in the park. For other visitors these reduced speeds would enhance their sense of safety and opportunities for swimming, wading, and fishing. The total area of park waters that would have slow speed restrictions would be about 1.5% of park waters.

The Noncombustion Engine Use Zone would include four areas that generally are shallow, where caution is needed, and where different visitor experiences are available. These include the West and East Featherbed and Featherbed areas on either side of the Intra-coastal Waterway west of Boca Chita Key; the waters within 500 feet of the mainland; the waters encircling West Arsenicker and Arsenicker keys' Sensitive Resource Zone; and the waters surrounding the southern keys, including Old Rhodes Key and Jones Lagoon. This prohibition of combustion engine use (with some limited exceptions) would potentially have a negative impact on those visitors who are used to using these areas of the park with combustion engines. Some visitors would have boats with too deep a draft to be able to operate successfully at the slower speeds in these areas and would be excluded from access. For some visitors this change would be perceived as a long-term adverse impact on their visitor experience while boating in the park. This zoning would potentially have a beneficial impact on the experience of many visitors who currently use or would like to use these areas of the park to canoe and kayak and explore the mangroves and more remote key environments. Prohibiting combustion engines would enhance visitor's abilities to more successfully see wildlife and experience the natural sounds of the bay and mangrove environments as well as increase the likelihood that some visitors would be able to achieve a sense of solitude and tranquility. Also, boaters would have less likelihood of grounding in this zone, and flats

anglers would have improved conditions for successful catches. This Noncombustion Engine Use Zone would affect about 1.7% of park waters.

Under this alternative the Legare Anchorage would be rezoned and reduced in size relative to current conditions. This would result in visitors having access to an additional 1,700 acres of reef waters for a full range of recreational activities (Multiuse Zone). The Sensitive Underwater Archeological Zone, which would be applied to a smaller area at Legare Anchorage, would allow for limited visitor access, which is currently the case. The addition of 1,700 acres to the Multiuse Zone would provide visitors enhanced opportunities for access and recreation, which would be a long-term beneficial impact on visitors' abilities to access and recreate in park waters.

The continued closure to visitors of West Arsenicker and Arsenicker keys would not change. What would change under this alternative is the application of the Sensitive Resource Zone 500 feet out from the keys' shorelines and a Noncombustion Engine Use Zone extending out another 500 feet from the Sensitive Resource Zone. This would be a modest increase over the current 200-foot closure. Also, Swan Key would be closed to visitors. This area is currently lightly used because of limited accessibility; however, those visitors who expect unrestricted access might find this closure to be a long-term, minor, adverse impact on their ability to experience the area.

Northern and southern portions of the mainland, the southern keys, and all of Sands Key would be zoned nature observation. The relative inaccessibility of the mangrove forests and tropical hardwood hammocks naturally limits the range of visitor activities. Most visitors to these areas would likely experience few interactions with others and would have opportunities to explore, observe nature, and find solitude. Also, Sands Key is currently closed to the public. Making it available to the public would be a long-term positive impact on visitor's opportunities to experience this key.

An area from Hawk Channel to the eastern park boundary (about 7% of park waters) would be placed in the Marine Reserve Zone. Visitors to this zone would be able to engage in most of their current activities, and the concessioner would continue to be able to take visitors here. However, in the Marine Reserve Zone, visitors would not be able to engage in recreational and commercial fishing. For these visitors this restriction would result in a minor to moderate adverse impact on their visitor experience. However, because marine reserves worldwide have documented "spillover effects" where more fish and bigger fish leave the reserve and become available to visitors fishing outside the reserve, a minor to moderate beneficial impact would be expected for visitors fishing immediately outside the Marine Reserve Zone.

Visitors who snorkel and dive in the Marine Reserve Zone would be able to experience a healthier, more natural coral reef than what is currently present, with larger and more numerous tropical reef fish and an ecologically intact reef system. The increased number of mooring buoys would make the snorkeling and diving experience safer and easier. Therefore, a major beneficial impact would be expected for visitors who snorkel and dive in the Marine Reserve Zone. Anchoring would not be allowed in the Marine Reserve Zone and some visitors may feel this is adverse impact on their visitor experience. However, this should not be an adverse effect as additional mooring buoys would be provided to facilitate access to reefs and historic shipwrecks within this zone as described in the Mooring Buoy and Marker Plan.

**Visitor Services and Facilities.** The northern half of Boca Chita Key would be designated as a Visitor Services/Park Administration Zone. Some of the historic structures could be used for expanded visitor services that might be provided through on-site staff or wayside exhibits. This would be a beneficial impact on enhancing visitor's opportunities to learn about and experience the key.

In the harbor area at Elliott Key, accessibility for visitors would be enhanced through the hardening of the trail connecting the harbor with the ocean side. This would be a beneficial enhancement of visitor opportunities to better access the ocean side of Elliott Key.

The park would consider using Adams Key as a backup staging area for canoes or kayaks and might use Adams Key as a staging area for canoes or kayaks to access Porgy Key during special events or programs on that key.

At Porgy Key, a canoe dock and the interpretation of the old home site would provide long-term beneficial improvements in visitor opportunities to learn about and experience that key.

### Cumulative Impacts

The growing population of the Miami-Dade region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. To this end there are a number of recent and ongoing studies and partnership efforts underway in the Biscayne Bay area to improve and protect water quality and quantity, wetlands, fisheries, and coastal viewsheds. Projects include the *Fishery Management Plan for Biscayne National Park*; the *South Miami-Dade Watershed Study and Plan*; the *Biscayne Bay Surface Water Improvement and Management Plan*; the *Lower East Coast Regional Water Supply Plan*; the Biscayne Bay Partnership Initiative; the Southeast Florida Coral Reef Initiative; and the *Biscayne Bay Coastal Wetlands Plan*.

The actions of this alternative, especially park zoning that could enhance resource conditions, such as the Slow Speed, Noncombustion Engine Use, Sensitive Resource, and Nature Observation zones, combined with these ongoing regional efforts, would have the potential to improve the quality of visitor activities in the region, especially related to fishing, nature viewing, and other resource-based recreational activities. There would also be improved visitor opportunities to learn

from various sources regarding the importance and complexity of restoration efforts in a rapidly growing urban environment.

Adjacent state parks (such as Bill Baggs Cape Florida State Park, Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park) and the Florida Keys National Marine Sanctuary offer services, facilities, and recreational opportunities that enable visitors to experience and learn about the natural and cultural resources of the Biscayne Bay and Florida Keys region. Also, current efforts through the *GMP Amendment: Stiltsville Management Plan* and the Biscayne Bay Coastal Wetlands project provide potential opportunities for enhanced visitor access, education, and recreation related to the Biscayne Bay area.

The actions of this alternative to improve access and recreational opportunities and facilities would have the potential positive contribution of more and better public information about and access to the Biscayne Bay area and enhanced opportunities to learn about and recreate there, especially enhanced canoeing and kayaking opportunities.

Alternative 4 would have beneficial and adverse impacts and when combined with the beneficial effects of other actions would result in minor beneficial cumulative effects on visitor experience in the area. Alternative 4's contribution to these cumulative effects would be small.

### Conclusion

Additional speed restrictions and new Non-combustion Engine Use Zones would exclude some visitors from these areas, which would be a long-term, minor to moderate, adverse impact. The same zones would help over time to separate conflicting visitor uses, increase boating safety, increase nonmotorized opportunities, and increase opportunities for solitude, which would be long-term beneficial impacts on some visitors' experiences. Upgrades in visitor information, services and facilities would be limited but result in a long-term beneficial impact on some visitors'

experiences. Both long-term, minor, adverse and beneficial impacts would occur to different visitors from implementing the Marine Reserve Zone. This alternative would have small contributions to the effects of other actions, resulting in minor beneficial cumulative effects on visitor experience in the area.

## NPS OPERATIONS AND FACILITIES

### Analysis

Actions under alternative 4 would generally have the same impacts on park operations and facilities at Convoy Point and Porgy, Adams, Elliott, and Boca Chita keys as the previous alternatives, although the zones for visitor services on the keys would be smaller (Visitor Services/Park Administration Zone would cover 20 acres compared with 170 acres under alternative 2).

However, actions under alternative 4, with its emphasis on strong natural and cultural resource protection and development of as many as nine potential visitor contact points outside of the park while providing a diversity of visitor experiences inside the park, would require additional law enforcement and resource management staff and equipment to enforce the park's regulations and protect its resources. The new Marine Reserve Zone as well as the expanded Nature Observation Zone and Noncombustion Engine Use Zone would require additional park staff time to manage. These actions would result in short-term, minor to moderate, adverse impacts on the park's budget because of equipment acquisition, and long-term, minor, adverse impacts on the park's budget because of the employment of additional personnel and from equipment maintenance.

### Cumulative Effects

As discussed under alternative 1, past and ongoing cooperative planning and development projects in the Biscayne Bay region, such as the Biscayne Bay Partnership Initiative, *Miami-Dade County Comprehensive Development Master Plan*, and *Biscayne Bay Strategic*

*Access Plan*, and NPS special resource studies, such as those for Miami Circle and Virginia Key Beach Park, have resulted in some long-term beneficial effects on park operations and facilities. However, these effects are almost impossible to measure.

This alternative, with its emphasis on strong natural and cultural resource protection while providing a diversity of visitor experiences as well as establishment of potential visitor contact points outside the park, in combination with the aforementioned beneficial effects of past and ongoing cooperative planning and development projects in the Biscayne Bay region, would generally result in long-term beneficial cumulative effects on facilities and long-term, negligible, adverse cumulative effects on park operations. This alternative's contribution to these effects would be small and beneficial for facilities and small and adverse for park operations.

### Conclusion

Actions under alternative 4 would generally result in long-term, minor, adverse impacts on park operations. The overall cumulative effects would be long term and beneficial for facilities and long term, negligible, and adverse for park operations. This alternative's contribution to these effects would be small and beneficial for facilities and small and adverse for park operations.

## SOCIOECONOMIC ENVIRONMENT

### Analysis

Full implementation of this alternative would require the National Park Service to hire six additional employees to handle the increased workload for administration, interpretation, law enforcement, and maintenance. This additional employment would bring in about \$432,000 in wages and an increased demand for housing, utilities, services, and goods, resulting in a long-term, negligible to minor, benefit for the local economy.

Excluding employee wages, implementing alternative 4 is estimated to cost a total of \$1.3

million above the current level of spending over the next 20 years. Most of this would be an input of federal dollars into the region in the form of increased purchases of supplies and construction contracts. This would be a long-term, negligible, beneficial impact as government expenditures enter the local economy.

Implementing alternative 4 would result in the creation of a Marine Reserve Zone, which is a no-take area. This would have an adverse effect on commercial fishing as this activity would have to occur elsewhere in or out of the park. The zone in this alternative would comprise about 5.5% of the park, so the impact would be expected to be long term and adverse but negligible.

The number of visitors or average length of visit would not be expected to increase under this alternative so there would be no effect on tourism-related businesses.

### **Cumulative Effects**

The social and economic situation in Miami-Dade County is affected by a combination of many factors, including the presence of units of the national park system. Some of the \$15.5 billion in federal spending in the county is generated by Biscayne National Park in the forms of employee wages, purchase of supplies, and various contracts. Although tourism is not the most important driving factor in the regional economy, the livelihoods of service-related businesses in the region rely to some degree on the inflow of tourist dollars, especially restaurants and motels.

The total direct economic value of public recreation areas also includes two sets of values: (1) the user benefit that people receive from their visit and (2) the values of land near the recreation area. Economic studies have shown that the value of private land can increase with the number of outdoor recreation opportunities and the proximity to outdoor recreation space (Clawson and Knetsch 1966). Therefore, the continued presence of Biscayne National Park provides

an important benefit to the residents and property values in the vicinity.

The preferred alternative would contribute a small beneficial increment to the above impacts of other past, present, and future actions on socioeconomic conditions and, when considered in combination with other actions, would result in a beneficial cumulative impact.

### **Conclusion**

Implementing the preferred alternative would have a long-term negligible adverse impact and short-term and long-term beneficial impacts on the regional economy. The overall cumulative effects would be beneficial with this alternative contributing a small increment.

### **UNAVOIDABLE MODERATE OR MAJOR ADVERSE IMPACTS**

Unavoidable adverse impacts are defined here as impacts that cannot be fully mitigated or avoided. There would be no unavoidable moderate or major adverse impacts expected as a result of implementing alternative 4.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Alternative 4 would have a small potential for some commitments of resources because it would involve a minimum of new development (e.g., trails, primitive dock). However, most of the development being proposed is minimal, such as trails with only small areas of potential effect. Most proposed development would be built in previously disturbed areas, so would not result in irreversible or irretrievable commitments of resources. Cultural resources would continue to be protected through active preservation maintenance.

**NATURAL OR DEPLETABLE  
RESOURCES AND ENERGY  
REQUIREMENTS AND  
CONSERVATION POTENTIAL**

Whenever feasible, the National Park Service strives to maximize the use of renewable resources and energy and therefore minimize

the use of depletable resources. However, it is not possible with today's technologies to cost-effectively avoid all use of depletable resources in building and operating facilities. Implementing alternative 4 would involve minimal increase in energy requirements.



# IMPACTS OF IMPLEMENTING ALTERNATIVE 5

## NATURAL RESOURCES

### Fisheries

Proposed management actions under this alternative would include the most area of fish habitat in protective zones of all the alternatives. Alternative 5 would include a Marine Reserve Zone from Elliott Key east to the park boundary and encompassing Ajax Reef and Long Reef and Hawk Channel (see Alternative 5 map). In this 21,800-acre zone, both commercial and recreational fishing would be prohibited as well as the harvest of ornamentals, corals, and sponges. In this area boat size, type, and speed could be regulated to protect resources. Under this alternative the adverse impacts associated with fishing and other recreational activities would be substantially reduced. Both the number and size of previously fished organisms as well as species richness and diversity would be expected to increase over time within this zone because of decreases in direct mortality, habitat destruction, and indirect ecosystem effects. The impacts of this alternative on the coral reef and associated fish populations in the bay would be long term and beneficial.

Implementation of the large Access-by-Permit Zone and the number of acres covered by the Noncombustion Engine Use and Slow Speed zones in the bay would limit the number, type, and speed of boats in these areas. This would reduce existing impacts from boats on important seagrass beds and habitat for juvenile fish in the park. In addition, a 21,800-acre Marine Reserve Zone where fishing is not allowed would be implemented. The Access by Permit Zone and Marine Reserve Zone would also reduce the number of people fishing in these areas, therefore reducing fishing pressure in these areas. However, it is possible that fishing pressure may be simply relocated to other zones such as Multiuse Zone. These actions would result in longterm beneficial impacts on fisheries.

**Cumulative Impacts.** In 2002 the National Park Service and the Florida Fish and Wildlife Commission initiated a *Fishery Management Plan and Environmental Impact Statement*.

Once completed, the *Fishery Management Plan* would involve changes in current management strategies for both recreational and commercial fishing activities. These changes could include establishment of a permit system for both recreational boating and commercial fishers, limits on the type of spearfishing equipment that can be used in the park, a moderate decrease in fisheries harvest, and elimination of the lobster-sport season. With implementation of the *Fishery Management Plan*, the park anticipates the current condition of fisheries stocks would improve and the impact of fishing on habitat within the park would be reduced. The long-term impacts of the *Fishery Management Plan* on fisheries in the park would be beneficial. Because proposed management actions under this alternative are more protective of fish habitat than under alternative 1, there would be more benefits on fisheries realized from combining actions under this alternative with the implementation of the *Fishery Management Plan* than implementing the *Fishery Management Plan* alone (as in alternative 1).

The United States Coral Reef Task Force, created in 1998, was established to lead U.S. efforts to protect, restore, and “sustainably” use coral reef ecosystems. These efforts include but are not limited to reducing and mitigating coral reef degradation from pollution, overfishing, and other causes. The task force has identified fundamental themes to guide immediate and sustained national action. These themes include quickly reducing the adverse impacts of human activities on coral reefs and associated ecosystems. Specific actions that could be taken have not been proposed. However if the initiatives of the task force are fully implemented, the impacts of these activities would likely be beneficial

for the coral reef system in the park. Full implementation of the task force recommendations would also likely cause the park to modify current management approaches to incorporate the recommendations. In the interim, a Marine Reserve Zone would be designated from Elliott Key east to the park boundary. This zone would have a beneficial impact by protecting the coral reef and the habitat it provides. This would be a long-term benefit to the ecosystem.

This alternative would contribute a beneficial impact on the beneficial and adverse impacts of other past, present, and future actions resulting in beneficial cumulative effects. The magnitude of this alternative's contribution to these effects would be modest.

**Conclusion.** Adverse impacts now occurring to fisheries and fish habitat in the park would be reduced substantially under alternative 5, resulting in a long-term, minor to moderate, beneficial impact. Cumulative effects would be beneficial. The magnitude of this alternative's contribution to these cumulative effects would be modest.

### Threatened and Endangered Species

**Manatee.** Manatees are more likely to be found in the warm waters closest to shore, so there would continue to be a 1,000-foot manatee protection area in the waters closest to the shoreline. In this alternative, the entire 1,000-foot manatee protection area would be designated as a Noncombustion Engine Use Zone (poling and trolling only). The expanded zone would increase the area where water-based resources are protected and visitor use impacts are minimized and would further reduce the likelihood of boat-related injuries and mortality of manatees in the park. The Slow Speed and Noncombustion Engine Use zones under this alternative would result in fewer boat groundings in seagrass beds, an important habitat/food source for manatees.

This alternative would provide greater protection to the manatee and its habitat than in other alternatives. This would have a long-

term beneficial impact on manatees in the park.

