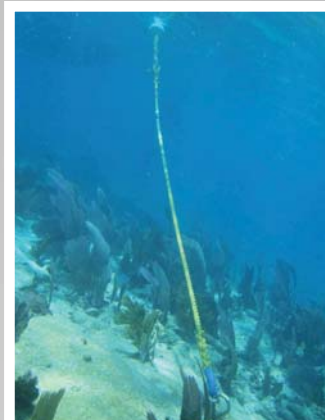




## Mooring Buoy and Marker Plan Environmental Assessment

July 2010



COVER PHOTOS:

Background – visitor boat at mooring buoy on Atlantic reef tract in Biscayne National Park

Upper left – shallow water warning marker in Biscayne National Park

Upper center – Florida manatee in Biscayne National Park

Upper right – mooring buoy pin and line on Atlantic reef tract in Biscayne National Park

Bottom – seagrass propeller scarring in Biscayne National Park

## EXECUTIVE SUMMARY

Biscayne National Park (BISC), located in Homestead, Florida, is one of the largest marine parks in the National Park System. Nearly 95 percent of the park's 173,000 acres are covered by water. Currently, an average of more than 500,000 people visit the park annually (NPS 2010b) with 90 percent of visitors on boats (NPS 2010a). The park preserves a unique, sensitive marine environment that is an important component of the South Florida ecosystem and tourist economy (Ault *et al.* 2001, Stynes and Sun 2003).

The National Park Service (NPS) proposes a plan for the long-term management of the park's mooring buoy and marker system. The plan includes a defined management framework for decision making, including monitoring and adaptive management, and site-specific actions to address immediate needs. Elements that would be managed under the framework include mooring buoys and navigational, informational, and regulatory markers. The purpose of the proposed action is to reduce damage to park resources, enhance visitor opportunities, increase safety of navigation in the park, and improve the effectiveness of park operations.

Two alternatives were analyzed for meeting the general objectives of the plan:

**Alternative A, the No Action Alternative.** This alternative would continue current management of the park's mooring buoy and marker system, with no changes to the existing network of mooring buoys and markers. Maintenance of the existing mooring buoys and markers would continue using a system in which no comprehensive or parkwide schedule has been established to ensure that buoys and markers are routinely maintained or replaced. Visitor access to mooring buoys and the associated experience of park resources would not be changed. There would be no change to existing navigational, informational, or regulatory markings in the park.

**Alternative B, Adaptive Management, the Preferred Alternative.** This alternative would implement a defined management strategy and an adaptive management approach to the park's installation, placement, and maintenance of buoys and markers. The plan would use siting criteria, monitoring data, and a set of management tools to identify appropriate locations and types of mooring buoys and markers to meet plan objectives. The plan includes actions to address immediate needs within the park to protect resources, reduce visitor crowding, and improve safety of navigation. The plan would also formalize a new visitor experience in the park, the Maritime Heritage Trail.

Neither of the alternatives analyzed in this EA would result in major environmental impacts or impairment to park resources or values.

### Public Review and Comment

This draft EA will be available for public review for **30** days. If you wish to comment, you are encouraged to submit your comments directly on the NPS Planning, Environment, and Public Comment (PEPC) website. The other option is to mail comments to the name and address provided below.

Please **e-mail comments** through the NPS PEPC planning website: <http://parkplanning.nps.gov/bisc>, and follow the links for the Mooring Buoy and Marker EA. The "Open for Public Comment" link on the left column provides access to the draft EA.

Copies of the draft Mooring Buoy and Marker EA will also be available for review at public libraries throughout South Florida.

Go to the "Document List" link on the left hand column of the NPS PEPC planning website to find a listing of the libraries.

Please **mail written comments** to:

Biscayne National Park  
ATTN: Mooring Buoy and Marker EA Comments  
9700 SW 328 Street  
Homestead, FL 33033

Before including your address, phone number, e-mail address, or other personal identifying information in your comments, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While 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.

The NPS will hold a series of public workshops to present information about the Mooring Buoy and Marker EA and solicit public comment. The workshop will include a presentation by Biscayne National Park staff. Before and after the presentation, the public will be able to view informational displays, meet with park staff, and provide comments.



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## CHAPTER 1: PURPOSE AND NEED

The National Park Service (NPS) proposes to implement a decision-making framework and plan for the installation of mooring buoys and navigational, informational, and regulatory markers at Biscayne National Park, Miami-Dade County, Florida. Henceforth, the term “markers” may be considered synonymous with “navigational, informational, and/or regulatory markers.” This action is needed because the number of mooring buoys and markers, as well as the current condition and maintenance of the park’s buoys and markers is inadequate, resulting in decreased safety, diminished visitor experience, and damage to park resources.

There is a need for a framework for decision making in the park for establishing mooring buoys and markers to protect park resources and visitors that would allow for determination of immediate and future site specific actions that are required for the protection of resources. This framework would allow the park to consistently evaluate and reevaluate where and what actions need to occur to enhance or modify the buoy and marker system to protect resources while continuing to allow for visitor experience and appreciation in a safe manner.

Implementation of the buoy and marker system in the park is needed for the following:

- To develop criteria and standards for establishing future mooring sites and installing navigational, informational, and regulatory markers.
- To define desired conditions for mooring sites and markers in the park.
- The current buoy and marker system is not adequate to protect sensitive natural and cultural resources.
- The current buoy and marker system does not adequately provide a variety of sustainable visitor experiences near these resources.
- There are currently not enough buoys in place to support visitor experiences near interesting natural and cultural resources.
- Markers are needed to prevent boater entrance to shallow waters or running aground, and to protect public safety.
- Markers are needed for clear demarcation and notification of restrictions and closures.
- There is a need for enhanced boating visitor education through communication and information that increases visitors’ understanding of appropriate boating behavior while on the water in a national park setting.
- There are a few areas in the park where boating visitors are concentrated in a confined area, which results in resource damage, visitor conflicts, and unsafe conditions for visitors.

The purpose of this project is to increase marine resource protection, enhance visitor appreciation of submerged natural and cultural resources, and better protect health and human safety, through buoys, aids to navigation, and informational signs.

An environmental assessment (EA) analyzes the proposed action and alternatives and their impacts on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9).

## **PARK DESCRIPTION**

Biscayne National Park (BISC), located in Homestead, Florida, is one of the largest marine parks in the National Park System. Nearly 95 percent of the park's 173,000 acres are covered by water. Situated south of the city of Miami, in Miami-Dade County, Florida, the park is about 22 miles (35.4 kilometers (km)) long; its northern boundary is near Key Biscayne and its southern boundary near Key Largo. The park's western boundary is roughly defined by the landward extent of a mature red mangrove forest that forms a narrow band, 100–2,000 feet (ft) (30.5–610 meters [m]) wide, along the western shoreline of Biscayne Bay. The park's eastern boundary follows the 60-ft (18.3-m)-depth contour, for an approximate width of 14 miles (22.5 km). Biscayne's submerged area lies within either the nearshore waters of Biscayne Bay or the offshore waters of the Hawk Channel and the Florida Straits (NPS 2007) (Figure 1).

Currently, an average of more than 500,000 people visit the park annually (NPS 2010b) with 90 percent of them on boats (NPS 2010a). The park preserves a unique, sensitive marine environment that is an important component of the South Florida ecosystem and economy (Ault *et al.* 2001, Stynes and Sun 2003).

## **PURPOSE AND SIGNIFICANCE OF THE PARK**

Biscayne National Park was established by Congress in 1968 as Biscayne National Monument. The boundaries were expanded in 1974 “to add approximately 8,738 acres of land and water, including all of Swan Key and Gold Key.” In 1980 the area was again expanded by 80,000 acres to its current size and designated Biscayne National Park. Its 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.”

### **Park Significance**

- The park's fabric of Florida 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.
- Consistent with the park purpose and Organic Act, visitors enjoy opportunities for a multitude of recreational activities in proximity to one of the country's major metropolitan centers.
- Visitors find inspiration in Biscayne's tranquility, solitude, scenic vistas, underwater environment, and the sound of nature's voices.
- The park encompasses the northernmost extent of fragile and dynamic Florida coral reefs and coastal systems characterized by numerous transitions in the physical and biological environment.
- Biscayne National Park provides a rare opportunity to experience largely undeveloped Florida keys.
- Biscayne National Park preserves unique marine habitat and nursery environments that are capable of sustaining diverse and abundant native fisheries.
- Its submerged and terrestrial cultural resources represent a sequence of rich history encompassing early settlement, maritime activities, agricultural and development of the islands, and the melding of diverse cultures.

- The park offers outstanding opportunities for education and scientific research due to the diversity and complexity and interrelatedness of its natural and cultural resources and provides a dynamic laboratory for marine and terrestrial studies.