**Section 7 Determination of Effect** — The impacts on the manatee under this alternative would be localized, and beneficial. Measurable beneficial outcomes on individual manatees and the manatee population because of the protective zones are likely. This would equate to a “may affect, not likely to adversely affect” determination.

**Sea Turtles.** Collisions between boats and sea turtles would be expected to be minimized in the Slow Speed, Noncombustion Engine Use, and Access by Permit zones. However, given the size of these zones compared to the size of the Multiuse Zone, the beneficial impacts of implementation of this alternative would be minor. There would be no new development on Boca Chita Key. Because the number of visitors to Boca Chita would not likely change; current turtle management efforts could be sufficient. There would be no adverse impact of development on Boca Chita on nesting sea turtles.

The current level of development on Elliott Key would continue in the harbor facilities, and there would be no trail improvement under this alternative. Continuation of current management of turtle nesting areas would likely be adequate. The implementation of a Marine Reserve Zone would result in less derelict fishing gear (monofilament, traps) in this area. This would result in the reduction of the threat of entanglement for sea turtles within this zone. Because the zone would be considerably larger under this alternative, implementation of alternative 5 would be a minor to moderate, beneficial, long-term impact on sea turtles.

**Section 7 Determination of Effect** — This alternative would have a beneficial effect on current populations of sea turtles. This would equate to a “may affect, not likely to adversely effect” determination.

**American Crocodile.** Visitor services and infrastructure would remain at or near current

levels with the boardwalk and jetty in the vicinity of Convoy Point. This area is north of the designated critical habitat area for the crocodiles where few crocodiles are seen and would not be expected to impact their activities in the park. The mangrove wetland south of the visitor center would continue to be managed primarily to protect the habitat characteristics of the area. No additional development within the designated critical habitat would be proposed under this alternative. The impacts of activities on crocodile habitat and activities along the mainland shore would be adverse but negligible for this alternative.

Under this alternative, there would be no new development on Porgy Key. The Noncombustion Engine Use Zone would be expanded to include the eastern shoreline of Old Rhodes Key and south to include the waters around Swan Key and Broad Creek. Without the park administrative presence, there would not be the opportunity to orient visitors to the waters around the southern keys and include a discussion of crocodiles and their habitat. However, because of the Noncombustion Engine Use Zone and the lack of visitor facilities, visitation would likely be low in this area. Even if population pressures along the mainland encourage crocodiles to venture across the bay, the interaction between crocodiles and visitors would be even lower than anticipated in alternative 4. The impact of this alternative on crocodiles in this area of the designated critical habitat would be adverse but negligible in the long term.

**Section 7 Determination of Effect** — The impacts on the American crocodile under this alternative would be negligible and adverse, localized, and beneficial. Mitigation measures would be put in place in the event of more visitor-crocodile interactions because of population pressures near the park. Overall, this would equate to a “may affect, not likely to adversely affect” determination for the American crocodile.

**Smalltooth Sawfish.** As in other alternatives, smalltooth sawfish could be affected by any increase in hook-and-line fishing efforts, although any effects are unlikely given the rarity of smalltooth sawfish in the national park. The establishment of the Marine Reserve Zone which would extend from the oceanside of Elliott Key out to deeper reef habitat may have a positive effect on smalltooth sawfish by reducing bycatch of the species across a variety of habitats where the fish may possibly occur. However given the rarity of this species in park waters, any beneficial impacts are likely to remain insubstantial, as with other alternatives. No other actions that would occur under this alternative would be expected to affect sawfish in the park.

**Section 7 Determination of Effect** — The impacts on the smalltooth sawfish under this alternative would be adverse but negligible. This would equate to a “may affect, not likely to adversely affect” determination for the smalltooth sawfish.

**Schaus Swallowtail Butterfly.** The impacts on the butterfly population and habitat would be the same as in the no-action alternative because likely no new development would occur on Adams Key and the trail through the hardwood hammock on Elliott Key would not be hardened. Old Rhodes and Totten Keys would continue to be zones for nature observation, and Swan Key would be zoned as a sensitive resource area. Impacts on the hardwood hammocks on these keys are currently minimal and would not be expected to change under this alternative. The long-term adverse impacts on butterfly populations and habitat would be negligible under this alternative.

**Section 7 Determination of Effect** — The impacts on the Schaus swallowtail under this alternative would be adverse but negligible. Mitigative measures to protect the species’ habitat and breeding season would likely be successful. Overall, this alternative would result in the determination of “may affect, not likely to adversely affect” the Schaus swallowtail.

**Acroporid Corals.** Under this alternative, the Legare Anchorage would be reduced in size from its current configuration, although it would continue to be closed to in-water activities and would provide protection to acroporid corals that may be in this area. The creation of a large (21,812 acres) Marine Reserve Zone would prohibit fishing and anchoring on many of the southern reefs in the park, which includes areas known to support healthy populations of Acroporid corals, as well as in seagrass and hardbottom habitats west of these reefs.

Visitors that would otherwise use the area in the zone to fish would have to fish elsewhere, so boat traffic and anchoring throughout this zone could be expected to decrease. Although unlikely, this decrease could be offset if there is an increase in people using the Marine Reserve Zone for nonextractive activities such as snorkeling and diving. Because the Marine Reserve Zone is expected to reduce fishing and improve ecological balance, reduce fishing debris, reduce vessel groundings, and reduce damage from inappropriate anchoring in acroporid coral habitat, actions under alternative 5 would be expected to have a moderate and beneficial effect on Acroporid corals.

*Section 7 Determination of Effect* — The Marine Reserve Zone would be expected to have a beneficial, long-term effect on acroporid corals by protecting them from activities that could lead to physical and ecological damage. Thus, this alternative would result in a determination of “may affect, not likely to adversely affect” Acroporid corals.

**Cumulative Impacts.** Habitat disturbance or loss is the most common reason for a species to be listed. The establishment of Biscayne National Park has provided a protective refuge for listed species resulting in long-term beneficial impacts.

The *Florida Manatee Recovery Plan* and the site-specific county plans are designed in part to reduce boat-related manatee injury and mortality as well as protect habitat areas.

These measures are consistent with protection measures incorporated into the proposed actions in this general management plan. Implementation of the recovery plan would continue to have a beneficial impact on manatee protection efforts in the park. The impacts of these changes, in conjunction with the state setback, would continue to have a beneficial impact on manatee protection efforts.

Alternative 5 would result in negligible adverse and beneficial impacts on federally listed species. When combined with the impacts of other past, present, and future actions, the overall cumulative effect would be negligible and beneficial. This alternative would have a small contribution to the overall cumulative effects.

**Conclusion.** Implementing alternative 5 would result in a beneficial impact on manatees and Acroporid corals. There would be no effects on sea turtles and negligible effects on smalltooth sawfish. Under this alternative there would be proposed development that could negligibly impact American crocodiles and the Schaus swallowtails. The park would continue to coordinate with the U.S. Fish and Wildlife Service and National Marine Fisheries Service and work to mitigate any potential adverse impacts on these species. Thus, the determination would be that this alternative may affect, but is unlikely to adversely affect, listed species in the park. Cumulative effects would be negligible and beneficial. This alternative would have a small contribution to the overall cumulative effects.

### **Special Status Species, including State Listed Species**

**Birds.** West Arsenicker Key would be zoned as a Sensitive Resource Zone and would remain closed. The impacts on the bald eagle population or nesting activity would not change from current conditions. Furthermore, the creation of a Noncombustion Engine Zone extending 500 feet from the Sensitive Resource Zone around West Arsenicker and

Arsenicker Keys would further reduce the likelihood of disturbances to bald eagles or any other state-listed birds using these islands.

Under this alternative, Sands Key, which is currently closed to visitors, and the islands surrounding Jones Lagoon would be zoned as Nature Observation Zones. The waters east of Cutter Bank Shallows extending into and south of Jones Lagoon would be designated a Noncombustion Engine Use Zone. Visitation would be allowed on Sands Key and the islands around Jones Lagoon, so there would be some human caused intrusions to birds nesting, roosting, loafing, and/or foraging there; however, resource protection would be emphasized. Actions under alternative 5 would reduce, although not eliminate, the potential for disturbance to birds using the Jones Lagoon area because there is still the possibility that small vessels (e.g., kayaks and canoes) and people coming ashore could closely approach birds. Given that visitation to both Sands Key and Jones Lagoon would be expected to remain minimal, adverse impacts on the birds and their habitat would be negligible in these areas. If visitation increases such that any state-listed birds could be disturbed, management actions could include limiting access to areas where birds are known to nest during nesting season and/or establishing set-back distances following recommendations in scientific literature. Under this alternative, the long-term adverse impact on the state-listed bird populations in the park and potential nesting activity on Sands Key and the Jones Lagoon area would be negligible.

Under this alternative, the entire western boundary of Elliott Key would be zoned as a Slow Speed Zone, and Elliott Key itself would be zoned as a Nature Observation Zone. There would be no new development on Elliott Key under this alternative. State-listed bird populations would be expected to benefit from (1) the reduction in potential boat-related disturbances along the western border of Elliott Key and (2) making resource protection the focus of visitation to the island. Currently, visitation to the ocean side of Elliott Key is low. If visitation to the ocean

side increases such that the any state-listed species could be negatively affected, the park could enforce no-access set-back distances or close part of the beach south of Petrel Point during nesting season to reduce impacts on the birds.

Under this alternative, birds using coastal habitats along the park's mainland shoreline would be protected from potential boat-related disturbances from a Noncombustion Engine Use Zone that extends 1,000 feet east from the mainland (excluding Black Point, Convoy Point, and Turkey Point channels). By limiting the use of the waters immediately adjacent to the mainland shoreline, this zone would be expected to reduce potential boat-related disturbances (e.g., loud engines frightening a bird off its nest) to roosting, nesting, foraging, and/or loafing birds in the area.

Overall, under this alternative, including any necessary mitigation, the long-term adverse impact on state-listed bird populations and nesting activity in the park would be negligible.

**Miami blue butterfly.** There would be no new development on Elliott Key under this alternative. There would be no new impact on the Miami blue population in the park.

**Cumulative Impacts.** These species were listed because the adverse impacts of habitat disturbance or loss resulted in declines in population numbers. The establishment of Biscayne National Park has provided increased protection of habitat for eagles, other listed birds, and butterflies in the park, which is a long-term beneficial impact.

Reintroduction efforts of Miami blue butterflies have occurred on Elliott Key in an attempt to restore this species. If successful, this would be a moderate, long-term, beneficial impact. The monitoring and recovery plan would continue to be implemented.

At the time this plan was started, bald eagles were federally listed as endangered. They have since been delisted because of population

recovery, indicating a long-term beneficial impact on this species.

Alternative 5 would result in negligible adverse impacts on bald eagles and no effect on Miami blue butterflies. When combined with the impacts of other past, present, and future actions, the overall cumulative effect would be minor and beneficial. This alternative would slightly reduce the overall beneficial cumulative effects.

**Conclusion.** Implementing alternative 5 would result in long-term, negligible, adverse impacts on bald eagles and other state listed birds, and no effect on Miami blue butterflies. Cumulative effects would be minor and beneficial. This alternative would slightly reduce the overall beneficial cumulative effects.

### Terrestrial Vegetation

This alternative would have little adverse impact on terrestrial vegetation because of the low level of proposed development on the mainland and keys. There would be no new development of visitor services on Porgy Key, and visitation to the Jones home site would not be encouraged. Although there could still be some continued adverse impacts on Porgy Key associated with visitation, such as trampling and social trails, these impacts would be slight because visitation would be low. Thus, impacts on vegetation on Porgy Key would be adverse but negligible in the long term.

The adverse impacts on vegetation associated with visitation at Boca Chita and Adams keys would be minor. The adverse impacts could include trampling of vegetation and social trails. In general these impacts could be mitigated by visitor education efforts and trail design to keep visitors on the existing trails. With mitigation measures in place, the adverse impacts of continued visitation would be negligible in the long term.

The trail on Elliott Key would remain as it is today, and no primitive campgrounds or hardened access trails would be developed. There would continue to be some adverse

impacts associated with visitation, but they would be negligible.

**Cumulative Impacts.** The establishment of Biscayne National Park has resulted in long-term benefits to terrestrial vegetation by maintaining some undeveloped areas. An exotic plant management plan has been developed for Biscayne Bay National Park and eight other national parks in the region. Nonnative invasive plant species can change the structure and function of native plant communities. These changes can have an adverse impact on habitat for native species that rely on the native plant communities. Disturbances of native vegetation encourage growth of invasive species. Removal of the exotic species would provide better conditions to reestablish native vegetation in disturbed areas, which could help to mitigate the adverse impacts associated with social trails in the park. Implementation of this plant management plan would have a beneficial impact on terrestrial vegetation in the park and the habitat it provides.

A *Fire Management Plan* was developed that includes the park's upland areas. This plan helps guide resource management efforts in the park in the vegetation communities that are fire adaptive. Because these plant communities are fire adaptive, controlled burning would be beneficial and would reduce fuel buildup associated with catastrophic fires. Implementation of this fire management plan has a beneficial impact on the terrestrial vegetation in the park and the habitat that it provides.

When the negligible adverse impacts of alternative 5 are combined with the beneficial impacts of other past, present, and future actions in the park, the resulting cumulative effects would be beneficial. This alternative would slightly reduce these beneficial cumulative impacts.

**Conclusion.** Implementing this alternative would result in long-term, negligible, adverse impacts on native terrestrial vegetation. Cumulative effects would be beneficial. This

alternative would slightly reduce these beneficial cumulative impacts.

### **Submerged Aquatic Communities**

This alternative would provide the greatest protection to submerged aquatic communities in the park, particularly seagrass beds. The entire 1,000-foot buffer area along the mainland shoreline of the park would also be designated a Noncombustion Engine Use Zone. The size of this zone around Totten Key would also include Cutter Bank Shallows to the Rubicon Keys in this alternative. Large areas of seagrass and hardbottom communities would receive protection from boat scarring and changes in water quality associated with increased turbidity under this alternative. The long-term impact of the large Noncombustion Engine Use Zone on these communities would be beneficial.

The western shoreline of Elliott Key and the waters north of Stiltsville would be designated as a Slow Speed Zone. The type of boats in this area would be limited because boats that need to travel and a high rate of speed would be precluded from entering these areas, consequently the number of boats in these areas is expected to be fewer under this alternative. In addition, the Slow Speed Zone would reduce the potential for scarring in the seagrass beds as well as the potential for turbidity in the water column from high-speed boats, thus minimizing adverse impacts on the productivity of this habitat and water quality in the area. This would be a long-term, minor, beneficial impact.

The waters in the northwest part of the park would be zoned for access by permit only. In this zone the number of vessels as well as vessel type and size could be controlled to protect natural resources in the park such as seagrass beds. With fewer vessels in the area the potential for scarring of the seagrass beds and turbidity in the water column from boating would be reduced.

The productivity of the seagrass beds would be expected to increase under this alternative because of the large Slow Speed Zones as well

as the inclusion of the areas accessible only by permit. The increase in productivity in the seagrass beds would be a long-term beneficial impact. Impacts from fishing and anchoring would continue outside the Marine Reserve Zone.

Under this alternative, a Marine Reserve Zone would be designated from Long Reef to the Pacific Reef Lighthouse and west towards the eastern shoreline of Elliott Key. The marine reserve area would be managed to protect resources. Both commercial and recreational fishing would be prohibited in this zone, as well as the harvest of ornamentals, corals, and sponges. In this area boat size, type, and speed could be regulated to protect resources. Under this alternative the adverse impacts associated with fishing and other recreational activities would be substantially reduced. Both the number and size of previously fished organisms as well as species richness and diversity would be expected to increase over time within the Marine Reserve Zone because of decreases in mortality, habitat destruction, and indirect ecosystem effects. Additionally, the entire lifecycle of commercially and recreationally important fish species such as the snapper and grouper species would be protected because the zone would cover both the mangrove nursery habitat and the adult habitat in the reefs. The beneficial impacts of this alternative on the coral reef in the Marine Reserve Zone would be long term and minor to moderate.

**Cumulative Impacts.** Damage to seagrass beds from boat groundings and anchors has degraded habitat for shrimp, crabs, snails, lobsters, and echinoderms that inhabit these areas.

Boat groundings (propeller and hull impacts) and inadvertent placement of anchors have damaged the dense soft corals, sea fans, and sponges in the hardbottom communities, which in turn have an adverse impact on the fish and invertebrates that seek refuge in these areas.

Coral reefs are complex ecosystems and sensitive to disturbances. Fishing, snorkeling,

and diving can also have adverse impacts on coral reef systems. The damage caused by these activities includes scarring from boat propellers and inadvertent placement of anchors, as well as breakage caused by snorkeling and diving. Debris from recreational and commercial fishing (e.g., fishing tackle and lines from crab and lobster traps) left on the reef can wrap around the coral and damage it. Fishing also results in removal of predators and the removal of herbivorous fish that keep algae minimized (contributes to reef health). Damage to the coral reefs also adversely impacts other species that rely on the reefs for food and shelter. Damage to the seagrass beds, hardbottom communities, and coral reefs would continue to have longterm, minor to moderate, and adverse impacts.

Alternative 5 would result in long-term beneficial impacts. When combined with the adverse impacts of other past, present, and future actions, the cumulative impacts would be minor and adverse. The contribution of this alternative would be small and slightly reduce the adverse cumulative impacts.

**Conclusion.** Alternative 5 would result in long-term beneficial impacts on submerged aquatic communities. Cumulative effects would be minor and adverse. The contribution of this alternative would be small and slightly reduce the adverse cumulative impacts.

## Wetlands

No additional access into the mangroves that fringe the keys would be developed under this alternative, so there would be no change in the current size, integrity, or continuity of the wetland areas in the park. However, placement of the Nature Observation Zone along almost all the mainland would give greater protection to mangrove shorelines. This would have minor to moderate, beneficial, long-term impacts.

**Cumulative Impacts.** The Biscayne Bay Coastal Wetlands Project of the Comprehensive Everglades Restoration Plan includes pump stations, spreader swales, storm water

treatment areas, flow ways, levees, culverts, and backfilled canals in southeast Miami-Dade County and covers 13,600 acres from the Deering Estate south to the Turkey Point Power Plant. The purpose of this project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. The proposed project will replace lost overland flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The proposed redistribution of freshwater flow across a broad front is expected to restore or enhance freshwater wetlands, tidal wetlands, and nearshore bay habitat. Sustained lower-than-seawater salinities are required in tidal wetlands and the nearshore bay to provide nursery habitat for fish and shellfish. This project is expected to create conditions that will be conducive to the re-establishment of oysters and other components of the oyster reef community. Diversion of canal discharges into coastal wetlands is expected not only to re-establish productive nursery habitat along the shoreline but also to reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets. The impact of these actions once implemented would be beneficial for wetland inside and outside the park.

The Biscayne Bay Coastal Wetlands Project could improve the overall health of the wetland areas along the mainland shoreline such that the system as a whole is better able to accommodate the stresses associated with the short- and long-term impacts of the development and human use in the area.

This alternative would have a slight beneficial contribution to the beneficial impacts of other present and future actions, resulting in minor beneficial cumulative impacts.

**Conclusion.** There would be minor to moderate, beneficial, long-term impacts to wetlands as a result of protective zoning. Cumulative impacts would be minor and beneficial.



## **Soundscapes**

Under alternative 5, there would be large areas of the bay zoned for permit only, slow speed, or noncombustion engine use. Because these restrictions would reduce the level and duration of noise from boats, there would be long-term, minor to moderate, beneficial impacts on soundscapes on portions of the bay and adjacent land.

There would be little new construction in this alternative; this construction would result in short-term, localized, adverse impacts that would be negligible in intensity because it would be localized and occur in the Visitor Services/ Park Administration Zone where noise is better tolerated.

Existing natural soundscapes in the interior of the larger keys would continue to be preserved by vegetative screening, a continuing, minor, beneficial impact.

**Cumulative Effects.** Natural soundscapes have been degraded from activities on land and water portions of the park such as vehicle traffic, boat traffic, agricultural or industrial activity, and occasional construction. Because most of the park is open water, noise from motorized boats is the most prevalent disruption to natural soundscapes.

The concentration of visitors around the visitor center and parking lot also affects the natural soundscape at Convoy Point. NPS staff mowing the grass and blowing leaves causes short-term, localized, adverse impacts on the soundscapes in this area. This noise is generally tolerated in the Visitor Services/Park Administration Zone, so the related impacts would be adverse but negligible.

Natural soundscapes predominate in the distant portions of the park away from popular boating routes. Increases in visitation on weekends and during special events add to the number of boats at one time on the bay. More boats leads to an increased noise level and results in short-term, minor to moderate, adverse impacts.

The minor to moderate beneficial impacts of this alternative, in combination with the adverse impacts of other actions, would result in negligible and adverse cumulative impacts on the natural soundscape. This alternative would modestly reduce these cumulative impacts.

**Conclusion.** Implementing alternative 5 would have long-term, minor to moderate, beneficial impacts on soundscapes and short-term, negligible, adverse impacts during construction. The overall cumulative impacts would be negligible and adverse; this alternative would modestly reduce these adverse impacts.

## **CULTURAL RESOURCES**

### **Archeological (including Submerged Maritime) Resources**

**Analysis.** Implementation of this alternative would generally have the same impacts on archeological (including submerged maritime) resources as those listed in alternative 1, although the emphasis on natural resource preservation, as well as protection of significant cultural resources, could be expected to have some additional long-term, minor to moderate, beneficial impacts on archeological sites. Under this alternative management actions designed to protect sensitive park resources, such as limiting numbers of visitors, means of access, and types of activities in some areas; closing other areas to visitors; and limiting the built environment to basic visitor safety and services in geographically concentrated areas or outside the park boundaries would generally contribute to beneficial impacts on archeological resources. Further benefits would be realized from the elimination of recreational and commercial fishing (including trawling and traps) in marine reserve zone that would help to protect submerged archeological resources.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described

under alternative 1. As described above, implementation of alternative 5 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 5, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor adverse cumulative effect. The adverse effects of alternative 5, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on archeological resources as those listed under alternative 1, although the emphasis on natural resource preservation, as well as protection of significant cultural resources, could be expected to have some additional, long-term, beneficial impacts on archeological sites. Actions under this alternative would have the same cumulative effects on archeological resources as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on archeological resources. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

### Historic Structures and Buildings

**Analysis.** Implementation of this alternative would generally have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because the structures and buildings would be rehabilitated, preserved, and adaptively used in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. However, some minor elements of historic fabric could be lost as a result of remodeling/rehabilitation

efforts, and anticipated increasing visitation levels could result in loss of some historic fabric from inadvertent visitor use or vandalism. As with alternative 1, impacts on historic structures and buildings would be localized, long-term to permanent, and generally beneficial.

Under this alternative the Fowey Rocks Lighthouse would be transferred from the Coast Guard to the National Park Service in accordance with the National Historic Lighthouse Preservation Act (2000). The Park Service would preserve and maintain the lighthouse in accordance with the act and the *Secretary's Standards*. Preservation of the lighthouse in accordance with the *Secretary's Standards* would have a long-term beneficial impact on the lighthouse.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described under alternative 1. As described above, implementation of alternative 5 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 5, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor cumulative effect. The adverse effects of alternative 5, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would generally have the same impacts on historic structures and buildings in the Boca Chita Key Historic District as those listed under alternative 1 because they would be rehabilitated, preserved, and interpreted by the National Park Service in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

Implementation of this alternative would have long-term, beneficial impacts on the Fowey Rocks Lighthouse because it would be preserved in accordance with the *Secretary's Standards*.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on historic structures and buildings. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Historic Properties* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

### Cultural Landscapes

**Analysis.** Implementation of this alternative would generally have the same impacts on cultural landscapes in the park as those listed under alternative 1 because potential landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria, and the National Park Service would implement resource management policies that preserve the natural resources and culturally significant character-defining patterns and features of Boca Chita Key as well as other listed, or determined eligible, landscapes in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*.

Additionally, actions under this alternative would emphasize natural resource preservation, as well as protection of significant cultural resources, to protect sensitive resources. These actions, which would include limiting numbers of visitors, means of access, and types of activities in some areas; closing other areas to visitors; and limiting the built environment to basic visitor safety and services in geographically concentrated areas or outside the park boundaries would contribute to long-term, beneficial impacts on the park's potential cultural landscapes.

**Cumulative Effects.** Impacts associated with other past, present, and reasonably foreseeable actions would be the same as described

under alternative 1. As described above, implementation of alternative 5 would result in negligible to minor adverse effects and beneficial effects. The impacts of alternative 5, in combination with negligible to minor adverse impacts and beneficial impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor cumulative effect. The adverse effects of alternative 5, however, would be a small component of the adverse cumulative impact.

**Conclusion.** Implementation of this alternative would have the same impacts on the park's cultural landscapes as those listed under alternative 1, although the emphasis on natural resource preservation, as well as protection of significant cultural resources, could be expected to have some additional long-term, beneficial impacts on cultural landscapes. Actions under this alternative would have the same cumulative effects on cultural landscapes as those listed under alternative 1.

**Section 106 Summary.** The implementation of this alternative could include some minor adverse impacts on cultural landscapes. If impacts remain minor there would be no adverse effects under Section 106. Any adverse impacts resulting from moderate or major impacts would be mitigated through the use of the *Secretary of the Interior's Standards and Guidelines for Documentation and Treatment of Cultural Landscapes* and a memorandum of agreement with the state historic preservation officer and Advisory Council to counteract such adverse effects.

## VISITOR EXPERIENCE

### Analysis

**Diversity of Visitor Activities.** Under this alternative, visitors would continue to have unrestricted access (as described in the Multiuse Water Zone) to approximately 72% of the park's waters to participate in a wide range of recreational opportunities. The remaining 28% of the park would have some restrictions or changes (existing and new) that

would potentially enhance, modify, limit, or prohibit visitor access and activities.

This alternative does not provide for transportation to Adams Key, thereby limiting how many people could reach the more remote keys.

This alternative would add a Slow Speed Zone to Caesar Creek and the entire west side of Elliott Key, including Sands Cut. Another Slow Speed Zone would be north of Stiltsville to the park boundary. These slow speed areas would help visitors focus attention on these relatively shallow, sensitive, and sometimes busy areas of the bay. Some visitors would have boats with too deep a draft to be able to operate successfully at slow speeds in these areas and would be excluded from access. For some visitors this change would be perceived as a long-term, adverse, impact on their visitor experience while boating in the park. For other visitors, these reduced speeds would enhance their safety and opportunities for activities like swimming, wading, and fishing. The total area of park waters that would have slow speed restrictions would be about 5% (not including dredged channels that may have speed limits).

The Noncombustion Engine Use Zone would include four areas that generally are shallow, where caution is needed, and where different visitor experiences are available. These include three Featherbed areas on either side of the Intracoastal Waterway west of Boca Chita Key; the waters within 1,000 feet of the mainland; the waters encircling West Arsenicker and Arsenicker Keys' Sensitive Resource Zone; and the waters surrounding the southern keys, including Old Rhodes Key, Jones Lagoon, and Cutter Bank Shallows. For some visitors this change would be perceived as a long-term, minor, adverse impact on their visitor experience while boating in the park. Also, some visitors would have boats with too deep a draft to be able to operate successfully at slow speeds in these areas and would be excluded from access. This zoning would potentially have a positive impact on the experience of some visitors who currently use or would like to use these areas

of the park to canoe and kayak and explore the mangrove coastline and more remote key environments. Prohibiting combustion engines would enhance visitor's abilities to more successfully see wildlife and experience the natural sounds of the marine environments as well as increase the likelihood that some visitors would be able to achieve a sense of solitude and tranquility. Also, boaters would have less likelihood of grounding in this zone, and flats anglers would have improved conditions for successful catches. This Noncombustion Engine Use Zone would affect about 2.5% of park waters.

Under this alternative the Legare Anchorage would be rezoned and reduced in size relative to current conditions. This would result in visitors having access to an additional 1,700 acres of reef waters being in the Multiuse Zone and allowing a full range of recreational activities. The Sensitive Underwater Archeological Zone, which would be applied to a small area for the Legare Anchorage area, would allow for limited visitor access, which is currently the case. The addition of 1,700 acres to the Multiuse Zone would provide visitors enhanced opportunities for access and recreation, which would be a long-term beneficial impact on visitors' abilities to access and recreate in park waters.

The Access-by-Permit Zone would affect about 10,500 acres of park waters (about 6.3%). A large area of bay waters in the northwest quadrant of the park would be in this zone. Visitors currently have unlimited access to this area. Adding this permitting requirement would be perceived by some visitors who have previously used these areas of the park without restriction as a long-term, minor, adverse impact on their visitor experience. However, for other visitors this access-by-permit opportunity would likely become increasingly valuable as park visitation levels increase because it would allow visitors to have a relatively secluded or at least uncrowded visit of certain areas of the park with limited competing noise or activity from other groups. This would be a long-term beneficial impact on visitor access and opportunities for a range of visitor activities.

The continued closure to visitors of West Arsenicker and Arsenicker keys would not change. What would change under this alternative is the application of the Sensitive Resource Zone 500 feet out from the keys' shorelines and a Noncombustion Engine Use Zone 500 feet out from the Sensitive Resource Zone. This would be an increase from the current 200-foot closure. Also, Swan Key, Totten Key, and the south half of Sands Key would be closed to visitors. This area is currently lightly used because of limited accessibility; however, visitors who are used to having unrestricted access might find this closure to be a minor adverse impact on their ability to experience the area.

All of the mainland and most of the keys would be zoned for nature observation. Although the full range of recreational activities would be allowed, the relative inaccessibility of the mangrove forests and tropical hardwood hammocks naturally limits activities. Most visitors to these areas would likely experience few interactions with others and would have opportunities to explore, observe nature, and find solitude.

In this alternative, the Marine Reserve Zone would include a large section of the seagrass and reef area from Elliott Key east to the park boundary, including Long Reef, Ajax Reef, and Hawk Channel (about 21,800 acres or 14.4% of park waters). Visitors to this zone would be able to engage in most of their current activities in this zone. However, visitors would not be able to engage in recreational and commercial fishing. For these visitors, this restriction would have a minor to moderate adverse impact on their visitor experience. However, because marine reserves worldwide have documented "spillover effects" where more fish and bigger fish leave the reserve and become available to visitors fishing outside the reserve, a minor to moderate beneficial impact would be expected for visitors fishing immediately outside the Marine Reserve Zone.

Visitors who snorkel and dive in the Marine Reserve Zone would be able to experience a healthier, more natural coral reef than what is

currently present, with larger and more numerous tropical reef fish and an ecologically intact reef system. The increased number of mooring buoys would make the snorkeling and diving experience safer and easier. Therefore, a major beneficial impact would be expected for visitors who snorkel and dive in the Marine Reserve Zone.

Although anchoring would not be allowed in the Marine Reserve Zone, additional mooring buoys would facilitate access to reefs and historic shipwrecks within this zone as planned in the Mooring Buoy and Marker Plan.

**Visitor Services and Facilities.** Acquisition of the Fowey Rocks Lighthouse would provide an additional opportunity for visitors to learn about the park's maritime history. The Visitor Services/Park Administration Zone would apply to the existing park developed areas at Convoy Point and portions of Boca Chita Key, Elliott Key, and Adams Key. Visitor services and facilities would generally remain at current levels. There would be no measurable change from current conditions and trends.

## Cumulative Impacts

The growing population of the Miami-Dade region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. To this end there are a number of recent and ongoing studies and partnership efforts underway in the Biscayne Bay area to improve and protect water quality and quantity, wetlands, fisheries, and coastal viewsheds. Projects include the *Fishery Management Plan for Biscayne National Park*; the *South Miami-Dade Watershed Study and Plan*; the *Biscayne Bay Surface Water Improvement and Management Plan*; the *Lower East Coast Regional Water Supply Plan*; the Biscayne Bay Partnership Initiative; the Southeast Florida Coral Reef Initiative; and the *Biscayne Bay Coastal Wetlands Plan*.

The actions of this alternative, especially park zoning that could enhance resource conditions, such as the Slow-Speed, Noncombustion Engine Use, Sensitive Resource, Nature Observation, and Marine Reserve zones, combined with these ongoing regional efforts, would have the potential positive cumulative impact of improving the quality of visitor activities in the region, especially related to fishing, nature viewing, and other resource-based recreational activities. There would also be improved visitor opportunities to learn from various sources regarding the importance and complexity of restoration efforts in a rapidly growing urban environment.

Adjacent state parks (such as Bill Baggs Cape Florida State Park, Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park) and the Florida Keys National Marine Sanctuary offer services, facilities, and recreational opportunities that enable visitors to experience and learn about the natural and cultural resources of the Biscayne Bay and Florida Keys region. Also, current efforts through the Stiltsville plan and the public access plan for Biscayne Bay provide potential opportunities for enhanced visitor access, education, and recreation related to the Biscayne Bay area.

The actions of this alternative to improve resource conditions and opportunities, especially for dispersed use, nonmotorized boating, and access to solitude, would have the potential beneficial contribution of visitors having a greater range of quality resource-based recreational opportunities available to them in the Biscayne Bay region.

The beneficial and adverse contributions of alternative 5, when combined with the beneficial effects of other actions, would result in minor beneficial cumulative effects on visitor experience in the area. Alternative 5's contribution to these cumulative effects would be small.

## Conclusion

Additional Slow Speed Zones, new Noncombustion Engine Use Zones, a new Access-by-

Permit Zone, and a large Marine Reserve Zone would potentially exclude some visitors or visitor activities from these areas, which would be a long-term, minor to moderate, adverse impact. However, these also would be long-term beneficial impacts on other visitors' experiences. This alternative would result in beneficial cumulative effects on visitor experience in the area. Alternative 5's contribution to these cumulative effects would be small.

## NPS OPERATIONS AND FACILITIES

### Analysis

Actions under alternative 5 would generally have the same impacts on park operations and facilities at Convoy Point and on Boca Chita keys as those described under alternative 4, including the nine potential visitor contact points outside the park. However, current operations and facilities on Elliott, Adams, and Porgy keys would continue with no improvements or enhancement. The establishment of an Access by Permit Zone, the largest of the proposed Marine Reserve Areas, and the largest of the proposed Non-Combustion Engine Use Zones will necessitate the installation of numerous markers and navigational aids. The maintenance of these markers represent an increased workload and expense to the park. Thus, actions under this alternative would have long-term, minor, adverse impacts on park facilities due to the additional maintenance requirement.