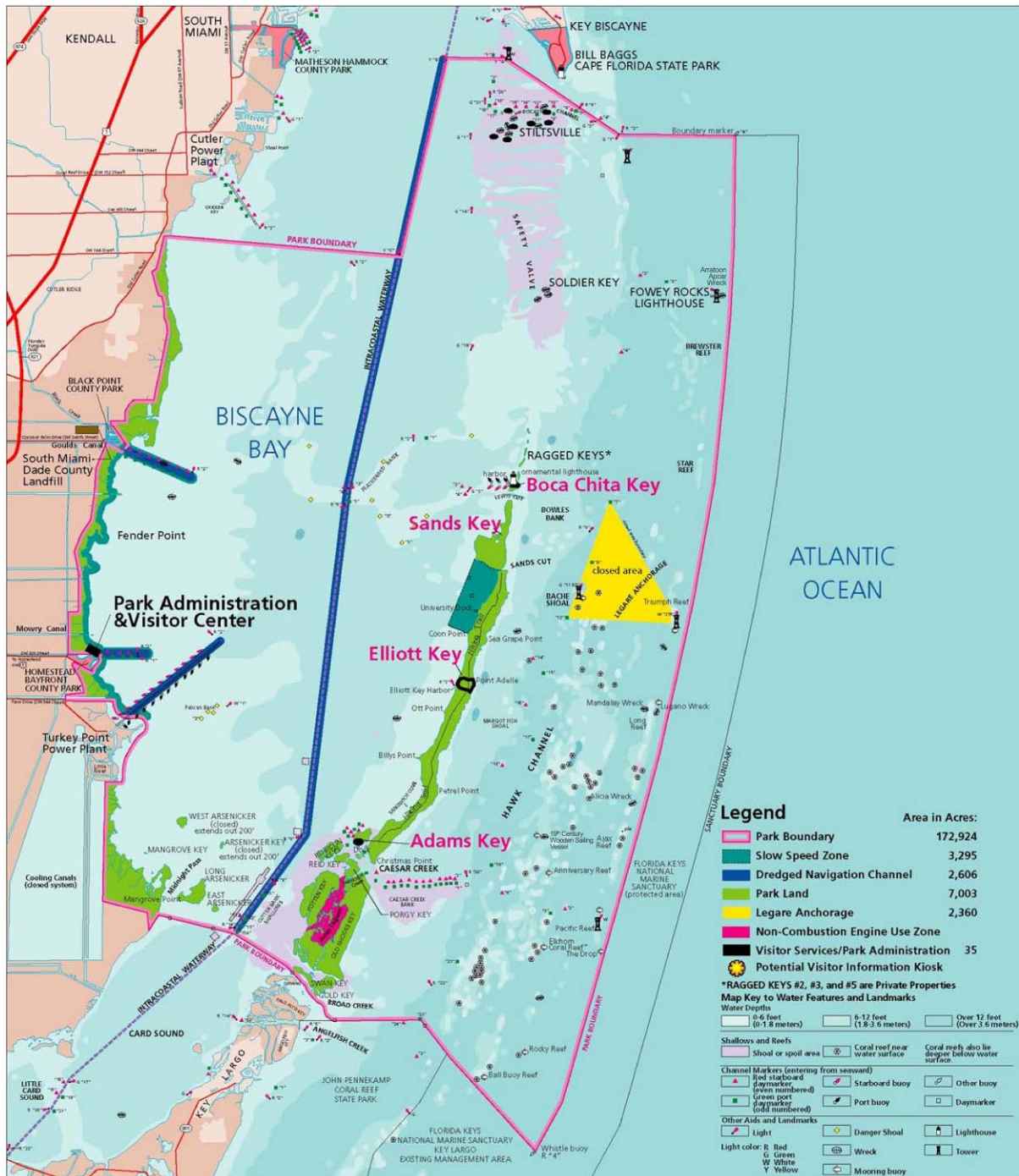


Figure 1. Biscayne National Park

## **PROJECT BACKGROUND, PREVIOUS PLANNING, AND SCOPING**

### **Project Background and Scope**

The following provides a review of the status of the mooring buoy and marker system within park and a summary of resource effects that are related to past and current levels of boating activities within the park.

#### **Markers**

Waters within Biscayne National Park and surrounding the park are marked to assist boating navigation, as well as to provide pertinent information and to notify park users of applicable regulations. This system employs a variety of markers and a simple arrangement of colors, shapes, numbers and light characteristics to delineate navigable channels, waterways and obstructions, and prohibited areas containing sensitive resources. Markers found within the park include embedded markers such as lighted structures, day markers (both lighted and non-lighted), poles and pilings, and those that are floating such as buoys.

Prior to the internal scoping meeting, the National Park Service had identified 93 markers found within the park where it was uncertain what agency was responsible for their maintenance. With input from the U.S. Coast Guard during the internal scoping workshop, clarification was provided as to the ownership and maintenance responsibility of a number if not all of these markers. The information provided in this section details the types of markers found within the park, ownership, and agency responsible for maintenance.

#### **Embedded Markers**

Lighted structures, day markers, and poles and pilings are markers that are embedded into the substrate. Within the park, lighted structures maintained by the U.S. Coast Guard include those found at Pacific Reef, Fowey Rocks, Triumph Reef, and Bache Shoal. Day markers within Hawk Channel, Biscayne Channel, the five that mark the points of the Safety Valve, and those marking the Intracoastal Waterway are maintained by the U. S. Coast Guard. Other day markers found within the Herbert Hoover and Black Point marinas and those that demarcate navigations through Broad Creek are owned and managed by Miami-Dade County.

Day markers located in Caesar Creek are owned by National Park Service but maintained by the U.S. Coast Guard under a Memorandum of Agreement. Day markers are also located within the park to assist boat navigation through sensitive and shallow areas such as through the Featherbeds Bank area. Although this area has several markers in place, there are still numerous groundings in this sensitive area of the park. The day markers in this location are the responsibility of the National Park Service.

Many embedded poles and pilings found within the park serve to mark shallow water areas or shoals such as in the Pelican Bank area within the park. These poles and pilings were placed by the National Park Service and it is the responsibility of the park to maintain them. If any of these poles and pilings present a hazard to navigation, then they would need to be converted to a lighted day marker and would require a U.S. Coast Guard permit.

#### **Floating Buoys**

Floating buoys, which are tethered by chain to an anchor, are also found in the park and have been in place since the park's establishment. The first buoy to be put in the park was a mooring buoy near a schooner wreck in 1969. More were added in 1980s by the resource management division.



The buoys serve three types of purposes in the park: mooring, navigational, and scientific. Most buoys found within the park have been installed and are maintained by the National Park Service with the exception of the buoys that mark the northeast and southeast corners of the park that are maintained by the U.S. Coast Guard. Buoys located at Turkey Point are owned and managed by Florida Power and Light.

Mooring buoys are used on reefs for tying up boats, as channel markers, and there are a few in the park that identify shallow areas. The anchor of the buoy is embedded into the bottom either by a manta, which is a shaft with a plate that expands when embedded, or attached to an eyebolt that is set in concrete. The mooring buoy, which is typically a ball type buoy, is then attached to the anchor with a polypropylene line.

It should be noted that there are other buoys in park waters. Some are used by commercial fishermen to mark locations for trapping organisms, including crabs, and others are used for research purposes. The number of traps allowed in particular locations is permitted by the state through fishing licenses, while research buoys require a permit through the National Park Service. These special buoy markers are not managed and maintained by the National Park Service; rather, they are temporary and therefore not a part of this planning process.

On average the National Park Service replaces buoys annually with an approximate 25 percent loss of mooring buoys each year due to the heavy use the buoys receive in the summer season. The loss of navigational buoys tends to be slightly less at approximately 20 percent per year. These tend to be damaged or lost as a result of direct contact with boats attempting to navigate through an area. The estimated cost to the National Park Service for maintaining buoys is approximately \$60 per buoy per year (NPS 2010k)

#### **U.S. Coast Guard Coordination**

The U.S. Coast Guard issues permits for the placement of any embedded markers such as day markers but does not issue permits for the placement of buoys or informational regulatory markers. Coordination with the U.S. Coast Guard includes identifying the locations and types of markers to be installed. The National Park Service submits an application for setting navigational markers via a 2544 form. The U.S. Coast Guard reviews the application and ensures that all applicable rules have been adhered to. Once the National Park Service has U.S. Coast Guard approval, markers can be installed. The U.S. Coast Guard sends out a notice to mariners that new markers have been located within park waters and the markers are identified on navigational charts. To place additional markers in areas where they are the responsibility of the U.S. Coast Guard, such as in the Intracoastal Waterway or Hawk Channel, the National Park Service must submit a request describing desired locations of markers and rationale for why they are needed.

For the placement of buoys and informational or regulatory markers, the National Park Service consults with the U.S. Coast Guard to obtain a Letter of No Objection. Information and regulatory markers are used to identify exclusion zones, hazards, and to relate information. Informational and regulatory markers often differ in content presented on the signs, as there is no uniformity within the state as to the shapes and information that is being presented. This often results in confusion by boaters. Although the U.S. Coast Guard issues a Letter of No Objection regarding informational markers, they do not place these markers on navigational charts.

The U.S. Coast Guard would continue to maintain navigational markers as described above under the existing Memorandum of Agreement (MOA) with the National Park Service. For example, the private markers on the northern and southern boundary and at Caesar Cut are owned by the National Park Service, but they are maintained under the MOA by the U.S. Coast Guard. The NPS must reimburse the USCG for costs associated with repair and maintenance of markers. Lighted markers within the park are also maintained by the U.S. Coast Guard.

However, due to budgetary constraints, the resources available to the U.S. Coast Guard for maintenance of these markers are expected to decline in the coming years.

### **Boating Effects on Marine Resources**

Vessel groundings and subsequent injuries are common in the park due to high boater concentrations because of the park's proximity to a major metropolitan area, as well as the existence of many shallow areas outside of marked channels. Large commercial boat groundings occur less frequently than smaller recreational crafts or smaller commercial boats and can be attributed to the park's location adjacent to commercial shipping lanes and major navigational routes such as the Intracoastal Waterway (NPS 2007).

Between 1998 and 2007 there have been on average approximately 100 vessel groundings reported each year in the park (NPS 2007). However, this average number of annual groundings represents only a portion of the groundings that occur because many incidents are unreported. About 90 percent of the reported groundings occur in seagrass habitat. Although groundings occur throughout the park, several hotspots have been identified at shoals (shallow water areas), along tidal creeks and near navigation channels. Although seagrass beds are injured more often than coral reefs by vessel groundings in the park, when vessel groundings do occur on coral reefs, injuries are often substantial.

Improper anchoring in or near sensitive habitats also can cause considerable damage to seagrass beds and coral reefs. All vessels that anchor in sensitive habitats have the potential to injure or destroy coral and seagrass. Even when the anchor itself is in the sand, the anchor chain may drag on the bottom, damaging seagrass and coral. These exposed or denuded areas may then enlarge with wave action and other storm events. On small boats, there is more ability to spot sandy areas for anchoring and to manually reset anchors when needed. This ability to spot appropriate anchoring areas on a larger vessel is more limited.

All mooring buoys in the park are located on the reef tract, east of Hawk Channel. These buoys are in place to minimize boat anchoring on reefs. Use of buoys is voluntary and on a first-come, first-serve basis. Only one boat is allowed to tie off or moor to a mooring buoy per the 2010 Superintendent's Compendium (NPS 2010e). The areas where anchoring is currently not allowed within the park include the following:

- Boca Chita Key Harbor
- Elliott Key Harbor
- The slow speed zone marked by buoys at the mouth of Boca Chita Key Harbor
- The Legare Anchorage, a triangular shaped area, determined by connecting lines between U.S. Coast Guard navigational day marker #7 and #13 in Hawk Channel and Triumph Reef Light
- The slow speed zone marked by buoys at the mouth of Elliott Key Harbor
- Any marked navigational channel
- At Boca Chita Key, within an imaginary square defined by the island's shoreline (approximately 10 yards off the sea wall) and the two mooring buoys north of the shoreline.

### **ISSUES**

Issues are concerns or topics that need to be considered in the course of developing a successful management strategy that is consistent with governing laws, regulations, and policies and park resources. Issues need to be addressed in the analysis of the proposed management action and its alternatives. Issues identified in association with a buoy and marker plan are as follows:

## **Natural and Cultural Resources**

- Coral reefs and seagrass beds are important and sensitive habitats that can be damaged by anchoring and boat strikes.
- Many shallow areas, especially the Featherbeds, are poorly marked or unmarked and experience many groundings, resulting in damage to habitat injuries.
- Anchoring in the seagrasses, visitor impacts on water quality, and dispersing of wildlife are resulting from high rates of use in areas such as at Sands Cut, Soldier Key, and Stiltsville.
- Submerged cultural resources may be damaged by anchoring and boat strikes.
- Viewscapes within the park are an important resource and should be considered when making management decisions. From some perspectives, there may be too many navigational aids and mooring buoys on the water that distract or disrupt visitor experience and appreciation of the viewscape. From other perspectives, additional buoys and markers may have no viewscape impact.
- Natural soundscapes are also a valuable resource for visitors to the park and should be considered when making management decisions. Crowding of loud vessels negatively impacts the natural soundscapes than visitors often come to a park to experience.