Actions under alternative 5 would require additional law enforcement and resource management staff and equipment to enforce the park's regulations and protect its resources, although the successful implementation of these special zones would likely result in somewhat fewer groundings and resource damage and consequently less commitment of park staff and budget for legal prosecutions and resource rehabilitation. Nevertheless, these labor-intensive actions would result in short-term, minor to moderate, adverse impacts on the park's budget for equipment acquisition and long-term minor adverse

impacts on the park's budget for employment of additional personnel and equipment maintenance. Such actions would include the following:

- largest area of protection by Slow Speed Zones, such as the entire west side of Elliott Key of all action alternatives
- largest area of protection by Access-by-Permit Zone in the northwest part of the park of all action alternatives
- largest area of protection by Nature Observation Zone on keys and mainland of all action alternatives
- Largest area of protection by Noncombustion Engine Use Zones, including West Featherbed, East Featherbed, areas surrounding keys in south central area of park, and along mainland
- Largest Marine Reserve Zone of all action alternatives between Elliott Key and park's eastern boundary
- Additional historic structure maintenance for the Fowey Rocks Lighthouse

### Cumulative Effects

As discussed under alternative 1, past and ongoing cooperative planning and development projects in the Biscayne Bay region, such as the *Biscayne Bay Partnership Initiative*, *Miami-Dade County Comprehensive Development Master Plan*, *Biscayne Bay Strategic Access Plan*, and NPS special resource studies (such as those for Miami Circle and Virginia Key Beach Park) have resulted in some long-term beneficial effects on park operations and facilities. However, these effects are almost impossible to measure.

This alternative, with its emphasis on natural resource preservation and provision of opportunities for visitors to experience uncrowded park areas as well as establishment of potential visitor contact points outside the park, in combination with the aforementioned beneficial effects of past and ongoing cooperative planning and development projects in the Biscayne Bay region, would generally result in long-term beneficial cumulative effects. This

alternative's contribution to these effects would be modest and adverse.

These actions and additional maintenance needs for the Fowey Rocks Lighthouse would result in short-term, minor to moderate, adverse impacts on the park's budget resulting from equipment acquisition, and long-term, minor, adverse impacts on the park's budget resulting from employment of additional personnel and additional equipment maintenance.

### Conclusion

Overall, actions under alternative 5 would generally have long-term, minor to moderate, adverse impacts on park operations and facilities. The overall cumulative effects would be long term and beneficial; this alternative's contribution to these effects would be modest and adverse.

### SOCIOECONOMIC ENVIRONMENT

Full implementation of this alternative would require the National Park Service to hire four additional employees to handle the increased workload for administration, interpretation, law enforcement, and maintenance. This additional employment would bring in about \$288,000 in wages and an increased demand for housing, utilities, services, and goods, resulting in a long-term, minor, benefit for the local economy.

Excluding employee wages, implementing alternative 5 is estimated to cost a total of \$1.3 million above the current level of spending over the next 20 years. Most of this would be an input of federal dollars into the region in the form of increased purchases of supplies and construction contracts. This would be a long-term, negligible, beneficial impact as government expenditures enter the local economy.

Implementing alternative 5 would result in the creation of a Marine Reserve Zone, which is a no-fishing area. This would have an adverse effect on commercial fishing because this

activity would have to occur elsewhere in or out of the park. The zones in this alternative would comprise about 11% of the park, so the impact is expected to be long term and adverse but minor.

The number of visitors and average length of visit would not be expected to change under this alternative, so there would be no effect on tourism-related businesses.

### **Cumulative Effects**

The social and economic situation in Miami-Dade County is affected by a combination of many factors, including the presence of units of the national park system. Some of the \$15.5 billion in federal spending in the county is generated by Biscayne National Park in the forms of employee wages, purchase of supplies, and various contracts. Although tourism is not the most important driving factor in the regional economy, the livelihoods of service-related businesses in the region rely to some degree on the inflow of tourist dollars, especially restaurants and motels.

The total direct economic value of public recreation areas also includes two sets of values: (1) the user benefit that people receive from their visit and (2) the value of land near the recreation area. Economic studies have shown that the value of private land can increase with the number of outdoor recreation opportunities and the proximity to outdoor recreation space (Clawson and Knetsch 1966). Therefore, the continued presence of Biscayne National Park provides an important benefit to the residents and property values in the vicinity.

Alternative 5 would contribute a modest beneficial increment to the above impacts of other past, present, and future actions on socioeconomic conditions and, when considered in combination with other actions, would result in a beneficial cumulative impact.

### **Conclusion**

Implementing alternative 5 would have a long-term, minor, adverse impact and short-term and long-term, beneficial impacts on the economy in the region. The overall cumulative effects would be beneficial. Alternative 5 would contribute a modest beneficial increment to these impacts.

### **UNAVOIDABLE MODERATE OR MAJOR ADVERSE IMPACTS**

Unavoidable adverse impacts are defined here as impacts that cannot be fully mitigated or avoided. There would be no unavoidable moderate or major adverse impacts expected as a result of implementing alternative 5.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Alternative 5 would have the smallest potential for some commitments of resources because it would involve the least new development. It is not likely to result in any irreversible or irretrievable commitments of resources. Cultural resources would continue to be protected through active preservation maintenance.

### **NATURAL OR DEPLETABLE RESOURCES AND ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

Whenever feasible, the National Park Service strives to maximize the use of renewable resources and energy and therefore minimize the use of depletable resources. However, it is not possible with today's technologies to cost-effectively avoid all use of depletable resources in building and operating facilities.

Implementing alternative 5 would involve no increase in energy requirements.



## CHAPTER 5

### Consultation and Coordination





## PUBLIC AND AGENCY INVOLVEMENT

### PUBLIC MEETINGS AND NEWSLETTERS

Public input and feedback is a key element of the environmental impact statement process. Public and agency review of this draft document for Biscayne National Park help ensure that relevant issues and alternatives are adequately considered and evaluated and that all pertinent implications of the alternatives have been analyzed. The purpose of this section is to describe the agency and public comments received during the initial scoping process, and those from comments on the preliminary management prescriptions and alternatives. The comments and agency responses allow interested parties (including the National Park Service) to review and assess how other agencies, organizations, and individuals view the park and have responded to the different alternatives.

A mailing list was compiled by the planning team that consisted of members of governmental agencies, organizations, businesses, legislators, local governments, and interested citizens. The National Park Service published three newsletters and held public meetings to keep the public informed and involved in the planning process for Biscayne National Park's general management plan. The newsletters were sent to interested parties and were also available at the park and through the park's website. Public meetings were advertised in local newspapers, at the park, and on the park's website.

There have been three primary avenues to provide comments throughout the development of the draft plan—participation in public meetings, responses to newsletters, and comments on the NPS planning website. All three avenues were available to people who wanted to comment during plan development. The questions answered by parties interested in Biscayne National Park are purposely open ended so that the planning team could hear

about what was most important to the individuals or organizations that send in comments. For this reason numerical comparisons of one issue to another would not be meaningful.

The “Notice of Intent” to prepare an environmental impact statement was published in the *Federal Register* in January 2001. The first newsletter was also published in January 2001 and was followed by five public meetings in Florida and Washington, D.C. The newsletter described the general management plan process and asked the public to consider what they value about the park, their concerns, and their vision for the park for the next 15 to 20 years. A total of 2,667 comments were received from participants during the meetings, from mail-in response cards, and through e-mail. Of these, 784 bulk mail comments were received from the National Parks Conservation Association, and an additional 613 electronic and bulk mail comments were received regarding Stiltsville. Comments were also received from seven environmental and special interest groups as well as a request for additional information from one local governmental entity.

The comments directly related to scoping for the general management plan focus on nine general categories—public access, Homestead Air Force Base, boating, cultural resources, education and interpretation, fisheries, natural resources, park operations, and partnerships. With the exception of the Air Force base, the range of comments has remained consistent throughout the public participation process for developing the general management plan.

The second newsletter was published in September 2001. The focus of the newsletter was to share the input received during the initial scoping process and to introduce draft management prescriptions for the park. Two public meetings were also held in September.

A total of 769 comments were received during the public meetings, from mail-in response cards, and through e-mail. Of these, 381 were electronic bulk mail responses from National Parks Conservation Association members. Comments were also received from one local government entity and four environmental or special interest groups.

The public was asked to review and comment on (six) draft management zones that described different approaches to managing areas within the park. Many comments supported the management zones as proposed or with some modifications. The management zones were modified based on the comments received.

Three public meetings were held in Florida following the publication of the third newsletter in 2003. This newsletter described the five draft alternatives being considered to guide management of the park, including a preferred alternative. A total of 5,264 comments were received by mail and e-mail. Of these, 4,907 were form letter e-mails and 158 were cards and letters with similar comments. Another 850 comments were received from 104 people who attended three public meetings. In addition, four government agencies and 11 nongovernmental organizations and educational institutions provided comments.

The form letters and e-mails recommended that the park develop stronger conservation-based alternatives to provide long-term protection of the ecosystem. These letters also suggested incorporating no-take zones or marine reserves and limiting or prohibiting commercial fishing within the park boundaries. Other suggestions included increasing the number of rangers present on the water to better enforce speed limits and educate boaters on responsible boating practices, more slow speed areas, and no-motor zones. These comments also suggested that the National Park Service work more closely with state agencies to facilitate land acquisition bordering the park as a conservation buffer.

Of the comments received, 85% related to the management zones in the park, 44% related to boating and natural resources, and 37% related to fishing. Another 45% suggested modifications to the draft alternatives. Because many comments related to more than one category (e.g., natural resources and management or fishing and boating), there is some overlap between the categories. Several themes emerged in the comments that addressed fishing and boating. Of particular concern were the location and size of the noncombustion engine zones. Some were concerned that the areas were so large that flats fishers could not access some areas because it would be too difficult to pole to and from fishing sites. Many offered alternative suggestions, including slow-speed or no-wake zones in many corridors through the proposed noncombustion engine zones where use of engines would be allowed.

Many of the comments related to natural resources expressed concern that fish populations were in decline and fragile areas such as the seagrass beds were being impacted. Many also supported activities that would assist in the recovery of fish populations in the bay such as no-take zones or bans on commercial fishing. Others suggested reintroducing some fish species or developing a hatchery within the park. The importance of protecting the seagrass, coral reefs, and manatees was also discussed by many. Some of the comments suggested modifications to the boundaries of the management zones in specific areas such as the Arsenicker Flats and Elliott Key. Others suggested ways to minimize any impacts from different activities such as increasing boater education and enforcement. Some professional fishing guides proposed “alternative 6,” which suggested a different configuration of no-wake and noncombustion zones and two designated “no-entry” zones for research purposes. The guides and others believed the preliminary alternatives may not be safe in all conditions especially for small boats.

Of the people who commented on a particular alternative, more favored alternative 1, the no-action alternative, or alternative 5. Of the

people who favored alternative 1, some felt the other alternatives were too complicated or would restrict access to the park via boat. Of particular concern were the noncombustion zones and the permit-only areas. Many suggested greater enforcement of existing regulations. The most frequent comment against alternative 1 noted that the existing approach did not manage visitor use effectively. Many who supported alternative 5 noted it was the most protective of the bay's natural resources. Comments frequently supported the noncombustion zones. Some people who believed that alternative 5 is not protective enough suggested including nature observation and no-take zones as well. Comments against alternative 5 most frequently said it was too restrictive for boating and fishing.

Many comments supported greater law enforcement and educational efforts on both proper boating etiquette in the park and the natural history of the bay. Some also felt that more signs would make it easier for boats to avoid sensitive areas, such as the seagrass beds, while others felt that more signs would distract from the natural ambiance of the bay. Many noted that the park's current budget was not sufficient to adequately address the range of management and resource issues facing the park.

Four government agencies provided comments on the preliminary alternatives. Within the Florida Department of Natural Resources, the Biscayne Bay Aquatic Preserve supported alternative 5 because it is the most consistent with preserve rules and state statutes. Within the same agency, the Division of Recreation and Parks with the Office of Park Planning supported alternative 4 as the best balance between protection and the restoration of a wide range of recreational opportunities. In particular the division supported boating speed restrictions west of Elliott Key and greater opportunities for kayaks and canoes in the park. The South Florida Regional Planning Council noted that alternative 4 was particularly compatible with some of the council's goals and policies. The council also suggested that the management plan should be

consistent with existing local and regional planning documents. The South Florida Water Management District suggested a more quantitative analysis be completed before they could comment on any particular alternative. The district also suggested that the general management plan for the park be compatible with the Comprehensive Everglades Restoration Plan (CERP) and particularly the CERP Biscayne Bay Coastal Wetlands project and the CERP Restoration Coordination and Verification Efforts (RECOVER) efforts.

A round of public workshops were held in 2009 to solicit input on the proposed marine reserve zones. Three workshops were held with a total of 81 participants. Attendees drew on park maps with their ideas of locations for the reserve zones and provided oral and written comments.

## **CONSULTATION WITH OTHER AGENCIES/ OFFICIALS AND ORGANIZATIONS (TO DATE)**

### **Consultation with U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration—Fisheries**

#### *Consultation Concerning Federally Listed Threatened and Endangered Species*

Section 7 of the Endangered Species Act (16 USC 1531 et seq.) outlines procedures for federal interagency cooperation to protect federally listed species and designated critical habitat. Section 7(a)(2) states that each federal agency shall ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

In October 2000 the planning team initiated informal consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration – Fisheries (NOAA) to determine the presence of federally listed threatened and endangered species in Biscayne National Park. Letters

were sent to both advising them of this planning effort and seeking information on species in the park. On October 31, 2000 a letter was received from the National Oceanic and Atmospheric Administration providing a list of the species under their jurisdiction in Florida (Appendix D). The U.S. Fish and Wildlife Service directed the National Park Service to obtain the most current list from the USFWS website. Update letters were sent to USFWS and NOAA in July, 2010.

The National Park Service has regularly checked the agencies' websites for changes in the status of species listed as threatened or endangered and changes to critical habitat. Both agencies were invited to participate in the Marine Reserve Zone workshops.

Both agencies have been included on the mailing list for the distribution of information about this project. Copies of this *Draft General Management Plan / Environmental Impact Statement* have been sent to both agencies for review and a determination of concurrence on the National Park Service's findings concerning listed species and critical habitat.

### ***Consultation Concerning Essential Fish Habitat***

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act set forth a new mandate for the National Oceanic and Atmospheric Administration (NOAA), regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat. The essential fish habitat provisions of the act support one of the overall marine resource management goals—maintaining sustainable fisheries. The act requires federal agencies to consult with the National Oceanic and Atmospheric Administration when any activity proposed, permitted, funded, or undertaken by a federal agency may have adverse impacts on designated essential fish habitat.

In October 2000 the National Park Service sent a letter to the National Oceanic and Atmospheric Administration advising them of the general management planning effort. The letter requested information on the essential fish habitat in relation to the park and sought guidance on the procedures for consulting concerning essential fish habitat. The National Oceanic and Atmospheric Administration provided information on the consultation process and general information on essential fish habitat.

The National Oceanic and Atmospheric Administration was also invited to participate in the Marine Reserve Zone workshops. The National Oceanic and Atmospheric Administration has been included on the mailing list for information about this project. The National Oceanic and Atmospheric Administration was invited to public scoping meetings. Copies of this *Draft General Management Plan / Environmental Impact Statement* have been sent to the National Oceanic and Atmospheric Administration for review and comment.

### **Coastal Zone Management**

The federal Coastal Zone Management Act (1972), through its Federal Consistency Provisions, gives the state the ability to require that all federal activities in the state be consistent with the state's Coastal Management Program. Florida's management program was approved by the National Oceanic and Atmospheric Administration in 1981. The Florida program consists of a network of 11 state agencies and 4 of the 5 water management districts to

- to ensure the wise use and protection of the state's water, cultural, historic, and biological resources,
- to minimize the state's vulnerability to coastal hazards,
- to ensure compliance with the state's growth management laws,
- to protect the state's transportation system,

- and to protect the state's proprietary interest as the owner of sovereign submerged lands.

The state's coastal zone includes the area encompassed by the state's 67 counties and its territorial seas. Therefore, federal actions that occur throughout the state are reviewed by the state for consistency with the Florida Coastal Management Program.

For direct federal activities, the state is required by the Coastal Zone Management Act to complete its review and provide the federal agency with its federal consistency concurrence within 60 days following the receipt of the required information. If the state does not provide the federal agency with its federal consistency concurrence or objection within 60 days, the federal action is presumed to be consistent with the Florida Coastal Management Program.

Information for consistency determination is submitted to the Florida State Clearinghouse, which is in the Department of Environmental Protection. The state clearinghouse serves as the single point of contact for the receipt of documents that require federal consistency review. The State Clearinghouse is the only entity legally authorized to accept information and/or materials on behalf of the state that require federal consistency review.

The National Park Service has requested a consistency determination for the federal Coastal Zone Management Act via the Florida State Clearinghouse program of the Florida Department of Environmental Protection. The National Park Service proposes no development in any area of the national seashore that would conflict with the coastal management program.

### **Section 106 Consultation**

Agencies that have direct or indirect jurisdiction over historic properties are required by Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 270, et seq.), to take into account the effect of any undertaking on properties eligible for listing in the National Register of Historic

Places. The National Park Service sent letters to the Florida state historic preservation office and the Advisory Council on Historic Preservation on January 4, 2001, inviting their participation in the planning process. The State Historic Preservation Office responded positively to the request to consult. Both offices were sent all the newsletters with a request for comments. The State Historic Preservation Office and Advisory Council were sent letters to update their respective offices on the progress of the general management plan in October 2010.

### **Consultation with Native Americans**

The National Park Service recognizes that indigenous peoples may have traditional interests and rights in lands now under NPS management. The need for government-to-government Native American consultations stems from the historic power of Congress to make treaties with American Indian tribes as sovereign nations. Consultations with American Indians and other Native Americans, such as Native Hawaiians and Alaska Natives, are required by various federal laws, executive orders, regulations, and policies. They are needed, for example, to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Implementing regulations of the Council on Environmental Quality for the National Environmental Policy Act of 1969 (NEPA) also call for Native American consultations.

Letters were sent to the following Native American tribes on January 4, 2001, to invite their participation in the planning process: the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma.

The tribes were briefed on the scope of the planning project and the preliminary alternatives by newsletter and follow-up telephone calls soliciting comments. Subsequent meetings with the Miccosukee Tribe in 2002 provided perspectives on planning that the park considered in the formulation of the management plan alternatives. Comments by the Miccosukee included recommendations



to see Native American sites preserved in place, the return of all artifacts to their *in situ* location after archeological research is completed, and limiting visitor access to certain identified sites. In addition, the tribe wants to be contacted if human remains are located. The tribe also desires to be kept informed about research proposals in the park. Other tribes had no comments at that time. It was also communicated that it is important that park interpretation include the Native American viewpoint.

The Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma were sent letters to update their respective tribes on the progress of the GMP in October 2010. The tribes will have an opportunity to review and comment on this draft plan.

### **Consultation with Miami-Dade Historic Preservation**

Also in 2001, the Miami-Dade Historic Preservation Division was contacted to ask for their involvement in the consultation process. No response was received. A letter was sent to update Miami-Dade about the continuation of the planning effort and progress of the GMP in October 2010.

### **Consultation with Florida Fish and Wildlife Conservation Commission**

In October 2000 the planning team initiated coordination with the Florida Fish and Wildlife Conservation Commission to determine the presence of state listed species in Biscayne National Park. A letter was sent advising the commission of this planning effort and seeking information on species in the park. On October 20, 2000 a letter was received from the commission with information on the state listed species that may be in the park (Appendix D).



# **AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING A COPY OF THIS DOCUMENT**

## **FEDERAL AGENCIES**

Advisory Council on Historic Preservation  
U.S. Department of Commerce  
NOAA - National Marine Fisheries Service,  
Florida Keys National Marine Sanctuary,  
U.S. Coral Reef Task Force, South Atlantic  
Fisheries Management Council  
U.S. Army Corps of Engineers  
U.S. Department of Agriculture  
National Forest Service  
Natural Resources Conservation Service  
U.S. Department of Homeland Security  
U.S. Coast Guard  
U.S. Department of the Interior  
U.S. Fish and Wildlife Service  
U.S. Geological Survey  
U.S. National Park Service  
U.S. Environmental Protection Agency

## **U.S. SENATORS AND REPRESENTATIVES**

Honorable, U.S. Senator from Florida  
Junior U.S. Senator from Florida  
Honorable U.S. Representative from Florida

## **STATE AGENCIES**

State of Florida Clearinghouse, including but  
not limited to Florida Fish and Wildlife  
Conservation Commission, Florida  
Department of Environmental Protection,  
South Florida Water Management District,  
and State Historic Preservation Office  
Bill Baggs Cape Florida State Park  
Florida Fish and Wildlife Research Institute  
(FWRI)  
John Pennekamp State Park

## **STATE OFFICIALS**

Florida Governor  
State Senators  
State Representatives

## **AMERICAN INDIAN TRIBES TRADITIONALLY ASSOCIATED WITH BISCAYNE NATIONAL PARK LANDS**

Miccosukee Tribe of Indians of Florida  
Seminole Tribe of Florida  
Seminole Nation of Oklahoma  
Representative of Independent Miccosukees

## **CITY AND COUNTY GOVERNMENTS**

Mayor of Miami-Dade County  
Mayor of Florida City  
Mayor of Homestead  
Mayor of Cutler Bay  
Mayor of Miami  
Mayor of Palmetto Bay  
Mayor of Pinecrest  
Miami-Dade County Commissioners  
Miami-Dade County Office of Historic and  
Archeological Resources  
Miami-Dade Planning and Zoning  
Department  
Miami-Dade Department of Environmental  
Resource Management  
Monroe County Commissioners  
Public libraries of Miami-Dade County and  
Monroe County (Key Largo)

## **LOCAL AGENCIES/INSTITUTIONS**

University of Miami Rosenstiel School of  
Marine and Atmospheric Science  
University of Florida  
Florida International University  
Southeast Florida Coral Reef Initiative

## **ORGANIZATIONS AND BUSINESSES**

Active Divers Association  
American Fisheries Society  
American Whitewater Association  
Amy Slate's Amoray Dive Resort  
Associated Press  
Atlantic Gamefish Foundation  
Audubon Society of Florida  
Austin's Dive Center  
Biscayne Bay Foundation  
Biscayne Bay Wingnet Association  
Biscayne National Underwater Park  
CCA Florida  
Center for Marine Conservation  
Citizens for a Better South Florida  
Community Partners  
The Conservation Fund  
Defenders of Wildlife  
Divers Direct Outlet Store  
Environmental Defense Fund  
Everglades Association, Inc.  
Federation of Fly Fishermen  
Fishin' Buddy  
Fishing Rights Alliance  
Florida Audubon Society  
Florida Bay Outfitters  
Florida Collector  
Florida Keys Commercial Fishermen's Association  
Florida Keys Guide Association  
Florida Power and Light  
Florida Scuba News  
Florida Sea Base High Adventure  
Florida Skin Divers Association  
Florida Sportsmen  
Greater Miami Convention & Visitors Bureau  
History Miami  
International Game Fish Association  
Islamorada Dive Association  
Izaak Walton League  
Holiday Diver

Hook and Line Fishermen, Inc.  
Keys Association of Dive Operators  
The Miami Herald  
National Association of Black Scuba Divers  
National Fish and Wildlife Foundation  
National Hispanic Environmental Council  
National Parks and Conservation Association  
National Park Concessions, Inc.  
Natural Resources Defense Council  
The Nature Conservancy  
The Ocean Conservancy  
Ocean Divers  
Organized Fishermen of Florida  
Quiescence Diving Services, Inc.  
Reef Environmental Education Foundation  
Reefkeeper International  
Reef Relief  
R/V Coral Reef II  
Slate's Dive Center  
Sierra Club  
South Dade Anglers  
South Florida Freedivers  
South Florida National Parks Trust  
South Florida Sports Fishermen Club  
Tropical Anglers  
Tropical Audubon Society  
Trust for Public Land  
Underwater Society of America  
World Wildlife Fund  
WPBT-TV Channel 2  
Waterfront News  
Wildlife Rescue of Dade County  
World Wildlife Fund  
Youth Fishing Foundation  
and others on the park's mailing list

## **INDIVIDUALS**

There were too many individuals to list here.  
A full mailing list is available from the park.



**Appendixes,  
References, Preparers,  
and Consultants,  
and Index**





## APPENDIX A: LEGISLATION

### 6. Biscayne

An Act to authorize the establishment of the Biscayne National Monument in the State of Florida, and for other purposes. (82 Stat. 1188)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That, in order to preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty, the Secretary of the Interior may establish the Biscayne National Monument within so much of the area in the State of Florida as generally depicted on the drawing entitled "Biscayne National Monument Boundary Map," numbered NM-BIS 7101, and dated May 1966, which drawing is superimposed on a photographic reproduction of a portion of Coast and Geodetic Survey Chart Numbered 1349 (eighth edition, December 20, 1965, correction numbered 22, dated May 28, 1966) as lies north of the north boundary of the channel easement shown thereon. The drawing shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior. The Secretary may revise the boundaries of the national monument from time to time, but the total acreage of the national monument shall not exceed ninety-six thousand three hundred acres and no boundary shall be revised outward or in such a manner as to obstruct any seaport channel which may be hereafter constructed outside the boundaries hereinbefore referred to.

SEC. 2. (a) Within the boundaries of the Biscayne National Monument, the Secretary of the Interior may acquire lands, waters, or interests therein by donation, purchase with donated or appropriated funds, or exchange. The Secretary may in addition acquire by any of the above methods not more than eighty acres of land or interests therein on the mainland for a headquarters site, and not more than forty acres of land or interest therein on Key Largo for a visitor contact site.

(b) When acquiring property by exchange the Secretary may accept title to any non-Federal property within the boundaries of the national monument, and outside of such boundaries within the limits prescribed in subsection (a) of this section, and in exchange therefor he may convey to the grantor of such property any federally owned property under his jurisdiction in the State of Florida which he classifies as suitable for exchange or other disposal. The values of the properties so exchanged either shall be approximately equal or if they are not approximately equal the values shall be equalized by the payment

of cash to the grantor or to the Secretary as the circumstances require.

SEC. 3. Notwithstanding any other provision of this Act, lands and interests in land owned by the State of Florida or Dade County may be acquired solely by donation, and the Secretary shall not declare the Biscayne National Monument established until the State has transferred or agreed to transfer to the United States its right, title and interest in and to its lands within the boundaries of said national monument. The Secretary shall not acquire any other lands or interests in land pursuant to this Act except by donation or with donated funds until the State has made or obligated itself to make the aforesaid transfer: *Provided*, That nothing contained in this sentence shall preclude the Secretary from acquiring options for the purchase of lands and interests in land other than lands and interests in land held by the State of Florida or Dade County, which are to be acquired pursuant to this Act and, upon the State's transferring or obligating itself to transfer as aforesaid, he shall proceed as expeditiously as possible to acquire the other lands and interests in land which are necessary to carry out the purposes of this Act.

SEC. 4. The Secretary of the Interior shall preserve and administer the Biscayne National Monument in accordance with the provisions of the Act of August 25, 1906 (39 Stat. 535; 16 U.S.C. 1-4), as amended and supplemented. The waters within the Biscayne National Monument shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary, after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited or otherwise regulated in the interest of sound conservation or in order to achieve the purposes for which the national monument is established.

SEC. 5. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act, but not to exceed \$84,575,000 for land acquisition and \$2,000,000 for development.

Approved October 18, 1968.

*Legislative History*

House Report No. 1780 (Committee on Interior and Insular Affairs).

Senate Report No. 1597 (Committee on Interior and Insular Affairs).

Congressional Record, Vol. 114 (1968):

Sept. 16: Considered and passed House.

Oct. 4: Considered and passed Senate.

## 5. Biscayne

An Act to provide for increases in appropriation ceilings and boundary changes in certain units of the National Park System, to authorize appropriations for additional costs of land acquisition for the National Park System, and for other purposes. (88 Stat. 1-45) (P.L. 93-477)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

## TITLE I—ACQUISITION CEILING INCREASES

Sec. 101. The limitations on appropriations for the acquisition of lands and interests therein within units of the National Park System contained in the following Acts are amended as follows:

- \* \* \* \* \*
- (1) Biscayne National Monument, Florida: Section 5 of the Act of October 18, 1968 (82 Stat. 1188, 1189) is amended by changing "\$24,575,000" to "\$28,350,000":
- \* \* \* \* \*

## TITLE III—BOUNDARY CHANGES

Sec. 301. The Secretary of Interior shall revise the boundaries of the following units of the National Park System:

- \* \* \* \* \*
- (1) Biscayne National Monument, Florida: To add approximately 8,738 acres of land and water, including all of Swan Key and Gold Key.
- \* \* \* \* \*

Approved October 26, 1974.

An Act to authorize additional appropriations for the acquisition of lands and interests in lands within the Sawtooth National Recreation Area in Idaho. (92 Stat. 3-67) (P.L. 95-625)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

## TITLE I—DEVELOPMENT CEILING INCREASES

Sec. 101. The limitations on funds for development within certain units of the National Park System and affiliated areas are amended as follows:

- \* \* \* \* \*
- (4) Biscayne National Monument, Florida: Section 5 of the Act of October 18, 1968 (82 Stat.

1188), is amended by changing "\$2,900,000" to "\$6,565,000"

\* \* \* \* \*

Approved November 10, 1978.



NATIONAL PARKS

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3. Biscayne

PUBLIC LAW 96-287—JUNE 28, 1980

94 STAT. 599

Public Law 96-287  
96th Congress

An Act

To establish the Biscayne National Park, to improve the administration of the Fort Jefferson National Monument, to enlarge the Valley Forge National Historical Park, and for other purposes.

June 28, 1980  
[H. R. 5426]

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

Biscayne  
National Park  
Establishment

TITLE I—BISCAYNE NATIONAL PARK

SEC. 101. In order to preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty, there is hereby established the Biscayne National Park (hereinafter referred to in this title as the "park") in the State of Florida. The boundary of the park shall include the lands, waters, and interests therein as generally depicted on the map entitled "Boundary Map, Biscayne National Park", numbered 169-80,003, and dated April 1980, which map shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior. The Secretary of the Interior (hereinafter referred to as the "Secretary") shall publish in the Federal Register, not more than one year after the date of enactment of this Act, a detailed description of the boundary established pursuant to this section. Following reasonable notice in writing to the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate of his intention to do so, the Secretary may make minor revisions in the boundary of the park by publication of a revised boundary map or other description in the Federal Register.

16 USC 410gg.

Boundary map,  
availability for  
public  
inspection.

Boundary  
description,  
publication in  
Federal  
Register.  
Minor boundary  
revisions, notice  
to congressional  
committees and  
publication in  
Federal  
Register.

SEC. 102. (a) Within the boundary of the park the Secretary is authorized to acquire lands, waters, and interests therein by donation, purchase with donated or appropriated funds, or exchange, except that property owned by the State of Florida or any political subdivision thereof may be acquired only by donation, and subject to such reservations and restrictions as may be provided by Florida law. Lands, waters, and interests therein within such boundary which are owned by the United States and under the control of the Secretary are hereby transferred to the administrative jurisdiction of the National Park Service to be managed for the purposes of the park. Any federally owned lands within the park which are not under the control of the Secretary shall be transferred to his control for purposes of the park at such time as said lands cease to be needed by the agencies which currently control them.

Property  
acquisition;  
donation by  
Florida.  
16 USC 410gg-1.

U.S. property,  
transfer to  
National Park  
Service.

(b) It is the express intent of the Congress that the Secretary shall substantially complete the land acquisition program authorized herein within three complete fiscal years from the effective date of this Act. Any owner of property within the park may notify the

Time limitation  
on land  
acquisition.

Notification to  
Secretary.



Preservation  
and  
administration.  
16 USC 410gg-2.  
Fishing.

Biscayne  
National  
Monument,  
abolition.

Designation of  
wilderness areas,  
report to  
President and  
Congress.  
16 USC 410gg-3.  
16 USC 1132.

Management  
plan, submittal  
to congressional  
committees.  
16 USC 410gg-4.

16 USC 1a-7.  
Appropriation  
authorization.  
16 USC 410gg-5.

Secretary of the desire of such owner that his property be promptly acquired, and the Secretary shall give immediate and careful consideration, subject to the availability of funds, to the prompt acquisition of such property.

SEC. 143. (a) The Secretary shall preserve and administer the park in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1-4), as amended and supplemented. The waters within the park shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary, after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which the park is established: Provided, That with respect to lands donated by the State after the effective date of this Act, fishing shall be in conformance with State law.

(b) The Biscayne National Monument, as authorized by the Act of October 13, 1968 (82 Stat. 1188; 16 U.S.C. 450gc), as amended, is abolished as such, and all lands, waters, and interests therein acquired or reserved for such monument are hereby incorporated within and made a part of the park. Any funds available for the purposes of such monument are hereby made available for the purposes of the park, and authorizations of funds for the monument shall continue to be available for the park.

SEC. 144. Within three complete fiscal years from the effective date of this Act, the Secretary shall review the area within the park and shall report to the President and the Congress, in accordance with subsections 3 (c) and (d) of the Wilderness Act (78 Stat. 390), his recommendations as to the suitability or nonsuitability of any area within the park for designation as wilderness. Any designation of any such areas as wilderness shall be accomplished in accordance with said subsections of the Wilderness Act.

SEC. 145. Within two complete fiscal years from the effective date of this Act, the Secretary shall submit to the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate, a revised comprehensive general management plan for the park consistent with the provisions of this title and pursuant to the provisions of section 12(b) of the Act of August 18, 1970 (84 Stat. 825), as amended (16 U.S.C. 1a-1 et seq.).

SEC. 146. In addition to the sums previously authorized to be appropriated for Biscayne National Monument, there are authorized to be appropriated such sums as may be necessary for the administration of the park, and not to exceed \$8,500,000 for the acquisition of lands and interests therein, as provided in this title. Notwithstanding any other provision of law, no fees shall be charged for entrance or admission to the park.

Approved June 28, 1980.

#### LEGISLATIVE HISTORY:

HOUSE REPORT No. 693 (Comm. on Interior and Insular Affairs).  
CONGRESSIONAL RECORD

Vol. 125 (1979): Dec. 10, considered and passed House.

Vol. 126 (1980): June 5, considered and passed Senate, amended.

June 17, House concurred in Senate amendment.

## APPENDIX B: SERVICEWIDE MANDATES AND POLICIES

As summarized in the “Servicewide Laws and Policies,” appendix B shows some of the most pertinent servicewide mandates and policy topics related to planning and managing Biscayne National Park; across from each topic are the *desired conditions that the staff is striving to achieve* for that topic and thus the tables are written in the present tense. The law or policy directing these actions and examples of the types of actions being pursued by NPS staff is also included. The alternatives considered in this document incorporate and

comply with the provisions of the following mandates and policies as funding and staffing allow. These mandates and policies illustrate that a general management plan is not needed to decide, for instance, that it is appropriate to protect endangered species, control exotics species, protect archeological sites, conserve artifacts, or provide for handicapped access. Those and other things are already laws, mandates, or policies.