## **Public Health and Safety**

- The high concentration of boats and visitor uses at Sands Cut and Stiltsville is causing safety concerns. For example, the Sands Cut area is poorly marked, resulting in groundings and hazards to swimmers.

## **Navigational Aids and Markers and Boating Operations**

- A lack of proper signage in various areas causes safety concerns, navigational difficulties, and inadequate display of information, rules and regulations. Boaters do not have a clear understanding of restricted areas or resource protection needs. There is not a clear demarcation of the national park boundary, which results in visitors not recognizing when they have entered Biscayne National Park. As a result, visitors may undertake inappropriate activities that are inconsistent with the mission of the park. Without clear signage that delineates national park boundaries, there is an increased burden on visitor protection staff to enforce park rules and regulations and maintain public safety.
- Park visitors complain that potentially hazardous shallow waters are not clearly marked. In Hawk Channel, for instance, the distance between markers is too great. As a result, boaters are unable to locate sequential marks to navigate the area effectively. Hawk Channel passes immediately adjacent to patch reefs, which experience damage from boat strikes. The number and placement of markers along this channel are inadequate to protect coral resources.
- Markers should be clear and direct appropriate boating navigation. Maintenance and repairs have not been adequate or timely to assure that information is presented appropriately.
- During high use seasons and special events that occur in the park, such as the lobster mini-season, there is a shortage of mooring buoys. Visitors who may not ordinarily drop anchor must do so during these times.

- Information on marks may not be clear or uniform. There is also a lack of multiple languages in the informational and regulatory marking system. This sometimes results in inappropriate boating activities and navigational difficulties.
- Improved boater education is needed to enhance understanding of correct and safe navigation.

### **Visitor Use and Experience**

- There is a lack of mooring buoys at sites within the park near interesting and unique resources. This inhibits visitor use and understanding of park resources. There is a desire by the park to have visitors experience healthy and interesting coral reefs, along with submerged cultural sites such as the Maritime Heritage trail, without damaging sensitive resources.
- There is conflict with concessions use of areas. For example, visitors sometimes use the mooring buoy designated for concessions operations. During certain high-use times of the year, the concessioner avoids areas of the park in order to avoid conflicts or to prevent overcrowding.
- Visitors seeking a solitary experience generally visit the park during weekdays. On the weekends or during high visitor use times, there are not mooring buoys available to provide a solitary experience.
- There is an insufficient number of mooring buoys that have enough strength to support concession and large boat use in the park.

### **Park Operations**

- Staffing and budget is not adequate to enforce regulations, maintain the mooring buoys and markers, and to educate visitors.
- The responsibility of maintenance for markers and mooring buoys in the park is not clearly defined.
- There is potential for inappropriate use of mooring buoys by boaters – including rafting, overnight use, and mooring by the stern – which results in increased maintenance needs.
- There is an insufficient level of communication between the NPS and other agencies with jurisdiction over markers in the park. For example, a set of navigational markers was installed in the park in 2009 without consultation with the National Park Service.
- At Sands Cut and other high use areas of the park, visitor protection, medical, and fire emergency response vessels are sometimes unable to access sites because boat density restricts access.

## **OBJECTIVES**

Objectives are specific statements of purpose; they describe what must be accomplished to a large degree for the plan to be considered a success. To be able to measure success of the project, criteria such as visitor experience and thresholds of acceptability and cost-effectiveness must be identified. This will allow the NPS to make a decision on alternative selection. The following objectives were developed by the park staff and will be used in the analysis of alternatives in the plan/EA.

### **Navigational Aid and Mooring Buoy Management**

- Establish siting criteria for mooring buoys and markers that would identify appropriate areas for installation.
- Delegate the responsibility for planning and decision-making for future sites.

### **Natural and Cultural Resources**

- Install additional mooring buoys for enhancement of interpretation and visitor experience of the park's cultural resources, such as the Maritime Heritage Trail.
- Install additional mooring buoys on and near benthic communities frequented by park visitors.
- Provide better marking of restricted and hazardous areas to prevent resource damage.

### **Visitor Use / Public Safety**

- Reduce the potential for groundings to better protect public health and safety.
- Inform visitors of entry into Biscayne National Park through better boundary markers and signage (in appropriate languages).
- Facilitate safe navigation of hazardous areas in the park. There are several locations in the park where enhanced navigational markings are needed. These main channels are the park's highways.
- Increase variety of experiences related to diving and snorkeling sites while minimizing or avoiding impacts to sensitive natural resources such as corals and benthic communities.
- Re-establish appropriate visitor uses in the park. For example, eliminate boat beaching, reduce groundings, and improve understanding of need for resource protection.
- Identify appropriate sites for mooring buoys, anchorages, and markers.

### **Park Operations**

- Identify roles and responsibilities for maintenance of existing and new buoys and markers, including specification of the agency which is responsible and the division within the NPS which is responsible.
- Identify funding sources for plan implementation, including installation of new buoys and markers, as well as routine ongoing maintenance of existing markers and buoys.
- Ensure that boat densities do not exceed levels that prevent or inhibit access for emergency service vehicles.

### **Education**

- Provide navigational information on restricted areas.
- Provide appropriate bilingual messaging to facilitate navigation and enhance protection of park resources.
- Educate visitors on the importance of mooring buoys in protecting the park's resources.

## LAWS, REGULATIONS, AND POLICIES

Numerous laws, regulations, and policies at the federal, state, and local levels guide the decisions and actions regarding the mooring buoy and marker project. Some of the primary examples of these legal and regulatory constraints and bounds follow.

### National Park Service Legislation

#### Enabling Legislation

Biscayne National Park was established by Congress in 1968 as Biscayne National Monument (PL 90-606). The boundaries were expanded in 1974 “to add approximately 8,738 acres of land and water, including all of Swan Key and Gold Key” (PL 93-477). In 1980, the boundaries were again expanded to create its current size of 173,000 acres, and Biscayne National Monument was designated Biscayne National Park “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” (PL 96-287).

#### National Park Service Organic Act (1916) and Management Policies

Congress directed the U.S. Department of the Interior and the NPS to manage parks “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 United States Code § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 United States Code § 1 a-1).

Despite these mandates, the Organic Act and its amendments afford the NPS latitude when making resource decisions that balance visitor recreation and resource preservation. By these acts, Congress “empowered [the NPS] with the authority to determine what uses of park resources are proper and what proportion of the park resources are available for each use” (*Bicycle Trails Council of Marin v. Babbitt*, 82 F.3d 1445, 1453 [9th Circuit 1996]).

Courts consistently interpret the Organic Act and its amendments to elevate resource conservation above visitor recreation. *Michigan United Conservation Clubs v. Lujan*, 949 F.2d 202, 206 (6th Circuit 1991) states, “Congress placed specific emphasis on conservation.” The *National Rifle Association of America v. Potter*, 628 Federal Supplement 903, 909 (D.D.C. 1986) states, “In the Organic Act Congress speaks of but a single purpose, namely, conservation.” *Management Policies* (NPS 2006b) also recognizes that resource conservation takes precedence over visitor recreation. Section 1.4.3 states, “when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant.”

Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values, though they may allow negative impacts when necessary to fulfill park purposes, as long as the impact does not constitute impairment of the affected resources and values (NPS 2006b). That discretion to allow certain impacts within the park is limited by statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. An action constitutes an impairment when its impacts “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 2006b). An adverse impact constitutes impairment to the extent that it has a major adverse effect 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
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006b). The impairment determination for the Mooring Buoy and Marker Plan is included as Appendix B.

### **Management Policies**

*Management Policies* (NPS 2006b) establishes service-wide policies for the preservation, management, and use of park resources and facilities. These policies provide guidelines and direction for management of resources within the park. The alternatives considered in the EA would incorporate and comply with the provisions of these mandates and policies.

Management Policies, section 4.4.1 “General Principles for Managing Biological Resources” directs parks to preserve and restore native plant and animal populations and minimize human impacts on native plants, animals, and the ecosystems that sustain them. In section 4.4.4, “Management of Exotic Species,” park managers are directed not to allow non-native species to displace native species, if this can be prevented.

The NPS requires the containment, control, and management, to the greatest degree possible, of exotic species – especially those with serious ecological threats (NPS 2006a). In addition, introduction of new exotic species into parks is prohibited, unless required to meet specific management needs and when all prudent measure to minimize harm have been taken (section 4.4.4.2).

### **Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision-Making**

Director's Order #12 and the accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with NEPA. (See ‘National Environmental Policy Act, 1969, as Amended’ in ‘Other Federal Laws and Executive Orders’ below.) Director's Order #12 and the handbook set forth a planning process for incorporating scientific and technical information and establishing a solid administrative record for NPS projects.

Director's Order #12 requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand implications of those impacts in the short and long-term, cumulatively, and in context, based on an understanding and interpretation by resource professionals and specialists. Director's Order #12 also requires that an analysis of impairment to park resources and values be part of the NEPA document.

### **Park-Specific Regulation**

#### **Superintendent's Compendium of Designations, Closures, Request Requirements and other Restrictions**

The Superintendent's Compendium serves to ensure the proper management, protection, government and public use of the portion of Biscayne National Park under the jurisdiction of the



National Park Service. These discretionary regulations are in addition to the other regulations published in title 36 CFR, Chapter 1, and Parts 2 through 7. The Compendium addresses closures and public use limits, preservation of natural, cultural, and archeological resources, camping and food storage, fires, and vehicle speed limits.

## **Other Federal Laws and Executive Orders**

### **National Environmental Policy Act, 1969, as Amended**

Section 102(2)(c) of this act requires that an environmental analysis be prepared for proposed federal actions that may significantly affect the quality of the human environment or are major or controversial federal actions. NEPA is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500-1508). The NPS has, in turn, adopted procedures to comply with the act and the CEQ regulations, as found in *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision Making*, and its accompanying handbook (NPS 2001). Section 102(2) (c) of this act requires that an EIS be prepared for proposed major federal actions that may significantly affect the quality of the human environment.

### **National Parks Omnibus Management Act of 1998**

This act (16 USC 5901, et seq.) underscores NEPA in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both also recognize that such data may not be readily available and provide options for resource impact analysis in this case.