## Government-to-Government Relations between American Indian Tribes and Biscayne National Park

GOVERNMENT-TO-GOVERNMENT RELATIONS BETWEEN AMERICAN INDIAN TRIBES AND BISCAYNE NATIONAL PARK	
Current laws and policies require that the following conditions be achieved in the park	
Desired Condition	Source
The National Park Service and tribes culturally affiliated with the park maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in park management and operation.	National Historic Preservation Act, Archeological Resources Protection Act, Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act, NPS <i>Management Policies 2006</i>
Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to park neighbors and other agencies:	
<ul style="list-style-type: none"> <li>• Continue to cooperate with tribes in conducting ethnographic studies to better understand which tribes are culturally affiliated with the park and identify culturally significant resources.</li> <li>• Continue regular consultations with affiliated tribes to continue to improve communications and resolve any problems or misunderstandings.</li> <li>• Continue to encourage the employment of American Indians on park staff to improve communications and working relationships, and encourage cultural diversity in the workplace.</li> <li>• Consider culturally affiliated tribal values in efforts to improve overall management and park interpretation.</li> <li>• Implement a joint monitoring program to monitor plant-gathering sites for potential impacts.</li> </ul>	

## Natural Resource Management Requirements

AIR QUALITY	
The park is a class II air quality area. Current laws and policies require that the following conditions be achieved in the park.	
Desired Condition	Source
Air quality in the park meets national ambient air quality standards for specified pollutants. The park's air quality is maintained or enhanced with no significant deterioration.	Clean Air Act, NPS <i>Management Policies 2006</i> ; NPS-77, "Natural Resources Management Guidelines"
Nearly unimpaired views of the landscape both within and outside the park are present. Scenic views are substantially unimpaired.	
Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to air quality.	
Although the National Park Service has very little direct control over air quality in the air shed encompassing the park, the NPS will continue to cooperate with the Florida Department of Environmental Protection and the U.S. Environmental Protection Agency to monitor air quality and ensure that air quality is not impaired.	
<ul style="list-style-type: none"><li>• Inventory the air quality-related values associated with each park.</li><li>• Monitor and document the condition of air quality and related values.</li><li>• Evaluate air pollution impacts and identify causes.</li><li>• Minimize air quality pollution emissions associated with park operations, including the use of prescribed fire and visitor use activities.</li><li>• Conduct air quality monitoring in conjunction with other government agencies.</li><li>• Conduct park operations in compliance with federal, state, and local air quality regulations.</li><li>• Ensure healthful indoor air quality at NPS facilities.</li><li>• Participate in federal, regional, and local air pollution control plans and drafting of regulations and review permit applications for major new air pollution sources</li><li>• Conduct operations in compliance with federal, state, and local air quality regulations.</li><li>• Maintain constant dialogue with the Florida Department of Environmental Protection regarding visibility conditions at the park.</li><li>• Reduce emissions associated with administrative and recreational uses.</li><li>• Develop educational programs to inform visitors and regional residents about the threats of air pollution.</li><li>• Participate in research on air quality and effects of air pollution. Determine changes in ecosystem function caused by atmospheric deposition and assess the resistance and resilience of native ecosystems in the face of these external perturbations.</li><li>• Research effects of atmospheric deposition on water quality, plants, soils, and wetlands in the park.</li></ul>	

ECOSYSTEM MANAGEMENT	
Current laws and policies require that the conditions delineated below be achieved in the park.	
Desired Condition	Source
The park is managed holistically, as part of a greater ecological, social, economic, and cultural system.	NPS <i>Management Policies 2006</i> (1.5, 4, 4.1, 4.14, 4.41)
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to ecosystem management:</p> <ul style="list-style-type: none"> <li>Continue to participate in the South Florida Ecosystem Task Force.</li> <li>Continue to seek cooperative agreements with other adjacent land managing agencies to protect the ecosystem and wildlife corridors.</li> <li>Continue to develop cooperative agreements, partnerships, and other feasible arrangements to set an example in resource conservation and innovation, and to facilitate research related to park resources and their management.</li> </ul>	

EXOTIC SPECIES	
Current laws and policies require that the following conditions be achieved in the park.	
Desired Condition	Source
The management of populations of exotic plant and animal species, up to and including eradication, are undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.	NPS <i>Management Policies 2006</i> ; EO 13112, "Invasive Species"; NPS-77, "Natural Resources Management Guidelines"
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to exotic species:</p> <ul style="list-style-type: none"> <li>Complete an inventory of plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease) of selected species that are (a) invasive exotics or (b) native species capable of creating resource problems (e.g., habitat decline due to overpopulation).</li> <li>Continue to participate in the development of and the implementation of the Exotic Plant Management Plan for the South Florida Parks.</li> <li>Study the environmental and ecological effects of exotic species invasion to assess threats and prioritize management actions.</li> <li>Undertake research to assess the methods by which exotic species become established and spread into native plant communities so that strategies for preventing introduction and establishment can be developed and implemented.</li> <li>Manage exclusively for native plant species in pristine and primitive management prescriptions. In other management prescriptions, limit planting of nonnative species to noninvasive plants that are justified by the historic scene or operational needs.</li> <li>Control or eliminate exotic plants and animals, exotic diseases, and pest species where there is a reasonable expectation of success and sustainability. Base control efforts on: <ul style="list-style-type: none"> <li>the potential threat to legally protected or uncommon native species and habitats</li> <li>the potential threat to visitor health or safety</li> <li>the potential threat to scenic and aesthetic quality</li> <li>the potential threat to common native species and habitat</li> </ul> </li> <li>Manage exotic diseases and pest species based on similar priorities.</li> <li>Provide interpretive and educational programs on the preservation of native species for visitors and for residents neighboring the park.</li> </ul>	

LAND PROTECTION	
The National Park Service will manage for protection of park lands.	
Desired Condition	Source
Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the national park was created.	<i>NPS Management Policies 2006</i>
Actions	
The National Park Service will take the following kinds of actions to comply with the policies mentioned above.	
<ul style="list-style-type: none"> <li>• Prepare a land protection plan for the park.</li> </ul>	

LIGHTSCAPE MANAGEMENT / NIGHT SKY	
The park's night sky is a feature that contributes to visitors' experiences. Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	Source
Excellent opportunities to see the night sky are available. Artificial light sources both within and outside the park do not unacceptably adversely affect opportunities to see the night sky.	<i>NPS Management Policies 2006</i>
Actions	
The National Park Service will take the following kinds of actions to comply with the policy mentioned above:	
<ul style="list-style-type: none"> <li>• The National Park Service will cooperate with park visitors, neighbors, and local government agencies to find ways to prevent or minimize the intrusion of artificial light into the night scene in the park.</li> <li>• In natural areas, artificial outdoor lighting will be limited to basic safety requirements and will be shielded when possible.</li> <li>• The park staff will evaluate the impacts on the night sky caused by park facilities. If light sources in the park are affecting night skies, the staff will study alternatives such as shielding lights, changing lamp types, or eliminating unnecessary sources.</li> </ul>	

MARINE RESOURCES	
Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	Source
Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities.	NPS <i>Management Policies 2006</i> ; NPS-77 "Natural Resources Management Guideline" chapter 2, page 95
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to marine resources:</p> <ul style="list-style-type: none"> <li>• Inventory all ecosystem components.</li> <li>• Maintain and restore all components and processes of naturally evolving marine ecosystems, recognizing that change caused by extreme natural events (e.g., storms, red tide, El Niño) is an integral part of functioning natural systems.</li> <li>• Maintain natural genetic diversity of marine ecosystems.</li> <li>• Maintain or improve water quality affecting marine ecosystems.</li> <li>• Maintain or improve air quality affecting marine ecosystems.</li> <li>• Maintain natural marine viewsheds.</li> <li>• Protect and restore threatened and endangered species and their critical habitat.</li> <li>• Regulate and mitigate human activities to minimize adverse impacts.</li> <li>• Determine limits of natural system variation (baseline condition).</li> <li>• Monitor system dynamics to detect abnormal changes in time to affect remedial actions.</li> <li>• Educate visitors about the importance and fragility of marine resources, threats to them, and mitigation to lessen impact.</li> </ul>	

NATIVE VEGETATION AND ANIMALS	
Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	Source
<p>The National Park Service will maintain as parts of the natural ecosystem, all native plants and animals in the park.</p> <p>Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.</p> <p>Populations of native plant and animal species function in as natural condition as possible except where special considerations are warranted.</p>	<p>NPS <i>Management Policies</i> 2006; NPS-77 "Natural Resources Management Guideline"</p>
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to native wildlife and vegetation:</p> <ul style="list-style-type: none"> <li>• Complete inventory of the plants and animals in the park and regularly monitor the distribution and condition of selected species that are indicators of ecosystem condition and diversity.</li> <li>• Develop methods to restore native biological communities.</li> <li>• Minimize human impacts on native plants, animals, populations, communities and ecosystems and the processes that sustain them.</li> <li>• Restore native plant and animals populations in the park that have been extirpated by past human-caused action, where feasible.</li> <li>• Whenever possible, natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species.</li> <li>• Protect a full range of genetic types (genotypes) of native plant and animals populations in the park by perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity.</li> <li>• Complete an inventory of plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease) of selected species that are indicators of ecosystem condition and diversity.</li> <li>• Develop methods to restore native biological communities.</li> <li>• Research soil properties including nutrients, microorganisms and soil crusts to learn how to restore native plant communities.</li> </ul>	



SOUNDSCAPES	
An important part of the NPS mission is to preserve or restore the natural soundscapes associated with national park system units. The sounds of nature are among the intrinsic elements that combine to form the environment of our national park system units. Current laws and policies require that the following conditions be achieved in the park.	
Desired Condition	Source
The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation due to human-caused noise. Disruptions from recreational uses are managed to provide a high-quality visitor experience in an effort to preserve or restore the natural quiet and natural sounds.	NPS <i>Management Policies</i> 2006, DO 47, "Sound Preservation and Noise Management"
Noise sources are managed to preserve or restore the natural soundscape.	Executive memorandum signed by President Clinton on April 22, 1996
Actions	
<p>The National Park Service will take the following kinds of actions to comply with the policies mentioned above.</p> <ul style="list-style-type: none"> <li>• Actions will be taken to monitor and minimize or prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.</li> <li>• The park staff continues to require tour bus companies to comply with regulations designed to reduce noise levels (e.g., turning off engines when buses are parked).</li> <li>• Noise generated by NPS management activities will be minimized by strictly regulating administrative functions such as the use of motorized equipment. Noise will be a consideration in the procurement and use of equipment by the park staff.</li> </ul>	

SOILS	
Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	Source
The National Park Service actively seeks to understand and preserve the soil resources of the park, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.	NPS <i>Management Policies 2006</i> ; NPS-77 "Natural Resources Management Guideline"
Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.	NPS <i>Management Policies 2006</i> ; NPS-77, "Natural Resources Management Guidelines"
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to soils:</p> <ul style="list-style-type: none"> <li>• Update soils map of the park in digital format that can be used in the park's geographic information system (GIS).</li> <li>• Take actions to prevent — or if that is not possible, to minimize — adverse, potentially irreversible impacts on soils. Possibly implement soil conservation and soil amendment practices to reduce impacts, and import offsite soil or use soil amendments to restore damaged sites. Offsite soil normally is salvaged soil, not soil removed from pristine sites, unless the use of pristine site soil can be achieved without causing any unacceptable adverse impacts on the overall ecosystem.</li> <li>• Survey areas of the park with soil resource problems and take actions appropriate to the management prescription to prevent or minimize further erosion, compaction, or deposition.</li> <li>• Apply effective best management practices to problem soil erosion and compaction areas in a manner that stops or minimizes erosion, restores soil productivity, and reestablishes or sustains a self-perpetuating vegetative cover.</li> </ul>	

THREATENED AND ENDANGERED SPECIES	
Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	Source
Federally listed and state-listed threatened and endangered species and their habitats are protected and sustained.	Endangered Species Act; equivalent state protective legislation; NPS <i>Management Policies 2006</i> ; NPS-77, "Natural Resources Management Guidelines"
Native threatened and endangered species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.	
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to species of special concern:</p> <ul style="list-style-type: none"> <li>• Support research that contributes to management knowledge of rare and protected species and their habitat.</li> <li>• To protect rare or protected species and their habitat, complete an inventory of rare or protected plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease). Modify management plans to be more effective based on the results of monitoring.</li> <li>• Cooperate with the U.S. Fish and Wildlife Service and NOAA-Fisheries, as appropriate, to ensure that NPS actions comply with the Endangered Species Act.</li> <li>• Survey for, protect, and strive to recover all species native to the park that are listed under the Endangered Species Act.</li> <li>• Participate in the recovery planning process when appropriate.</li> <li>• Manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for listed species.</li> <li>• To the greatest extent possible, inventory, monitor, and manage state and locally listed species in a manner similar to federally listed species.</li> </ul>	

WATER RESOURCES	
Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	Source
Surface water and groundwater are protected and water quality meets or exceeds all applicable water quality standards.	Clean Water Act; Executive Order (EO) 11514 "Protection and Enhancement of Environmental Quality"; NPS <i>Management Policies 2006</i> ; NPS-77, "Natural Resources Management Guidelines"
NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.	Clean Water Act; EO 12088, "Federal Compliance with Pollution Control Standards"; Rivers and Harbors Act; NPS <i>Management Policies 2006</i> ; NPS-77, "Natural Resources Management Guidelines"
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to water resources:</p> <ul style="list-style-type: none"> <li>• Work with appropriate governmental bodies to obtain the highest possible water quality standards available under the Clean Water Act.</li> <li>• Cooperate with other government agencies to maintain and/or restore quality of park water resources.</li> <li>• Take all necessary actions to maintain or restore the quality of surface and groundwaters in the park consistent with the Clean Water Act.</li> <li>• Determine which methods can be used to ensure minimum flows under state and federal law.</li> <li>• Determine minimum flow needs to sustain aquatic life and provide recreational boating opportunities.</li> <li>• Investigate and monitor water quality including salinity and trace elements. Study the effects of the water quality on aquatic life.</li> <li>• Promote water conservation by the National Park Service, concessioners, park staff and visitors.</li> <li>• Apply best management practices to all pollution-generating activities and facilities in the park, such as NPS maintenance and storage facilities and parking areas.</li> <li>• Minimize the use of pesticides, fertilizers, and other chemicals and manage them in keeping with NPS policy and federal regulations.</li> <li>• Continue to work within the South Florida Ecosystem Task Force to address water resources facing the park.</li> <li>• Press for continued and expanded monitoring to fulfill the database requirement and thus reveal any unknown water quality problems.</li> <li>• Continue to monitor the effects of visitor use.</li> <li>• Continue to assess stormwater runoff.</li> <li>• Promote greater public understanding of water resource issues at park and encourage public support for and participation in protecting the watershed.</li> </ul>	

WETLANDS	
Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	Source
The natural and beneficial values of wetlands are preserved and enhanced.	Clean Water Act; EO 11990; "Protection of Wetlands"; NPS <i>Management Policies 2006</i> ; DO 77-1, "Wetland Protection"; Rivers and Harbors Act;
The National Park Service implements a "no net loss of wetlands" policy and strives to achieve a longer-term goal of net gain of wetlands across the national park system through the restoration of previously degraded wetlands.	DO 77-1, "Wetland Protection"; EO 11514 "Protection and Enhancement of Environmental Quality"
The National Park Service avoids to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and avoids direct or indirect support of new construction in wetlands wherever there is a practicable alternative.	EO 11990; "Protection of Wetlands"
The National Park Service compensates for remaining unavoidable adverse impacts on wetlands by restoring wetlands that have been previously degraded.	"Protecting America's Wetlands: A Fair, Flexible, and Effective Approach," White House Office on Environmental Policy, 1993; NPS 77-1, "Wetland Protection"
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to wetland resources:</p> <ul style="list-style-type: none"> <li>• All facilities would be located to avoid wetlands if feasible. If avoiding wetlands was not feasible, other actions would be taken to comply with Executive Order 11990 ("Protection of Wetlands"), the Clean Water Act, and Director's Order 77-1 ("Wetland Protection").</li> <li>• A statement of findings for wetlands will be prepared if the NPS actions would result in adverse impacts on wetlands. The statement of findings would include an analysis of the alternatives, delineation of the wetland, a wetland restoration plan to identify mitigation, and a wetland functional analysis of the impact site and restoration site.</li> <li>• Conduct or obtain parkwide wetland inventories to ensure proper planning, management, and protection of wetlands.</li> <li>• Enhance natural wetland values by using them for educational and scientific purposes that do not disrupt natural wetland functions.</li> <li>• If natural wetland functions have been degraded or lost due to human action, the National Park Service will work to restore wetlands to predisturbance conditions, to the extent practicable.</li> </ul>	

## Cultural Resource Management Requirements

ARCHEOLOGICAL RESOURCES	
Current laws and policies require that the following conditions be achieved in the parks:	
Desired Condition	Source
Archeological sites area identified and inventoried and their significance is determined and documented. Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. When disturbance or deterioration is unavoidable, the site is professionally documented and excavated and the resulting artifacts, materials, and records are curated and conserved in consultation with the Florida state historic preservation office (and American Indian tribes if applicable). Some archeological sites that can be adequately protected may be interpreted to the visitor.	National Historic Preservation Act; Archeological Resources Protection Act; the <i>Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i> ; programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (2008); NPS <i>Management Policies 2006</i> , DO 28 "Cultural Resource Management Guideline"
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to archeological sites:</p> <ul style="list-style-type: none"> <li>• Conduct a parkwide cultural resource inventory.</li> <li>• Survey and inventory archeological sites park wide, determine and document their significance. The most critical area for study is park land where development or visitor activity is planned.</li> <li>• Determine which archeological sites should be added to the Archeological Sites Management Information System (ASMIS) and nominated to the National Register of Historic Places.</li> <li>• Educate visitors on regulations governing archeological resources and their removal and transport.</li> <li>• Monitor archeological sites.</li> <li>• Treat all archeological resources as eligible for listing on the National Register of Historic Places pending a formal determination by the National Park Service, the state historic preservation office, and associated Indian tribes as to their significance.</li> <li>• Protect all archeological resources eligible for listing or listed on the National Register; if disturbance to such resources is unavoidable, conduct formal consultation with the Advisory Council on Historic Preservation, as appropriate, and the Florida state historic preservation office and Indian tribes in accordance with the National Historic Preservation Act and implementing regulations.</li> </ul>	