### **National Historic Preservation Act of 1966, as Amended**

Section 106 of this act requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing on the National Register of Historic Places. All actions affecting the parks' cultural resources must comply with this legislation.

### **Clean Water Act**

The Federal Pollution Control and Prevention Act of 1972, commonly known as the Clean Water Act, is the primary federal law in the United States governing water pollution. The purpose of the act is to make our nation's waters "fishable and swimmable" by 1983 by eliminating releases of toxic substances, controlling wastewater and storm water pollution of waterways, and instituting water quality standards and associated permitting systems.

The principal body of law currently in effect is based on the Federal Water Pollution Control Amendments of 1972, which significantly expanded and strengthened earlier legislation. Major amendments were made to the Clean Water Act of 1977 enacted by the 95th United States Congress and the Water Quality Act of 1987 enacted by the 100th United States Congress.

### **Endangered Species Act**

The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service of the Department of the Interior maintain a worldwide list which includes endangered species of animals and plants. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees.

The law requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and the U.S. National Oceanic and Atmospheric Administration Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of

such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. This EA addresses requirements of the act by incorporating analyses and impact findings for special-status species that could potentially be affected by the project.

### **33 CFR 66.10 - Uniform State Waterway Marking System**

The Uniform State Waterway Marking System (USWMS) was developed to convey to the small vessel operator, in particular, adequate guidance for safe boating channels by indicating the presence of either natural or artificial obstructions or hazards, marking restricted or controlled areas, and providing directions. The USWMS may be used in those navigable waters of the U.S. which have been designated as State waters for private aids to navigation and in those internal waters which are not navigable waters of the U.S.

### **Executive Order 11990 - Protection of Wetlands**

This Executive Order directs federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

## **RELATIONSHIP TO OTHER PLANS, POLICIES, AND ACTIONS**

Actions undertaken in association with the mooring buoy and marker project have the potential to contribute to the cumulative effects of other plans and projects in or near the park. The following projects and plans with the ability to contribute to cumulative effects of the project have been identified. These are included in analyses of the cumulative scenario for the various impact topics addressed in the EA.

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

The park is currently drafting a plan that will guide park activities and management over the next 20-25 years. One element being considered for the general management plan is the establishment of marine reserve zone(s). The goal of establishing marine reserve zone(s) is to provide snorkelers and divers an opportunity to experience a healthy, natural reef with a wide diversity of fish species and sizes.

### **Fishery Management Plan**

Biscayne National Park's Fishery Management Plan is currently in draft form and is anticipated to be completed in 2010. It is the result of a cooperative effort between the park and the Florida Fish and Wildlife Conservation Commission. The plan presents a range of alternatives being considered for the Biscayne National Park (BISC) Fishery Management Plan (FMP) and identifies a preferred alternative for the BISC FMP, which will guide fishery management decisions in BISC for the next five to ten years. BISC hosts both commercial and recreational fishers, and increases in South Florida's boating and fishing population, combined with improved fishing and boating technology, pose a threat to the long-term sustainability of fishery-related resources of BISC. A fishery management plan is deemed necessary to guide sustainable use of BISC's fishery-related resources, as recent studies suggest that many of BISC's fisheries resources are in decline.

### **Local and Regional Water Quality Plans**

Miami-Dade County and the South Florida Water Management District have water quality management plans intended to address various water quality issues specific to Biscayne Bay. See also Local and Regional Stormwater Management, below.

### **Ongoing Seagrass Restoration Efforts**

The park has ongoing restoration activities to address damage to seagrass, coral reefs, and other benthic habitats. Funds for these activities are generated from fines levied from prior resource injury incidents.

### **Coordination and Maintenance**

The park coordinates with the U.S. Coast Guard, as previously discussed in the “Project Background, Previous Planning, Scoping, and Value Analysis” section, when identifying proposed locations and types of buoys and markers to be installed in the bay. The Coast Guard issues Letters of No Objection for some, but not all, types of markers. Under an existing memorandum of agreement with the National Park Service, the Coast Guard maintains the park’s aids to navigation on the northern and southern boundary and at Caesar Cut. Lighted markers within the park are also maintained by the Coast Guard. However, due to budgetary constraints, Coast Guard resources available for maintenance of these navigational aids are expected to decline in the coming years.

### **Local and Regional Stormwater Management and Everglades Restoration**

Miami-Dade County, and other agencies that manage stormwater in the region, are working together to improve the water quality of stormwater runoff into Biscayne Bay by adopting standard criteria and methods for transporting and storing stormwater. Stormwater must meet minimum quality standards before being discharged to water bodies (Chin 2004).

The Comprehensive Everglades Restoration Plan (CERP) is intended to restore the natural hydrology of the Everglades, that is, the amount, timing, and distribution of water. The plan includes more than 50 projects to treat wetlands, remove barriers to water flow, and redirect flows (Comprehensive Everglades Restoration Program 2010). Biscayne Bay could benefit from the Biscayne Bay Coastal Wetlands Project, the C-111N Spreader Canal Project, the Levee-31 N Seepage Management Project, the Lake Belt Project, the West and South Miami-Dade Water Reuse Project, and the Water Conservation Decompartmentalization Project. These projects are expected to mainly benefit nearshore habitats in the western portion of the park by increasing freshwater flows and improving water quality.

## **ISSUES AND IMPACT TOPICS**

### **Derivation of Impact Topics**

Specific impact topics were developed for discussion focus, and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and Executive Orders; 2006 NPS *Management Policies*; and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

## IMPACT TOPICS INCLUDED IN THIS DOCUMENT

**Benthic Habitats:** Approximately 95 percent of Biscayne National Park is under water. Habitats on the sea bottom – “benthic habitats” such as seagrass beds and coral reefs – provide critical areas for foraging, breeding, and refuge for recreationally and commercially important species as well as for several special status species. Because the proposed action would affect benthic habitats, this topic was retained for analysis.

**Water Resources:** Biscayne National Park is prized for its clear waters. Vessel groundings in the park are reported almost 100 times a year, most often in seagrass habitat. Reported groundings likely represent a small fraction of all vessel groundings that occur each year. When vessels attempt to “power off” such shallow water areas, they can create lengthy propeller scars and large excavations (blow holes) in the bottom of the bay, displacing large volumes of sediment. In addition to being harmful to seagrass habitat, displaced sediments create turbidity plumes that negatively affect water quality. Because the proposed action would affect water quality through disturbance of bay substrate, this topic was retained for analysis.

**Wildlife, Fish, and Essential Fish Habitat:** The park provides important habitat for many fish and wildlife species. The park is an important refuge along a highly-developed coastline. The park’s seagrass, coral reefs, and mangrove shorelines provide habitat for a variety of commercial and recreational fish, invertebrates, birds, and marine mammals. Because this plan proposes actions that would affect wildlife and their habitats, this topic was retained for analysis.

**Special Status Species:** The Endangered Species Act requires federal agencies to conserve listed species and consult with U.S. Fish and Wildlife Service or the National Marine Fisheries Service to ensure that proposed actions that may affect listed species or critical habitat are consistent with the requirements of the act.

Biscayne National Park provides habitat for 13 species that are federally-listed as threatened or endangered. Seven of these species have the potential to be affected by the actions proposed in the Mooring Buoy and Marker Plan. These species include the Florida manatee (*Trichechus manatus latirostris*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), staghorn coral (*Acropora cervicornis*), and elkhorn coral (*Acropora palmata*).

The actions proposed in the Mooring Buoy and Marker Plan would specifically affect marine sites within southern Biscayne Bay and along the Florida reef tract. Other special status species may not occur in the project area, or would not be affected by proposed actions, and effects to these species are not discussed in detail. Some species occur so infrequently in the park that any impacts would be considered discountable due the unlikelihood of occurrence at a project site. The special status species occurring in the park that would *not* be affected include:

- **Wood stork.** Wood storks (*Mycteria americana*) are large, long-legged wading birds that occur in the southeastern U.S. and are listed as federally endangered species. Wood storks occur in hydric pine flatwoods, wet prairies, freshwater marshes, seepage and flowing water swamps, mangroves, saltmarsh, and seagrass habitats (U.S. Fish and Wildlife Service 2009); they are known to occur within Biscayne National Park (NPS 2008a). Storks are birds of freshwater and estuarine wetlands, primarily nesting in cypress or mangrove swamps. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools (U.S. Fish and Wildlife Service 2009). Because the wood stork primarily feeds and nests along the shoreline of the park in mangroves and wetland areas, it is unlikely to be affected by the proposed actions in the marine environments of the park. Therefore, this species is not carried through for analysis.

- American Crocodile.** The American crocodile (*Crocodylus acutus*) is designated by the U.S. Fish and Wildlife Service as threatened. The crocodile population in Florida, although small, appears stable. The American crocodile inhabits coastal habitats of extreme south Florida, including coastal areas of Miami-Dade, Monroe, Collier, and Lee counties. Crocodiles are regularly observed in Florida and Biscayne Bays, found primarily in mangrove swamps, low-energy mangrove-lined bays, creeks, and inland swamps (Kushlan and Mazzotti 1989). Crocodiles are affected by habitat loss and fragmentation due to increases in urbanization and agricultural land uses; natural catastrophes (e.g., hurricanes); changes in the distribution, timing, quantity, and quality of freshwater flows; and hunting. Critical habitat for the crocodile was designated in 1979 and extends into the southern portion of Biscayne National Park. Critical habitat for the crocodile in the park begins at the easternmost tip of Turkey Point, Miami-Dade County, on the coast of Biscayne Bay along a straight line southeastward to Christmas Point at the southernmost tip of Elliott Key and continues southwestward along a line following the shores of the Atlantic Ocean side of Old Rhodes Key. The habitat continues around the Florida Peninsula into Florida Bay. Crocodiles use the park primarily for the mangroves which provide cover and the canals and inland lakes and ponds that provide low salinity water (Keen 1999). The American crocodile inhabits fresh and brackish water in the park along the shoreline and mangroves, but is not likely to occur in the marine environment. Therefore, this species is not carried through for analysis.
- American Alligator.** Since American alligators (*Alligator mississippiensis*) were first protected in 1967, prior to the Endangered Species Act, the species has made a dramatic comeback. In 1987, the U.S. Fish and Wildlife Service pronounced the species “fully recovered.” However, the species remains protected as a threatened species because of its similarity in appearance to the threatened American crocodile. The alligator can be distinguished from the American crocodile by its broader snout and dark body color, and is found in freshwater and brackish water habitats. Alligators may live to 30 years of age or more, and can reach lengths of 10 to 13 feet and weigh 1,000 pounds at maturity. Alligators prey on fish, turtles, snails, and any animals that come to the water’s edge (U.S. Fish and Wildlife Service 2008). In the park, alligators occur in the freshwater tributaries of the bay (Florida Department of Environmental Protection 2010a). The American alligator is a freshwater species that may occur in the park, but would not be in the marine environment. Therefore, this species is not carried through for analysis.
- Smalltooth Sawfish.** The smalltooth sawfish (*Pristis pectinata*) is an endangered fish species that may potentially occur within the park. The smalltooth sawfish is a tropical marine and estuarine elasmobranch (the ray and skate family) that was listed as endangered in 2003. Smalltooth sawfish may grow up to 18 feet long and sport an elongated, blade-like snout studded with numerous teeth on either side. Habitat destruction and overfishing have eradicated this species from its former range of New York to Texas. Smalltooth sawfish are generally a shallow water fish of inshore bars, mangrove edges, and seagrass beds, but are occasionally found in deeper coastal waters (National Marine Fisheries Service 2000). Critical habitat for the sawfish consists of two units: the Charlotte Harbor Estuary Unit, which comprises approximately 221,459 acres of coastal habitat; and the Ten Thousand Islands/Everglades Unit (TTI/E), which comprises approximately 619,013 acres of coastal habitat. The two units are located along the southwestern coast of Florida between Charlotte Harbor and Florida Bay. Encounter data and research efforts indicate a resident, reproducing population of smalltooth sawfish exists only in southwest Florida, in the areas near the designated critical habitat (Federal Register 2009). From 1998 to 2009, National Marine Fisheries Service reports a total of nine smalltooth sawfish observations in Biscayne National Park.