HISTORIC STRUCTURES	
Current laws and policies require that the following conditions be achieved for historic structures (e.g., buildings, structures, roads, and trails):	
Desired Condition	Source
Historic structures are inventoried and their significance and integrity are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures on the National Register are protected in accordance with the <i>Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i> (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).	National Historic Preservation Act; Archeological and Historic Preservation Act; the <i>Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i> ; <i>Secretary of the Interior's Standards for the Treatment of Historic Properties</i> ; programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (2008); <i>NPS Management Policies 2006</i> , DO 28 "Cultural Resource Management Guideline."
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to historic structures:</p> <ul style="list-style-type: none"> <li>• Update and certify the list of classified structures (LCS).</li> <li>• Determine the appropriate level of preservation for each historic structure formally determined to be eligible for listing or listed on the National Register of Historic Places (subject to the <i>Secretary of the Interior's Standards</i>).</li> <li>• Implement and maintain the appropriate level of preservation for such properties.</li> <li>• Analyze the design elements (e.g., materials, colors, shape, massing, scale, architectural details, and site details) of historic structures in the park (e.g., intersections, curbing, signs, and roads and trails) to guide the rehabilitation and maintenance of sites and structures.</li> <li>• Before modifying any historic structure on the National Register of Historic Places, the Park Service will consult with the state historic preservation officer and the Advisory Council for Historic Preservation, as appropriate.</li> <li>• Before modifying any structures associated with "Mission 66," the structures would be evaluated for listing on the National Register in consultation with the state historic preservation office.</li> <li>• Complete a survey, inventory, and evaluation of historic properties.</li> <li>• Submit the inventory and evaluation results to the state historic preservation officer for review and comment. Forward the final nomination to the Keeper of the National Register with recommendations for eligibility to the National Register.</li> <li>• Implement and maintain the appropriate level of preservation for such structures.</li> </ul>	

CULTURAL LANDSCAPES	
<p>According to the National Park Service's <i>Cultural Resource Management Guideline</i> (DO-28), a cultural landscape is</p> <p>a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.</p> <p>Current laws and policies require that the following conditions be achieved for cultural landscapes.</p>	
Desired Condition	Source
<p>Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the National Register and to assist in future management decisions for landscapes and associated resources, both cultural and natural.</p> <p>The management of cultural landscapes focuses on preserving the landscape's physical attributes, biotic systems, and use when that use contributes to its historical significance.</p> <p>The preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties with Guideline's for the Treatment of Cultural Landscapes</i>.</p>	<p>National Historic Preservation Act of 1966, as amended (16 USC 470); Advisory Council on Historic Preservation's implementing regulations regarding the "Protection of Historic Properties" (36 CFR 800); <i>Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> (1996); National Park Service's <i>Management Policies</i> (2006); National Park Service's <i>Cultural Resources Management Guideline</i> (DO-28, 1996)</p>
Actions	
<p>To accomplish the above goals, the National Park Service will do the following:</p> <ul style="list-style-type: none"> <li>• Complete a survey, inventory, and evaluation of landscapes under National Register criteria.</li> <li>• Complete a survey, inventory, and evaluation of cultural landscapes.</li> <li>• Submit the inventory and evaluation results to the state or tribal historic preservation officer for review and comment; forward final nomination form to the Keeper of the National Register with recommendations for eligibility to the National Register.</li> <li>• Determine the appropriate level of preservation for each landscape formally determined to be eligible for listing or actually listed on the National Register, subject to the <i>Secretary of the Interior's Standards</i>.</li> <li>• Implement and maintain the appropriate level of preservation for such resources.</li> </ul>	



## Visitor Use And Experience and Park Use Requirements

VISITOR USE AND EXPERIENCE AND PARK USE REQUIREMENTS	
Current laws, regulations, and policies leave considerable room for judgment about the best mix of types and levels of visitor use activities, programs, and facilities. For this reason, most decisions related to visitor experience and use are addressed in the alternatives. However, all visitor use of national park system units must be consistent with the following guidelines.	
Desired Condition	Source
Park resources are conserved “unimpaired” for the enjoyment of future generations. Visitors have opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the park. No activities occur that would cause derogation of the values and purposes for which the park has been established.	NPS Organic Act, National Park System General Authorities Act, NPS <i>Management Policies 2006</i>
For all zones, districts, or other logical management divisions within a national park system unit, the types and levels of visitor use are consistent with the desired resource and visitor experience conditions prescribed for those areas.	National Park System General Authorities Act, NPS <i>Management Policies 2006</i>
Park visitors will have opportunities to understand and appreciate the significance of the park and its resources, and to develop a personal stewardship ethic.	NPS <i>Management Policies 2006</i>
To the extent feasible, programs, services, and facilities in the park are accessible to and usable by all people, including those with disabilities.	Architectural Barriers Act of 1968; Americans with Disabilities Act of 1990; 28CFR36, “Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities” (ADAAG-ADA <i>Accessibility Guidelines for Buildings and Facilities</i> ); Uniform Federal Accessibility Standards of 1984 (UFAS); U.S. Access Board Draft Accessibility Guidelines for Outdoor Developed Areas of 1999; NPS <i>Management Policies 2006</i> ; DO-42, <i>Accessibility for Visitors with Disabilities in NPS Programs, Facilities, and Services</i> ; Rehabilitation Act of 1973; Secretary of the Interior’s regulation 43CFR17, <i>Enforcement on the Basis of Disability in Interior Programs</i> ;
For all zones, districts, or other logical management divisions in a park, superintendents will identify carrying capacities for managing public use. Superintendents will also identify ways to monitor for, and address, unacceptable impact on park resources and visitor experiences.	1978 National Parks and Recreation Act (PL 95-625), NPS <i>Management Policies 2006</i>
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to visitor understanding and use of the park:</p> <ul style="list-style-type: none"> <li>• Park staff will continue to monitor visitor comments on issues such as crowding, encounters with other visitors in the backcountry, availability of campsites at busy times of the year, availability of parking and visitor encounters with bears. Should bear encounters increase to a level unacceptable to the park, actions such as seasonal closures, moving trails, reduction of visitor numbers in the area and increased education would be taken.</li> <li>• Conduct periodic visitor surveys to stay informed of changing visitor demographics and desires to better tailor programs to visitor needs and desires.</li> </ul>	

COMMERCIAL SERVICES	
<p>Commercial services are another way of providing for the visitor use and experience and park use requirements already described. Commercial operators are "partners" with the National Park Service to provide goods and services to visitors that are necessary and appropriate but not provided by NPS personnel. The Park Service manages commercial service levels and types to achieve the same resource protection and visitor experience conditions required by the NPS Organic Act, General Authorities Act, management policies, and other regulations and policies. In addition, commercial services must comply with the provisions of the NPS Concessions Management Improvement Act of 1998. By law, all commercial activities in national park system units must be authorized in writing by the superintendent. A commercial activity is defined as any activity for which compensation is exchanged. It includes activities by for-profit and nonprofit operators. Commercial services are more than just concessions. They include concession contracts, commercial use authorizations, leases, cooperative agreements, rights of way, and special use permits. All commercial services must be managed. All commercial services must be necessary and/or appropriate by achieving the resource protection and visitor use goals for the park unit.</p>	
Desired Condition	Source
Same as Visitor Use and Experience and Park Use Requirements (above)	Same as Visitor Use and Experience and Park Use Requirements
All commercial services must be authorized, must be necessary and/or appropriate, and must be economically feasible. Appropriate planning must be done to support commercial services authorization.	NPS Concessions Management Improvement Act of 1998
Actions	
<p>The National Park Service will take the following kinds of actions to meet legal and policy requirements related to commercial services:</p> <ul style="list-style-type: none"> <li>• Establish and document that all commercial services in the park unit are necessary and/or appropriate before they are proposed or reauthorized.</li> <li>• Ensure that all necessary and/or appropriate commercial activities in the park unit are authorized in writing by the superintendent.</li> <li>• Stop all unauthorized commercial activities in the park unit.</li> <li>• Use the most appropriate authorization tool (concession contracts, commercial use authorizations, leases, cooperative agreements, rights of way, and special use permits) to manage the commercial services program effectively and efficiently.</li> <li>• Ensure that all commercial activities in the park unit provide high-quality visitor experiences while protecting important natural, cultural, and scenic resources.</li> <li>• Ensure that new or modified concessions are economically feasible and that the operator has a reasonable opportunity to make a profit before they are proposed in a planning document.</li> <li>• Establish levels of commercial use that are consistent with resource protection and visitor experience goals for the park unit and do not unduly interfere with the independent visitor's ability to participate in the same activity.</li> <li>• Ensure that all commercial services are safe and sustainable.</li> <li>• Authorize only those commercial services that are not or cannot be made available within a reasonable distance outside the park unit.</li> <li>• Prepare a commercial services plan if necessary to describe in detail the actions required to achieve commercial services and related visitor experience goals.</li> </ul>	

SUSTAINABLE DESIGN/DEVELOPMENT	
Sustainability can be described as the result achieved by managing units of the national park system in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the short- and long-term environmental impacts of developments and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques.	
Desired Condition	Source
NPS and concessioner visitor management facilities are harmonious with park resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective.	NPS <i>Management Policies</i> 2006; EO 13123, "Greening the Government through Efficient Energy Management"; EO 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition"; NPS <i>Guiding Principles of Sustainable Design</i> ; DO 13, "Environmental Leadership"; DO 90, "Value Analysis."
All decisions regarding park operations, facilities management, and development in the park—from the initial concept through design and construction—reflect principles of resource conservation. Thus, all park developments and park operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the <i>Guiding Principles of Sustainable Design</i> (NPS 1993) or other similar guidelines.	"Greening Federal Facilities: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers," 2 <sup>nd</sup> ed.
Management decision making and activities throughout the national park system should use value analysis, which is mandatory for all Department of the Interior bureaus, to help achieve this goal. Value planning, which may be used interchangeably with value analysis/value engineering/value management, is most often used when value methods are applied on general management or similar planning activities.	Director's Order #90 "Value Analysis"
Actions	
<p>The NPS <i>Guiding Principles of Sustainable Design</i> (1993b) directs NPS management philosophy. It provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used in the design and management of tourist facilities that emphasize environmental sensitivity in construction, the use of nontoxic materials, resource conservation, recycling, and integrating visitors with natural and cultural settings. Sustainability principles have been developed and are followed for interpretation, natural resources, cultural resources, site design, building design, energy management, water supply, waste prevention, and facility maintenance and operations. The Park Service also reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems emphasizing the use of renewable energy sources.</p> <p>In addition to following these principles, the following also will be accomplished:</p> <ul style="list-style-type: none"> <li>• Have NPS staff work with appropriate experts to make park facilities and programs sustainable. Perform value analysis and value engineering, including life cycle cost analysis, to examine the energy, environmental, and economic implications of proposed developments.</li> <li>• Support and encourage suppliers, permittees, and contractors to follow sustainable practices.</li> <li>• Address sustainable practices within and outside the national park in interpretive programs.</li> <li>• Promote the reduction, reuse, and recycling of materials; support the rehabilitation (recycling) of existing buildings and facilities over new construction; require new developments or modifications of existing facilities to be built using NPS sustainability guidelines.</li> <li>• The park has state-of-the-art water systems for conserving water, and energy conservation technologies and renewable energy sources whenever possible. Biodegradable, nontoxic, and durable materials are used in the park whenever possible. Park personnel promote the reduction, use, and recycling of materials and avoid as</li> </ul>	

much as possible materials that are nondurable or environmentally detrimental or that require transportation from great distances.

- Promote and encourage modes of transportation other than the single-occupancy vehicle.
- Promote land use planning for transportation that can efficiently meet human needs and can be responsibly planned to conserve the finite resources.
- Implement the NPS Climate Change Response Strategy.
- Explore and establish sustainable practices for NPS operations within the park. Explore use of low-emission vehicles and biofuels for NPS operations. Encourage partners and concessioners to provide services and products that are consistent with departmental and NPS guidance on sustainable operations.

## Climate Change

CLIMATE CHANGE	
<p>Climate change is expected to affect the park's weather, resources (e.g., shorelines, vegetation, fish and wildlife, coral reefs, and submerged cultural resources), facilities (e.g., docks and roads), and visitors (e.g., seasonal use patterns, boating and fishing, and other visitor opportunities such as diving). These changes will have direct implications on resource management and park operations, and on the way visitors use and experience the park. Although climate change is expected to affect the park during the life of this plan, many of the specific effects, the rate of changes, and the severity of impacts are not known.</p>	
Desired Condition	Source
<p>Biscayne National Park is a leader in its efforts to address climate change by reducing the contribution of NPS operations and visitor activities to climate change; preparing for and adapting to climate change impacts; and increasing its use of renewable energy and other sustainable practices. NPS staff proactively monitor and mitigate the climate change impacts on cultural and natural resources and visitor amenities. The park provides refugia for marine and terrestrial species to increase their resilience to climate change. Education and interpretive programs help visitors understand climate change impacts in the park and beyond, and how they can respond to climate change. Partnerships with various agencies and institutions allow NPS staff to participate in research on climate change impacts.</p>	<p>NPS Organic Act; Executive Order 13423 (includes requirements for the reduction of greenhouse gases and other energy and water conservation measures); Department of the Interior Secretarial Order 3226 (ensures that climate change impacts be taken into account in connection with departmental planning and decision making); NPS <i>Management Policies 2006</i> (including sections on environmental leadership [1.8], sustainable energy design [9.1.1.6], and energy management [9.1.7]); NPS Environmental Quality Division's "Draft Interim Guidance: Considering Climate Change in NEPA Analysis"</p>
Actions	
<ul style="list-style-type: none"> <li>Identify key natural and cultural resources and visitor amenities that are at risk from climate change. Establish baseline resource conditions, identify thresholds, and monitor for change. Identify key resources in various management zones/areas (e.g., coral reefs, submerged cultural resources, important fisheries, seagrass and mangrove communities, and NPS operations) that may require different management responses to climate change impacts.</li> <li>Form partnerships with other resource management entities, including nearby national parks in South Florida, to maintain regional habitat connectivity and protected areas (refugia) that allow species dependent on park resources to better adapt to changing conditions. NPS staff would also participate with partners to research climate change impacts.</li> <li>Restore key ecosystem features and processes, and protect key cultural resources to increase their resiliency to climate change (e.g., coral reef protection, sea wall construction, building stabilization). By reducing other types of impacts on resources, the overall condition of the resources will improve and they will more easily recover from or resist the impacts of climate change.</li> <li>Use the dynamic environment of the southern Florida ecosystem as a teaching opportunity about climate change. Educate visitors about climate change and research efforts, and climate change impacts on the resources they are enjoying. Reach out to all sectors of the large and diverse visitor population, and inspire visitors to action through leadership and education.</li> <li>Implement the NPS Climate Change Response Strategy.</li> <li></li> </ul>	

## APPENDIX C: DETERMINATION OF IMPAIRMENT

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the environmental impact statement for the preferred alternative. The description of park significance in chapter 1 was used as a basis for determining if a resource is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment findings are not necessary for visitor experience, socioeconomics, public health and safety, environmental justice, land use, and park operations, etc., because impairment findings relate back to park resources and values. These impact areas are not generally considered to be park resources or values according to the Organic Act, and cannot be impaired the same way that an action can impair park resources and values.

### NATURAL RESOURCE TOPICS

#### Fisheries

The park provides habitat for many species of fish such as bonefish, snook, tarpon, permit, pink shrimp, spotted sea trout, oysters, clams, blue and stone crabs, bait fishes; and numerous coral reef fishes including snappers, groupers, grunts, barracuda, spadefish, spiny lobster, parrotfish, surgeonfish, and triggerfish. There are more than 325 fish and marine macroinvertebrate species in the park. The maintenance of healthy fish populations and fish habitat is important to the ecology of Biscayne Bay as well as the recreating public.

Healthy fish populations are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. The actions in the preferred alternative would have only beneficial impacts because of the additional protective measures including Non-Combustion Engine Use Zones and a no-take Marine Reserve Zone. These measures would reduce the taking of live fish and provide less disturbance of some habitat in the bay used for cover by young fish or for breeding. Because of these beneficial effects, the preferred alternative would not result in impairment.

#### Federal Special Status Species

The Endangered Species Act requires federal agencies to ensure that their activities would not jeopardize existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries identified a number of federal threatened, endangered, or species of concern that warrants the inclusion of this topic in this *General Management Plan / Environmental Impact Statement*. Some species on this list were dismissed from detailed analysis because they do not exist in the park or would not be affected by any proposed actions. Those that are retained for further analysis are the West India manatee, several sea turtle species, the American crocodile, and the Schaus swallow-tail butterfly. Implementing alternative 4, the preferred alternative, would result in a beneficial impact on manatees and may affect, but is unlikely to adversely affect, other listed species in the park.

Viable populations of special status species are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. The actions in the preferred alternative would have only

beneficial impacts because of additional protective measures including Slow Speed Zones, Non-combustion Engine Use Zones, and a no-take Marine Reserve Zone. Habitat disturbance, the number of collisions with boats, and the taking of sea life would be reduced in these zones. Because of these beneficial effects, the preferred alternative would not result in impairment.

### **State Listed Species**

A list of state listed special status species was obtained from the Florida Fish and Wildlife Conservation Commission. Some species on this list were dismissed from detailed analysis because they do not exist in the park or would not be affected by any proposed actions. Those that are retained for further analysis are the bald eagle and Miami blue butterfly. These species can be found on some of the keys in the park.

Viable populations of rare native species are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. Actions in the preferred alternative would have negligible adverse effects on bald eagles and Miami blue butterflies because additional disturbance could result from the slightly increased development and visitor use of Elliott Key. These actions would not be likely to lead to federal listing. Because these actions would only cause slight adverse effects on these species, the preferred alternative would not result in impairment.

### **Terrestrial Vegetation**

In the park, the keys are composed of limestone outcroppings that support tropical hardwood hammocks. Hammocks are evergreen, broad-leaved forest composed predominately of trees common to the Bahamas and Greater Antilles. The canopy is typically 29–39 feet (9–12 meters) tall with gumbo limbo, pigeon plum, wild tamarind, willow bustic, Jamaica dogwood, mastic, and strangler fig as common trees. The subcanopy contains white stopper, Spanish stopper,

crabwood, torchwood, wild coffee, and marlberry. Hammocks are typically abundant with epiphytic plants, including orchids, bromeliads, and ferns. A mature hammock has relatively open understory. As the elevation slopes towards sea level, halophytic (salt-tolerant) plants such as buttonwoods become more dominant.

Healthy native terrestrial vegetation is necessary to fulfill the purposes for which the park was established and is key to the natural integrity and enjoyment of the park. The preferred alternative would result in adverse impacts from increased visitation and trail development that could include increased trampling and small loss of vegetation (less than 1 acre). Because there would be only slight adverse impacts, the preferred alternative would not result in impairment.

### **Submerged Aquatic Communities**

The park encompasses a mosaic of submerged aquatic communities, including seagrasses, hardbottom, barebottom, and coral reef. The combination of these communities makes the area ecologically rich and biologically diverse. The seagrass beds or meadows in Biscayne Bay cover about 72,000 acres, or about 42% of the park area. The seagrass beds provide shelter from predators, breeding and nursery areas for many fish, and forage for other species such as the manatee. The beds also absorb nutrients from coastal and estuarine systems, stabilize substrates, and minimize the effects of wave action.

Healthy marine communities are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. The actions in the preferred alternative would have only beneficial impacts because of additional protective measures including Slow-Speed Zones, Noncombustion Engine Use Zones, and a no-anchoring Marine Reserve Zone. These measures would reduce the current level of disturbance and allow restoration of some submerged aquatic communities. Because of these beneficial

effects, the preferred alternative would not result in impairment.

## **Wetlands**

Wetlands are found along the coast of the mainland and the fringes of the keys and are an important ecosystem. Wetlands provide natural filtration of waters as they enter the park and habitat for a variety of aquatic and terrestrial species. Historically, the mainland coast of southern Florida was predominantly wetlands. Changes in land use and modifications to natural drainage patterns have dramatically reduced the amount of wetlands in the region. The wetlands in the park are predominately mangrove forest. The vegetation is a combination of buttonwood and red, white, and black mangroves.

Maintenance of some of the native coastal wetlands is necessary to fulfill the purposes for which the park was established and is key to the natural integrity of the park. Actions in the preferred alternative include construction of a boardwalk and viewing platform on Convoy Point that would cause both short-term and long-term adverse impacts on the mangroves along the mainland shoreline of the park. These impacts would be localized and only expected to affect 2 acres or less of mangroves. The long-term impacts would be mitigated through sustainable design. Because there would be only minor adverse impacts on wetlands, the preferred alternative would not result in impairment.

## **Soundscape Management**

Biscayne National Park offers some of the best places to hear natural sounds, including the calls of wildlife and the melodies of wind and water that together form a rich natural resource that is important to the park's ecological communities. Today, these natural ambient sounds, which are sometimes referred to as natural quiet, are threatened as human-produced noises increasingly intrude into even the most remote corners of the park.

Natural soundscapes in remote areas of the park are necessary to fulfill the purposes for which the park was established, and are key to the natural integrity of the park. The actions in the preferred alternative would have only beneficial impacts on soundscapes because the Slow-Speed Zones and Non-Combustion Engine Use Zones would reduce the level of noise currently caused by high-speed boat motors. Because of these beneficial effects, the preferred alternative would not result in impairment.

## **CULTURAL RESOURCE TOPICS**

### **Archeological Resources**

Biscayne National Park's cultural resources are rich with examples of the international maritime heritage that has shaped the history of southeast Florida and the Caribbean region. Because of environmental conditions in southern Florida, little cultural evidence — other than lithic tools and the sites where they were manufactured — survives to illustrate the Paleoindian period. Archaic sites in Florida are found in the interior highlands; St. Johns River valley; the Everglades; and along the Atlantic, southwest, and panhandle coasts as well as the Gulf Coast near Tampa. The rise in sea levels undoubtedly flooded coastal sites in South Florida's lowland areas and shorelines that had been inhabited during the first 5,500 years of the Archaic period. Thus, it is likely that Archaic period sites not in upland areas are now submerged possibly within Biscayne Bay. Archeological evidence of the Glades periods includes a variety of lithic tools and ornaments that indicate that the peoples living along the southeast Florida coast had developed a thriving trade network. Glades Period sites are present in Biscayne National Park, some of which are potentially eligible for listing in the National Register of Historic Places.

Shipwreck sites and other material remains of maritime casualties are now preserved as submerged archeological sites in the park, and some are listed on the National Register of Historic Places.



Archeological resources are necessary to fulfill the purposes for which the park was established and are key to the cultural integrity of the park. The actions in the preferred alternative would have no moderate to major adverse effects to archeological resources (no adverse effect) because increased management focus on archeological resources would result in more protection efforts and positive public stewardship. Because there would be no moderate to major adverse effects to archeological resources and no adverse effects, the preferred alternative would not result in impairment.

### Historic Structures

Biscayne National Park's "Historic Resource Study" generated a List of Classified Structures. This list, compiled in 1997, identified 11 historic structures, 10 of which are contributing resources in the Boca Chita Key Historic District. The district's 10 structures, which represent typical resort architecture for the Miami area in the 1930s, include a lighthouse, chapel, picnic pavilion, garage/barn, engine house and cistern, bridge, cannon, stone walls, canal, retaining walls, and concrete walkway.

Historic structures are necessary to fulfill the purposes for which the park was established and are key to the cultural integrity of the park. The actions in the preferred alternative (rehabilitated, preserved, and adaptively reused structures) would result in impacts on historic structures and buildings that would be localized and long-term to permanent, and there would be no moderate to major adverse impacts. Because there would be no adverse effects on historic structures under Section 106, the preferred alternative would not result in impairment.

### Cultural Landscapes

Biscayne National Park's "Historic Resource Study" (1998) evaluated the park's cultural resources within five historic contexts — aboriginal populations and European-American exploration (1513–1859); the wrecking industry (1513–1921); American settlement on the keys (1822–65); agriculture on the keys (1860–1926); and recreational development of Miami and Biscayne Bay (1896–1945). One cultural landscape, the Boca Chita Historic District, has been officially documented (Jaeger Co. 2010), and the potential remains for identification of additional cultural landscapes reflective of each of the historic contexts identified in the 1998 report, as well as for an overarching maritime cultural landscape."

Under the preferred alternative, the existing and potential landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria, and the National Park Service would implement resource management policies that preserve the natural resource values and culturally significant character-defining patterns and features of listed, or determined eligible, landscapes. Some slight impacts from visitation could occur if visitation to cultural landscapes were to increase. Because of protective efforts, the preferred alternative would not result in impairment.

### SUMMARY

As described above, adverse impacts anticipated as a result of implementing the preferred alternative on a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or identified as significant in the park's general management plan or other relevant NPS planning documents, would not rise to levels that would constitute impairment.

## APPENDIX D: CONSULTATION LETTERS



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Southeast Regional Office  
9721 Executive Center Drive North  
St. Petersburg, FL 33702  
(727) 570-5312, FAX 570-5517

OCT 31 2000

F/SEF3:EGH

Mr. Patrick Kenney  
National Park Service  
Denver Service Center  
12795 W. Alameda Parkway  
Denver, CO 80225-0287

Dear Mr. Kenney:

This responds to your October 2, 2000, letter concerning Biscayne National Park General Management Plan. You have requested section 7 consultation pursuant to the Endangered Species Act of 1973.

Enclosed is a list of Federally protected species under the jurisdiction of the National Marine Fisheries Service for the state of Florida.

If you have any questions, please contact Eric Hawk, fishery biologist, at the number listed above, or by email at [Eric.hawk@noaa.gov](mailto:Eric.hawk@noaa.gov).

Sincerely,

Charles A. Oravetz  
Assistant Regional Administrator  
for Protected Resources

Enclosure

cc: F/PR3  
o:\section7\informal\biscayne.nps  
File: 1514-22. O.4.a



**Endangered and Threatened Species and Critical Habitats  
under the Jurisdiction of the National Marine Fisheries Service**

**Florida - Atlantic Coast**

Listed Species	Scientific Name	Status	Date Listed
<b>Marine Mammals</b>			
blue whale	<i>Balaenoptera musculus</i>	Endangered	2/02/70
finback whale	<i>Balaenoptera physalus</i>	Endangered	2/02/70
humpback whale	<i>Megaptera novaeangliae</i>	Endangered	2/02/70
right whale	<i>Eubalaena glacialis</i>	Endangered	2/02/70
sei whale	<i>Balaenoptera borealis</i>	Endangered	2/02/70
sperm whale	<i>Physeter macrocephalus</i>	Endangered	2/02/70
<b>Turtles</b>			
green sea turtle	<i>Chelonia mydas</i>	Endangered <sup>1</sup>	07/28/78
leatherback sea turtle	<i>Eretmochelys imbricata</i>	Endangered	00/02/70
Kemp's ridley sea turtle	<i>Lepidochelys kempi</i>	Endangered	2/02/70
loggerhead sea turtle	<i>Dermodochelys coriacea</i>	Endangered	06/02/70
spiny-tailed sea turtle	<i>Caretta caretta</i>	Threatened	07/28/78
<b>Fish</b>			
shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	03/11/67
<b>Seagrasses</b>			
Johnson's seagrass	<i>Halophila johnsonii</i>	Threatened	09/14/98

**Species Proposed for Listing**  
None

**Designated Critical Habitat**

**Right whale:** Between 31°15'N (approximately the mouth of the Altamaha River, Georgia) and 30°15'N (approximately Jacksonville, Florida) from the coast out to 15 nautical miles offshore; the coastal waters between 30°15'N and 28°00'N (approximately Sebastian Inlet, Florida) from the coast out to 5 nautical miles.

**Proposed Critical Habitat**

None

Candidate Species <sup>1</sup>	Scientific Name
<b>Fish</b>	
dusky shark	<i>Carcharhinus obscurus</i>
sand tiger shark	<i>Odontaspis taurus</i>
night shark	<i>Carcharinus signatus</i>
speckled hind	<i>Epinephelus drummondhayi</i>
Atlantic sturgeon	<i>Acipenser oxyrinchus oxyrinchus</i>
mangrove rivulus	<i>Rivulus marmoratus</i>
coosum pipefish	<i>Microphis brachyurus lineatus</i>
Key silverside	<i>Menidia menidia</i>
jowfish	<i>Epinephelus itajara</i>
Warsaw grouper	<i>Epinephelus nigritus</i>
Nassau grouper	<i>Epinephelus striatus</i>

<sup>1</sup> . Candidate species are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

<sup>1</sup> Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

## FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION



JAMES L. "JAMIE" ADAMS, JR.  
Buckholz

BARBARA C. BARKH  
Jacksonville

QUINTON L. HEDGEPETH, DDS  
Miami

H.A. "HERKY" HUFFMAN  
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DAVID K. MEEHAN  
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JULIE K. MORRIS  
Sarasota

TONY MOSS  
Miami

EDWIN A. ROBERTS, DC  
Pensacola

JOHN D. BOOD  
Jacksonville

WILLIAM L. ROBERT, Ph.D., Executive Director  
VICTOR J. HELLER, Assistant Executive Director

OFFICE OF ENVIRONMENTAL SERVICES  
BRADLEY A. HARTMAN, DIRECTOR  
(850) 488-6661 TDD (850) 488-4342  
FAX (850) 922-0679

October 20, 2000

Patrick Kenney  
National Park Service  
12795 W. Alameda Parkway  
P.O. Box 25287  
Denver, Colorado 80221-0287

Dear Mr. Kenney:

This letter is in response to your request for information on listed species and critical habitats found within Biscayne National Park. Several species and their associated habitats were found within the park boundaries using various data sources. Potential habitat maps, Strategic Habitat Conservation Area (SHCA) maps, and point location data was examined for occurrences within the park.

Potential habitat for federally listed species (endangered and threatened) and state listed species (threatened and species of special concern) was found within the park. These species include: crocodile, alligator, indigo snake, brown pelican and white-crowned pigeon. Priority wetlands for the species listed above, excluding the indigo snake, were also within the park. Occurrence records indicated the following state or federally listed species have been located within the park: little blue heron, tri-colored heron, snowy egret, white ibis, Florida tree snail, and Schaus swallowtail.

I hope this information is helpful. If you have any further questions, feel free to contact me at (850) 488-6661.

Sincerely,

*Beth Stys*  
Beth Stys

BS  
ENV 8-7.8

## **APPENDIX E: PURPOSE AND AUTHORITY FOR MARINE RESERVE ZONES**

### **Purpose and Need**

The purpose of the proposed marine reserve zones is to provide snorkelers and divers with the opportunity to experience a healthy, natural coral reef, with larger and more numerous tropical reef fish and an ecologically intact reef system, while not being so large as to completely eliminate the opportunities for fishing any of the park's reef areas. Visitors to parks in the American West expect to see large healthy trees such as sequoias and redwoods, and large healthy diverse populations of big mammals such as bison and elk. Similarly, visitors to the largest marine park in the national park system expect to see healthy coral reefs teeming with diverse communities of large, healthy fish.

To accomplish this, the park has established objectives of larger, healthier, diverse corals and larger number and diversity of fish. Coral reef areas that are unfished would provide an opportunity for fish to obtain larger sizes and consequently have greater reproductive success; unfished areas would also benefit from intact ecological communities and a reduction of fishing gear impacts to organisms and benthic habitats. Therefore a no-take marine reserve zone would be expected to provide improved visitor experience for divers and snorkelers. The portion of the park's coral reef protected in this zone would contribute towards the Coral Reef Task Force's goal of 20% of the reefs in Florida being included in marine reserves (U.S. Coral Reef Task Force 2000).

The marine reserve zones proposed in this plan are large enough to accommodate many dive sites with enough mooring buoys that would not only protect reefs from anchor damage but also provide an uncrowded snorkel or dive experience. The park would have the ability to move mooring buoys to other equally suitable locations should reef monitoring indicate that specific sites are being impacted at an unacceptable level. Many locations for reef fishing opportunities will remain in the park outside of the marine reserve zones.

### **Authority**

Recreational fishing is allowed in parks when not specifically prohibited by a federal law. Commercial fishing is allowed only when specifically authorized by federal law or treaty right (NPS Management Policies 2006).

Section 3 of the law establishing Biscayne National Monument in 1968 (Public Law 90-606) states

The waters within Biscayne National Monument shall continue to be open to fishing in conformity with the laws of the State of Florida except as the Secretary [of the Interior], after consultation with appropriate officials of said State, designates species for which, areas and times within which, and methods by which fishing is prohibited, limited, or otherwise regulated in the interest of sound conservation to achieve the purposes for which the national monument is established.

Section 103(a) of Public Law 96-287 (June 28, 1980), which established Biscayne National Park and added areas to the park north of Boca Chita Key, reiterated much the same language regarding fishing as in the legislation that established Biscayne as a national monument in 1968 but added the following:

*Provided*, That with respect to lands donated by the State after the effective date of this Act, fishing shall be in conformance with State law.

These passages allow the Secretary of the Interior (through his delegates) to prohibit or limit fishing in areas within the boundaries of the original national monument for reasons of conservation, visitor experience, or to achieve the purposes for which the park is established. Biscayne National Park's purpose is to preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty. Fishing in areas of the national park that were added later outside the original monument boundary is governed by the laws and regulations of the State of Florida.

The National Park Service can close areas or otherwise regulate specific uses through special regulations published in the Code of Federal Regulations 36 (36 CFR) when necessary for safety or resource protection. Implementing the Marine Reserve Zone would restrict uses of these areas and so would require special regulations under section 1.5 of 36 CFR.

### **Zone Locations**

Locations of the proposed marine reserve zones were developed following mapping workshops held with the public in 2009 and a science review meeting held shortly after. The size and location of the zone proposed in alternatives 3 and 4 are the same, while the proposed zone in alternative 5 is larger and extends to the eastern shore of Elliott Key (see alternative maps in Chapter 2 of the general management plan). These areas were selected, in part, because they include a variety of reef types for visitors to experience, existing markers that could serve as boundary markers, living coral cover, documented fish use by targeted fish species, and some of the Maritime Heritage Trail shipwrecks that visitors enjoy snorkeling and diving on. In all three alternatives, the proposed marine reserve zone is in the original national monument boundary.

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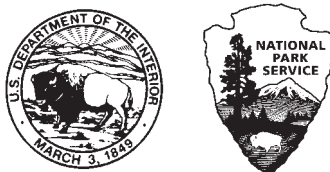
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