The smalltooth sawfish could potentially occur in Biscayne National Park; however, this is unlikely based on encounter data (Federal Register 2009). Given the scarcity of the species within the park, any potential effects from the proposed action are discountable. Therefore, this species is not carried through for analysis.

- **Piping Plover.** The piping plover (*Charadrius melodus*) is a shorebird that breeds on outer coastal beaches from Newfoundland to North Carolina, beginning in late March or early April. They winter on the Atlantic coast as far south as the West Indies, departing in early September. Key Biscayne, located directly north of the park, is a known wintering site for piping plovers, though it is not designated as critical habitat. Individuals commonly move across inlets and sounds to adjoining habitats (Stucker and Cuthbert 2006). The species was federally listed as threatened on January 10, 1986. Current threats to the plover's existence include development, human disturbance (including pets), increased numbers of scavenging predators near concessions, and storm tides (U.S. Fish and Wildlife Service 2007b). A few keys within the park might provide minimal habitat for wintering plovers, such as unvegetated intertidal areas, but most of the shoreline of the keys is mangrove, and the few beaches that remain have little sandy expanse due to exposed pinnacle rock, dune vegetation, or mangrove encroachment (U.S. Fish and Wildlife Service no date). Park data dating back to 1978 indicate that plovers occur infrequently in the park. In 2008, a winter shorebird survey was conducted in the park, and no plovers were observed. The last reported sighting of a piping plover occurred in 2001 on an ocean-side mudflat of Elliot Key. Prior to that sighting, there have only been three observances of the plover in the park since 1978 (NPS 2010n). Plovers might use certain areas of the park, such as the Sands Cut area, if not for the intense human use, but there will likely always be human use of these areas (NPS 2010m). Because the piping plover has not been documented in the park for several years, it was not carried through for analysis.
- **Johnson's Seagrass** (*Halophila johnsonii*) is a marine plant species found growing in lagoonal waters along approximately 125 miles of coastline in southeastern Florida between Sebastian Inlet and central-north Biscayne Bay. The species often grows in a patchy, noncontiguous distribution at water depths extending from the intertidal down to 3 meters. *Halophila johnsonii* is rare, has a limited reproductive capacity, and is vulnerable to a number of anthropogenic and natural disturbances. Principal threats to the species' survival include: (1) habitat degradation and destruction from dredging and filling, construction and shading from in- and overwater structures, propeller scarring, altered water quality, and siltation; (2) inadequacy of existing regulatory mechanisms to protect seagrasses; and (3) stochastic storm events (Federal Register 2004). Johnson's seagrass was listed as threatened under the Endangered Species Act in 1998 and is the first marine plant to be listed under the ESA (Federal Register 2004). The northern portion of Biscayne Bay is designated as critical habitat from Virginia Key into the northern reaches of the Bay (Federal Register 2000). However, Johnson's seagrass is not documented in the park and there is no designated critical habitat for Johnson's seagrass within the park. Therefore, this species was not carried through for analysis.

**Cultural resources – archeological resources:** The six shipwrecks on the Maritime Heritage Trail, along with possible future additions from the remaining submerged resources included in the Offshore Reefs Archeological District, may be affected by markers and mooring buoys discussed in this plan.

**Visitor Use and Experience:** Actions proposed under the plan have the potential to affect visitor experience and appreciation of park resources, boat densities and uses of specific areas of the

park, and access to high-quality sites to explore and understand park resources. Therefore, this topic has been retained for full analysis.

**Public Health and Safety:** Several health and safety issues were identified during the scoping and planning process. It is the goal of Biscayne National Park to ensure that all visitors and staff experience a safe environment at the park. Because this plan proposes actions that would address existing health and safety issues, this topic has been retained for analysis.

**Park Operations:** Many divisions, including Maintenance and Facilities, Administration, Interpretation, Resources Management, Visitor and Resource Protection, and the Superintendent's Office are all involved in the plan and system management maintenance.

## IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

**Conflicts with land use plans, policies, or controls, and urban quality:** Whenever actions taken by the National Park Service have the potential to affect the planning, land use, or development patterns on adjacent or nearby lands, the effects of these actions must be considered. The management framework and site-specific actions proposed under this plan would affect the marine environments within Biscayne National Park. None of the actions proposed in this plan would affect land use within or outside that park, or quality of the urban environment of Miami-Dade County. Therefore, these topics are not analyzed in this environmental assessment.

**Ecologically critical areas or other unique natural resources:** The proposed action would not affect any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in the Wild and Scenic Rivers Act, *Management Policies* (NPS 2006b), 40 CFR 1508.27, or the criteria for national natural landmarks (36 CFR 62), as none are present within the park.

**Floodplains and wetlands:** Executive Orders 11988 and 11990, Floodplain Management and Wetlands, respectively, require analysis of impacts on floodplains and wetlands. None of the actions proposed in the Mooring Buoy and Marker Plan would affect the coastal floodplain of Biscayne National Park, and floodplains are not analyzed in this environmental assessment. The seagrass beds of the park are considered submerged wetlands, and effects to this habitat are addressed in the Benthic Resources and Special-Status Species sections.

**Geology and soils:** Terrestrial systems comprise less than five percent of Biscayne National Park. They consist of a narrow fringe of mangrove along the western shore and 42 keys (NPS 2008a). The terrestrial soils of the park would not be affected by the proposed action. The Preferred Alternative involves changes to the park's system of buoys and markers that would occur in open water areas of the park. Currently approximately 6 percent of the substrate of Biscayne Bay has been affected by boat and propeller scarring. Although actions proposed in this plan would potentially localize and reduce sediment disturbance, the net change in scarring may not be measurable. This would result in long-term, site-specific, negligible, benefits to marine sediments. Installation of mooring buoys and markers would have limited effects on marine sediments, totaling less than one square foot. No long-term changes in the productivity of the bay substrate would result from implementation of the plan, and this topic is dismissed from further analysis.

**Indian trust resources:** Indian trust assets are owned by American Indians but are held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order 3206, American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act, and Secretarial Order 3175, Departmental Responsibilities for Indian Trust Resources. According to Biscayne National Park staff, Indian trust assets do not occur



within the park. Therefore, there would be no effects on Indian trust resources resulting from either of the alternatives.

**Cultural resources – historic/prehistoric structures, ethnographic resources, and cultural landscapes:** The park has a variety of cultural resources within its boundaries (ranging from the buildings present in the Boca Chita Key Historic District attributed to the Honeywell family, to terrestrial shell middens on the islands and along the shoreline.) However, the proposed plans for additional and enhanced markers and mooring buoys would have no effect on these types of cultural resources, and these topics are not analyzed in this environmental assessment.

**Environmental justice:** Presidential Executive Order 12898, General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. According to the Environmental Protection Agency, environmental justice is the

“...fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.”

The goal of fair treatment is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.

There are both minority and low-income populations in the greater Miami-Dade metropolitan area; however, environmental justice is dismissed as an impact topic because:

- The Park staff and planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the preferred alternative would not result in any identifiable adverse human health effects.
- The impacts associated with implementation of the preferred alternative would not disproportionately affect any minority or low-income population or community.
- Implementation of the preferred alternative would not result in any identified effects that would be specific to any minority or low-income community.
- The Park staff and planning team do not anticipate the impacts on the socioeconomic environment to appreciably alter the physical and social structure of the nearby communities.

**Prime and unique agricultural lands:** The Council on Environmental Quality 1981 memorandum on prime and unique farmlands states that prime farmlands have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. The management framework and site-specific actions proposed in this plan apply to the marine environment of Biscayne National Park. No such agricultural sites are found within the area of effect.

**Soundscapes:** Natural soundscapes include the natural sound conditions in a park that exist in the absence of any human-produced sound. These conditions are composed of many natural sounds, near and far, which are heard both individually and as a composite. Maintaining an unimpaired natural soundscape is as important to the wildlife of Biscayne Bay as it is to visitors to the park.

Due to the proximity of the Miami metropolitan area and the popularity of boating in South Florida, the natural soundscape of the park is susceptible to urban and human noise intrusions from outside the park. These may include motorboats, freighters, air traffic and other human-generated sounds originating outside of the park. The existing ambient sound level is the composite, all-inclusive sound associated with a given area during a given period of time. The natural ambient sound level is generally used as a baseline for park management purposes and represents an estimate of what the acoustical environment might sound like without the contribution of anthropogenic sounds (NPS 2009a).

The natural ambient sound level for Biscayne National Park is not available (NPS 2010l). A 1999 study, titled *Measurement of Natural Soundscapes in South Florida National Parks*, collected data at nine unmanned monitoring sites within the park. The study found that the highest average sound level was 39 dBA, at a location in the northern portion of Elliot Key. The average sound level at the remaining eight sites varied from 29 to 36 dBA (Downing *et al.* 1999). The Natural Sounds Program of the National Park Service also collected data in Biscayne National Park to compute the existing ambient sound level, which includes the entire soundscape (natural and non-natural) (U.S. Department of Transportation 2009). Although all of the data collection sites within the park were terrestrial, the data collected at Soldier Key is a good indicator of sound levels in open water and near-shore habitats of the park (NPS 2010l). The overall daytime sound level at Soldier Key was 48.4 dBA, and the nighttime sound level was 44.3. Most of the sound levels above 40 dBA were attributable to tropical winds and storms (U.S. Department of Transportation 2009).

A change in the management framework of the park's mooring buoy and marker system would have no direct effect on soundscape within the park. Likewise, changes to access of the Maritime Heritage Trail would not affect the park's soundscape. Under Alternative B, if installation of mooring buoys and markers occurs, noise from construction activities would be short-lived and temporary and would not be expected to have an adverse, long-term effect on the park's soundscape. The installation of mooring buoy fields in high-use areas of the park would distribute visitors and reduce congestion, but would not remove human effects on natural sounds in these areas. Effects on the park's soundscape from this plan would not likely be measureable. Therefore, this topic is not analyzed in this environmental assessment.

**Energy requirements and conservation potential:** The NPS 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 that emphasize the use of renewable energy sources. The alternatives do not include actions that would require increased energy usage.

**Natural or depletable resource requirements and conservation potential:** The NPS uses sustainable practices to minimize the short- and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques. Project actions would not compete with dominant park features or interfere with natural processes, such as the seasonal migration of wildlife or hydrologic activity in Biscayne Bay.

**Climate change and sea level rise:** Climate change refers to any significant changes in average climatic conditions (such as mean temperature, precipitation, or wind) or variability (such as seasonality and storm frequency) lasting for an extended period (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 provide evidence that climate change is occurring and could accelerate in the coming decades.

While climate change is a global phenomenon, it manifests differently depending on regional and local factors. General changes that are expected to occur in the future as a result of climate change include hotter, drier summers; warmer winters; warmer water; and higher ocean levels, among other changes.

Climate change is a far-reaching, long-term issue that could affect Biscayne National Park, its resources, visitors, and management. It is generally agreed upon in the scientific community that human-induced climate change will cause the rate of sea level rise to increase from current conditions. Climate change science is a rapidly evolving field with new information being developed continually. Although some effects of climate change are considered known or likely to occur, many potential impacts are unknown. Much depends on the rate at which the temperature would continue to rise and whether global emissions of greenhouse gases can be reduced or mitigated.

In a recent report on the impact of climate change on Florida, the average range of projected sea level rise was 6.6 inches by 2050 and 15.2 inches by 2100. For comparison, other authors used tidal data from Key West to provide a relative rate of sea level rise at Miami Beach of 9.4 inches per century (Maul and Martin 1993). IPCC also predicts that: (1) Atlantic storm frequency and intensity will increase; and (2) precipitation will decrease in both the wet and dry seasons in South Florida (NPS 2008c).

Ocean level rise could exacerbate storm surge impacts and coastal erosion associated with tropical storms. However, since this change is anticipated to be about six inches by 2050, it is expected that the park's buoy and marker system should remain serviceable for the next 10 to 15 years under both alternatives. The adaptive management alternative provides the park with the framework to make incremental changes in response to any effects to sea level resulting from climate change.

Implementation of an adaptive management approach to the park's buoy and marker system would not measurably contribute to global climate change. The buoy and marker project would not contribute cumulatively to the impacts on the park's natural resources which may result from changes in climate that are expected over the next 50 years. Therefore, climate change and sea level rise were dismissed from further evaluation in this EA.

**Socioeconomics:** The possibility of new mooring buoys or markers interfering with commercial fishing activities was raised during internal scoping, but was not retained for analysis in this environmental assessment. Currently, there are approximately 169 navigational markers and mooring buoys in park waters. This equates to less than one buoy or marker per 1,000 acres. Navigational markers are generally concentrated to facilitate safe passage, while informational and regulatory markers and mooring buoys are more dispersed. The actions proposed in this plan would increase mooring buoys and markers at select sites, based on defined needs and criteria. Several dozen markers and mooring buoys, or individual mooring buoy fields, could be installed under the proposed action. This modest increase in the number of mooring buoys and markers would not measurably affect the ability of commercial fishermen to operate in the park or to access their traditional fishing areas.

**Viewshed:** A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point. The question of the impacts of markers and mooring

buoys on the natural viewshed of the park was raised as an issue during internal scoping. Nearly 95 percent of the park's 173,000 acres are covered by water. Currently, there are approximately 169 navigational markers and mooring buoys in park waters. This equates to less than one buoy or marker per 1,000 acres. Although mooring buoys and markers are not evenly spaced throughout the park, there are a few areas where they are concentrated and are obvious on the sea surface. For example, channel markers that support safe navigation in Biscayne Bay and in Caesar Creek are in close enough proximity to one another for several to be seen in the viewshed. By contrast, the distance between navigational markers along the Intracoastal Waterway or Hawk Channel may be several miles, making location of markers and safe navigation a challenge. Along the Atlantic reef line, mooring buoys are generally not visible until closely approached, due to their relatively small size and sea conditions. Although mooring buoy fields may be installed in selected sites under this plan, these areas are popular visitor use areas that frequently have high boat densities that far exceed the effect of mooring buoys on the viewshed. None of the actions proposed in this plan would dramatically increase the overall density of mooring buoys or markers in Biscayne National Park, and any effects on the park's viewshed would be localized, and not greater than negligible to minor. For these reasons, viewshed was dismissed from full analysis.

**Wilderness:** Biscayne National Park is adjacent to metropolitan Miami-Dade County, with a population of over 2 million. The park does not contain and is not adjacent to any designated or proposed wilderness areas.

## CHAPTER 2: THE ALTERNATIVES

### DEVELOPMENT OF THE ALTERNATIVES

NEPA implementing regulations provide guidance on the consideration of alternatives in an EA. These regulations require the decision-maker to consider the environmental effects of the proposed action and a range of alternatives (40 CFR § 1502.14). The range of alternatives includes reasonable alternatives that must be rigorously and objectively explored, as well as other alternatives that are eliminated from detailed study. To be “reasonable,” an alternative must meet the stated purpose of and need for the project.

The purpose of including a No Action Alternative in environmental impact analyses is to ensure that agencies compare the potential impacts of the proposed action to the known impacts of maintaining the *status quo*. Current conditions are used as a benchmark. By using the current conditions as the No Action Alternative, impacts of the proposed alternatives can be directly compared to the existing baseline.

The No Action Alternative represents the current conditions in the project area. The action alternative proposed in this EA was developed by the NPS after careful assessment by subject-matter experts, including natural and cultural resource specialists, park planners and managers, and input by the public during project scoping. The collective efforts of these individuals in documenting the requirements for the mooring buoy and marker project formed the basis for development of the proposed action alternative, the Preferred Alternative.

The Preferred Alternative represents the NPS proposed action and defines the rationale for the action in terms of resource protection and management, visitor use and operational use, and other applicable factors.

### DESCRIPTION OF THE ALTERNATIVES

#### ALTERNATIVE A, THE NO ACTION ALTERNATIVE

The No Action Alternative would continue current management of the park’s mooring buoy and marker system, with no changes to the existing network of mooring buoys and markers, or their associated maintenance. Maintenance of the existing mooring buoys and markers would be continued by volunteer efforts and on no regular schedule. Visitor access to mooring buoys and the ability of visitors to experience park resources would not be changed. There would be no change to existing navigational, informational, or regulatory markers in the park.

#### Existing Management Framework

Under current management, there is no formal framework in place to guide the park in placement of mooring buoys and markers. As such, decision-making and maintenance of the park’s mooring buoys and markers takes place on an as-needed basis and generally at the first-line level. No specific individual or group is currently assigned responsibility for direction or decision-making pertaining to mooring buoys or markers, due to other park priorities or lack of staffing.

Generally, placement of any new buoys or markers has been determined by individuals within the Maintenance, Visitor and Resource Protection, and Resource Management Divisions. For example, installation of mooring buoys has often coincided with research needs or safety concerns. Under Alternative A, this practice would continue. While grounding reports are logged by park staff, use of the information in managing markers is reactive rather than proactive in

terms of visitor safety or resource protection. No written criteria exist for determining levels that would warrant relocation or addition of markers.

Typically the division that determines a need for a new monitoring or research buoy or marker is assigned responsibility for its maintenance. Park personnel maintain navigational and informational markers. The Maintenance Division staff is responsible for different components of the system, such as purchasing of equipment and supplies. As a result, no comprehensive or parkwide schedule has been established to ensure that navigational aids are routinely maintained or replaced.

The recreational mooring buoys are maintained by a single volunteer who is currently responsible for all monitoring and repair tasks related to mooring buoys. Supplies and use of a park boat during monitoring and maintenance activities are provided by the park.

### **Maritime Heritage Trail**

Under current management, the Maritime Heritage Trail would continue to function as a loosely defined and marked visitor experience. Three of the six currently identified submerged archeological resources, the *Lugano*, the *Mandalay*, and the *19<sup>th</sup> Century Wooden Sailing Vessel*, are accessible using mooring buoys. No formal visitor information or maps are developed, and no additional mooring buoys are installed on sites appropriate or eligible for inclusion on the trail. The remaining three shipwrecks, the *Arratoon Apcar*, the *Alicia*, and the *Erl King*, are unmarked, and visitors are not aware of these resources or easily able to access them without the risk of anchor damage. There are currently no limits on anchoring near the shipwrecks; nor are there documented criteria used to determine eligibility for inclusion of additional shipwrecks on the Maritime Heritage Trail.

### **Current Mooring Buoys and Markers**

Most of the existing mooring buoys are located on park reefs and support diving, snorkeling, and fishing activities that take place along the reefs. There are 35 sites in the park where mooring buoys have been in place at some time. Currently mooring buoys are in use at 23 of those sites. The remaining 12 sites have been damaged at the submerged pin or have lost their buoys to storms or from use.

Under Alternative A, use of mooring buoys would continue to be regulated through the Superintendent's Compendium (NPS 2010e) which stipulates the distance that one vessel must maintain from another vessel, including at mooring buoys. Only one vessel may occupy a mooring buoy; i.e., rafting at mooring buoys is prohibited. In addition, the Compendium states that any vessel at anchor, or whose hull is being supported by the sea bottom, must maintain a distance of at least 100 feet from another vessel or rafted group of vessels. Exceptions to this regulation are provided in the Superintendent's Compendium.

Use of mooring buoys in the park is on a voluntary basis. Boats using the park are allowed to drop anchor according to the regulatory provisions in the Superintendent's Compendium. The 'no-anchoring' zones in the park are as follows: within Boca Chita Key Harbor, within Elliot Key Harbor, within the slow speed zone at the mouth of Boca Chita Key Harbor, within the slow speed zone at the mouth of Elliot Key Harbor, within the triangular area around the Legare Anchorage, and within any marked navigational channel. Anchoring restrictions are also in place at other areas within the park as identified in the Superintendent's Compendium.

Informational markers are also used in the park for scientific and restoration purposes, such as for water quality or sediment monitoring. Currently there are 11 science markers in the park that are attached to the bottom with an eye bolt set in concrete. The markers are installed after consultation with the U.S. Coast Guard and used to deploy submerged water sampling equipment and to indicate that there is a submerged hazard. (Small 'can' type buoys are typically

used for this purpose.) There are also five eye bolts installed at reef restoration sites to facilitate safe mooring for personnel working on restoration and monitoring at these sites.

As discussed in Chapter 1, markers can serve three primary purposes – 1) navigation, 2) information, or 3) regulation. Purposes include warning boaters of shallow conditions that pose danger for grounding incidents, guiding boaters through navigable channels which form the ‘highways of the park,’ informing the public of entry into park boundaries, notifying visitors of closed areas of the park, or denoting sites along the Maritime Heritage Trail. Due to insufficient markers, many of these critical functions are not being carried out.

There are approximately 93 NPS-managed markers within the park. In addition to demarcating channels, such as in and around Elliott Key and Boca Chita Harbors; they are also used to indicate swim areas, areas with slower speed requirements, the park boundary, and anchor areas. Industry standards are followed for the installation and maintenance of the mooring buoys and markers. For example, navigational buoys are installed by placing a pre-fabricated concrete pad, with attached chain, in sandy areas. Mooring buoys are either drilled and eye bolted to the bottom by drilling a 3-inch diameter hole into the substrate and filling it with cement after placing the mooring pin into the hole; or a manta pin (similar to a molly-bolt) is used which is driven into the sediments until the shaft remains just above the sediment surface. The shaft is then pulled out until the pulling resistance reaches a predetermined force. Embedded markers (pilings) are generally placed using drilling or pile driving, depending on sediment conditions.

### **Maintenance**

A volunteer maintains the buoy system and visually inspects mooring buoy sites annually, and also generally repairs or replaces mooring buoy components each year. Repairs and replacements are also made when buoys are reported missing or when deterioration is reported. The existing markers owned by the NPS are repaired and replaced on an as-needed basis, and are often in disrepair due to lack of funding and personnel. The maintenance of other markers found within the park boundary (e.g., Intracoastal Waterway, Hawk Channel, etc.) is the responsibility of the U.S. Coast Guard, Monroe and Miami-Dade Counties, or Florida Power and Light.

### **Monitoring**

There is currently no monitoring program in place to routinely assess the parkwide effects of mooring buoys or markers on park resources or visitor experiences. Monitoring of coral reefs, habitat restoration sites, and water quality is conducted for research and management purposes. However, these efforts are not related to parkwide mooring buoy and marker management.

### **Enforcement**

The park’s Visitor Protection Division is responsible for enforcing all boating safety and resource protection requirements in the park. Park Visitor Protection rangers regularly patrol park waters, warn and inform visitors, and issue citations when necessary. The Superintendent’s Compendium contains park-specific regulations that address closures and public use areas, preservation of park resources, camping, fires, and vehicular use (consistent with 36 CFR part II). Park visitor protection officers enforce these regulations, along with Florida state boating laws. The current level of visitor protection coverage is insufficient to adequately patrol activities in the park, especially during peak use and special events.

### **Education**

Information regarding the location of markers and mooring buoys is provided in park brochures and on nautical charts. Informational markers in the park are provided in English only. Because the trail is not officially “open,” information regarding the Maritime Heritage Trail is limited to



cultural resource information found on the park's website (<http://www.nps.gov/bisc/historyculture/maritime-heritage-trail.htm>). The sensitivity of resources to improper boating activity is currently not highlighted in the park brochure although some information of this type is available on displays on the mainland and islands within the park. Due to the multiple access points to enter the park, it is difficult to distribute information to all park boaters.

The park does not have mandatory boating education requirements, but as of Jan 1, 2010, the state has passed the following law: "Boat operators who were born on or after Jan 1, 1988, must pass an approved boating-safety course and possess photographic identification and a boating-safety education identification card issued by the Florida Fish and Wildlife Conservation Commission (FWC) to legally operate a boat with a motor of 10 horsepower or more." Details may be found at [http://www.myfwc.com/RULESANDREGS/Rules\\_Boat.htm#educ](http://www.myfwc.com/RULESANDREGS/Rules_Boat.htm#educ).

## **Partnerships**

### *U.S. Coast Guard Coordination*

NPS coordination with the U.S. Coast Guard currently includes identifying the locations and types of markers needed to support safe navigation in the park, and submitting applications for necessary installations. Once approved and installed, the U.S. Coast Guard would then issue an updated Notice to Mariners and coordinate with National Oceanic and Atmospheric Administration to have the markers placed on navigational charts.

The U.S. Coast Guard would continue to maintain some, but not all, navigational markers under the existing Memorandum of Agreement with the NPS, as described in Chapter 1.

### *Other Agencies*

Other markers in the park are placed and maintained by Miami-Dade County, Monroe County, and Florida Power and Light. Miami-Dade manages and maintains markers in the Herbert Hoover and Black Point marinas (along the park's western shoreline). Broad Creek (south end of the park) is marked and maintained by Monroe County, without coordination with the NPS. The channel to Turkey Point Power Plant (adjacent to park on the southwest) is managed and maintained by Florida Power and Light for access to its facility.

## **ALTERNATIVE B, STRATEGIC AND ADAPTIVE MANAGEMENT, THE PREFERRED ALTERNATIVE**

### **Introduction**

Alternative B would implement a defined management strategy and an adaptive management approach to the park's system of buoys and markers. This section will define the framework needed to successfully carry out this approach, identify key personnel and their roles, explain the adaptive management, and describe site-specific locations that are in need of management through mooring buoys and markers.

### **Management Framework**

Under Alternative B, Biscayne National Park would adopt a comprehensive system for managing the park's system of mooring buoys and markers. A decision-making framework would be used to determine when and where mooring buoys and markers may be needed, based upon specific site-selection criteria.

The park would identify the individual or group responsible for planning, decision-making, and maintenance of the system components. Adaptive management tools and techniques would be

used to meet plan objectives by using mooring buoys and markers. This approach would allow the park to be flexible in the use of tools to address issues such as boating safety, resource damage, crowding, and the need for increased variety of visitor experiences.

Criteria would be used to help guide the management team in its selection of appropriate sites and tools for implementation of mooring buoy and marker management. Three specific sets of criteria would guide the management team in identifying sites for inclusion in the trail, mooring buoy locations, and marker placement.

### **Roles and Responsibilities**

Biscayne National Park would utilize the interdisciplinary expertise of the management team, maritime operations specialists, and other park resources to implement the planning framework for future decision-making regarding the park's mooring buoys and markers. The management team would consist of the Superintendent, Assistant Superintendent, and Division Chiefs (e.g., Resources, Interpretation, Visitor Protection, Maintenance), with site-specific recommendations from park archeological and coral reef specialists. The team would use resource and visitor use information, in conjunction with desired conditions and site-specific criteria, in the decision-making process. Management actions would include, but not be limited to, strategic additions, repositioning, and removal of mooring buoys and markers, along with changes in anchoring restrictions, in order to improve safety, resource protection, and visitor experience.

### **Maritime Heritage Trail**

The Maritime Heritage Trail would be formalized under Alternative B in order to provide more information to visitors, provide for site protection through the installation of mooring buoys and prohibition of anchoring, and provide a means of controlling and quantifying visitor access to the sites (by means of adding or removing mooring buoys at the sites). The six currently identified sites of the trail would be promoted as destination locations, and interpretive information would be included in visitor information, maps, dive-cards, and submerged markers installed at the mooring sites. Mooring buoys would be added to the *Arratoon Apcar*, *Alicia*, and *Erl King*, thus providing mooring buoys on all sites. Additional buoys may be added (including high-weight capacity buoys designated for concessioner use only) to the currently buoyed sites, *Mandalay*, *Lugano*, and *19<sup>th</sup> Century Sailing Vessel*, and anchoring will be prohibited on all six of the sites. All of the mooring buoys will be installed via pins in hardbottom adjacent to, but not within, the shipwreck site area. Removal of buoys in the future may also occur as a means of limiting visitor access if conditions on the sites indicate degradation caused by increased visitation. Future additions to the Maritime Heritage Trail would be identified based on site criteria (characteristics), with one or more of the criteria required for the site to be included on the Maritime Heritage Trail as decided by the park management team:

1. NPS ownership/management of site.
2. Compelling cultural resource story.
3. Has at least one educational component which provides an opportunity to learn about the maritime history of South Florida.
4. May include resources other than shipwrecks.
5. Safe for visitors to explore independently.
6. Hardened site (not susceptible to damage from visitor use).
7. Few portable artifacts.
8. Increased visitation to site would not adversely affect other nearby resources including natural resources.

9. Site must be suitable for buoy installation.

### **Mooring Buoys and Markers**

Need for mooring buoys and markers in specific areas would be based upon existing and desired resource conditions, identification of available visitor use opportunities, safety concerns, research opportunities, infrastructure damage, or opportunities for strategic collaboration which could promote the protection of park resources and ease of navigation.

#### *Mooring Buoys*

Under Alternative B, use of mooring buoys would continue to be regulated through the Superintendent's Compendium which stipulates the distance that one vessel must maintain from another moored vessel, and that no rafting would be permitted at a mooring site. Changes to regulations in the Superintendent's Compendium that would affect mooring buoy and marker decision-making or management would be incorporated into this plan during routine reviews and updates conducted by the planning team. Criteria specific to site selection for mooring buoys would include, but may not be limited to:

1. Need for improved visitor safety at the location.
2. Site has chronic or periodic crowding that results in resource or visitor experience degradation.
3. Site has chronic or periodic visitor use conflicts.
4. Site provides for a variety of visitor experiences and uses.
5. Need to minimize resource damage.
6. Use of site will not damage sensitive resources or special-status species.
7. Infrastructure at or near site is used for mooring by visitors (e.g., tying boat to lighthouse on reef line).

#### *Markers*

Under Alternative B, changes to the park's marker system would be managed for safety, resource protection, and ease of navigation. Criteria specific to site selection for markers would include:

1. Improve safety of navigation.
  - Shallows, hazards, inter-visibility (place at appropriate distances).
2. Improve boundary demarcation.
3. Minimize resource damage.
  - Protect mangroves and reduce seabottom disturbance.
  - Corals and other species of concern.
  - Vulnerable cultural resources.
4. Demarcate special use zone or regulated area.

### **Maintenance**

Any park division that installs project-specific buoys and markers (such as water quality buoys installed by the Resource Management division) would be responsible for their continued maintenance. Otherwise, maintenance and changes to the mooring buoys and marker system would be the responsibility of the Maintenance Division.

Each marker, mooring buoy, and submerged pin would be inspected for overall condition on a regular basis. Condition assessments would be documented, and appropriate maintenance would take place either on a scheduled basis, or based on site-specific needs for visitor and staff safety, resource protection, and enhanced visitor experience. As a result, a monitoring and maintenance schedule would be created to ensure that mooring buoys and markers are routinely maintained or replaced, as needed.

Best management practices would be followed for the installation and maintenance of the mooring buoy and marker system. Under a new formalized mooring buoy and marker system, NPS natural and cultural resource managers would be involved in the decision of mooring buoys and marker placement and monitor installation to ensure that there is no damage to sensitive park resources.

### **Monitoring and Adaptive Management**

A formal program has been defined and would be implemented in which areas of the park proposed for management would be monitored in order to correlate the presence, number, and condition of mooring buoys and markers with desired resource condition, visitor experience, and/or safety conditions. Details of the desired conditions, triggers, for management, and potential adaptive strategies can be found in Table 2, below. Standards have been proposed for resource conditions, boat densities, visitor satisfaction, and safety that would be maintained. After implementation of site-specific actions using mooring buoys or markers, monitoring would then determine the effectiveness of the tool(s) used, and future decisions would use this information to maintain or alter the management approach.

For example, at mooring buoy sites, including those on the Maritime Heritage Trail, effects of visitor use and anchoring would be investigated at regular intervals. Resource conditions at mooring buoy sites would be compared against desired conditions, and site-specific management changes would be made where needed to ensure that desired conditions are being met.

Information would be gathered to track usage of buoys in relation to visitor trends or park needs. Visitor use of mooring buoy sites would also be documented via systematic visual surveys of mooring sites to document visitor use. Criteria would be formulated for determining levels which constitute overcrowding, and a system would be put into place to manage crowds during peak visitation. Information would also be used to improve high-quality solitary experiences at certain park locations, for visitors seeking that type of experience.

### **Enforcement**

Enforcement of state boating laws and park regulations would continue as described for Alternative A, but would receive a greater emphasis. To provide additional enforcement of laws and regulations, the Superintendent would pursue funding to increase visitor protection staffing. Increased boat patrols would have the advantage of increasing the number of visitor contacts within the park, which could prevent unsafe actions, visitor use conflicts, and resource damage, as well as increase boater education.

### **Education**

Alternative B would promote education of park visitors and distribution of information as an integral part of overall mooring buoy and marker management. Educational materials would be developed specifically to inform boaters of the use and purpose of mooring buoys and markers. These materials, as well as information on the markers themselves, may be translated into Spanish in order to better serve park visitors. Additional educational materials would be created to highlight the visitor opportunities provided on the Maritime Heritage Trail. All new educational materials would be available in the park and on-line. The park would continue to work with local marinas to provide information to visitors entering the park from these

locations. Boater education materials with specific Biscayne National Park information would be developed. These materials could be offered in-person, online, or through EcoMariner<sup>1</sup>. A boating safety course, similar to Ecomariner, could be made optional for park visitors who receive a boating citation from visitor protection officers.

### **Partnerships**

Under Alternative B, the park would explore numerous opportunities to collaborate with other agencies and groups that may have similar interests, goals, or audiences in order to decrease any potential duplication of services and share information. Enhanced partnerships would serve to distribute responsibility for management and maintenance, and would also improve distribution of educational and informational materials. Examples of governmental agencies that could be potential partners range from the National Oceanic and Atmospheric Administration, and the U.S. Coast Guard at the federal level, to Miami-Dade and Monroe counties at the local level. Nearby college and university programs may also be interested in research and internship opportunities within the park. Finally, local businesses that specialize in outdoor recreation may help to educate potential park visitors and keep the park's educational and informational materials on hand.

### **Proposed Site-Specific Actions**

The NPS has identified a variety of sites throughout Biscayne National Park where implementation of comprehensive mooring buoy and marker management would be of benefit to park resources, visitors, and overall park operations. Table 1 summarizes proposed site-specific actions that would be undertaken as part of Alternative B. Figure 2 shows locations of both existing mooring buoys and those mooring buoys proposed under Alternative B.

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<sup>1</sup> EcoMariner is a web-based educational tool used by boaters interested in coursework which fosters a better understanding of the local ecosystem. EcoMariner educates boaters on impacts to and stewardship of natural resources, but does not currently have a class specific to Biscayne Bay.

**Table 1. Proposed Site-Specific Management Actions under Alternative B**

Site	Management Action
<i>Park Boundary</i>	<p>Increase boundary and informational marking along all park boundaries to alert visitors on entry into Biscayne National Park. Potential sites include:</p> <ul style="list-style-type: none"><li>• Northern boundary near Stiltsville.</li><li>• The light north of Fowey Rocks near eastern boundary.</li><li>• Fowey Rocks light near eastern boundary.</li><li>• Light south of Pacific Reef.</li><li>• Southern boundary oceanside and along Card Sound.</li></ul>
<i>Stiltsville – Coral Shoal</i>	<p>Install a shallow-water mooring field where boaters currently congregate, with anchoring prohibited within mooring field.</p> <p>Increase visitor protection presence.</p> <p>Improve navigational markings.</p> <p>Place informational markers to reduce groundings.</p> <p>Impose speed restriction zone on approaches to and in vicinity of mooring field.</p>
<i>Stiltsville – Biscayne Channel</i>	<p>Impose speed restriction zone outside and adjacent to the channel to reduce groundings in this area.</p> <p>Place regulatory markers prohibiting personal watercraft (PWCs).</p> <p>Place informational markers for shallows.</p> <p>Place informational signage at commercial PWC rental at Key Biscayne and Miami locations to inform public on PWC restrictions in Biscayne National Park.</p> <p>Increase visitor protection presence.</p>
<i>Fowey Rocks</i>	<p>Place additional mooring buoys; prohibit anchoring.</p>
<i>Brewster and Star Reefs</i>	<p>Add mooring buoys; prohibit anchoring.</p>
<i>Soldier Key</i>	<p>Place informational markers to notify visitors of closures.</p> <p>Replace damaged and worn signage.</p>
<i>No Name Shoal</i>	<p>Place one lighted informational marker indicating hazard.</p>
<i>Black Point Marina / Channel</i>	<p>Provide educational information and regulatory and informational markers to indicate that PWCs are prohibited, manatee low-speed zone, lobster sanctuary area, and park boundaries.</p>

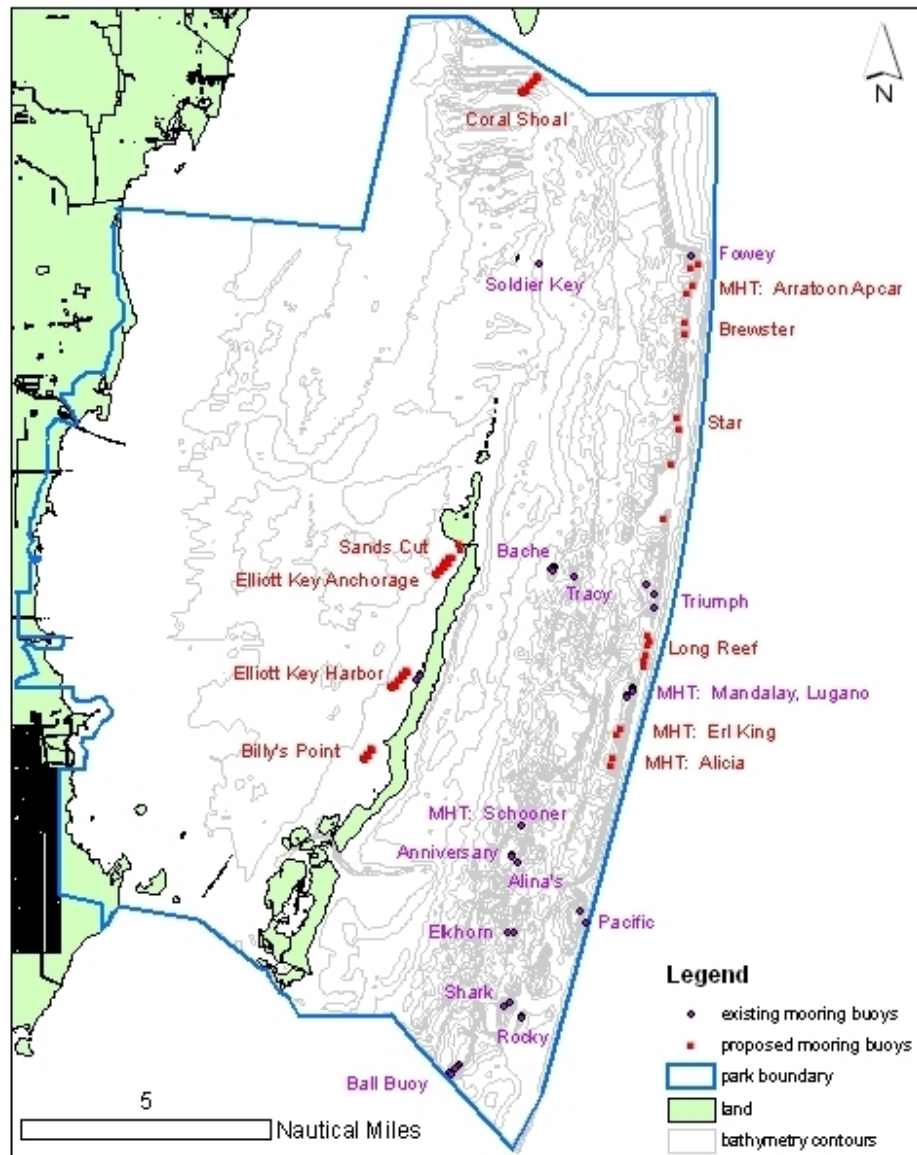
**Table 1. Proposed Site-Specific Management Actions under Alternative B**

Site	Management Action
<i>Featherbeds</i>	Relocate southern informational markers that are no longer on the southernmost edge of the East Featherbed shoal. Place more informational markers indicating shoals. Place lateral navigation markers to better guide boaters through the middle and east Featherbed; the USCG has volunteered to place these markers, which presents an opportunity for increased partnership with another agency.
<i>Legare Anchorage</i>	Place additional informational markers indicating area closure; include closure information on existing markers. Place educational information at the park marina regarding area closure.
<i>Sands Cut Shoals</i>	Add mooring buoy field or shallow-water mooring system north and south of Sands Cut. Prohibit beaching and anchoring within mooring field.
<i>Elliott Key Anchorage</i>	Add mooring buoy field; prohibit anchoring within the field.
<i>Sands Cut</i>	Replace damaged and worn informational signs on pilings which indicate shoals or danger.
<i>University Dock</i>	Place informational markers/signage indicating that overnight use is prohibited.
<i>Mainland Western Shoreline</i>	Enhance slow-speed signage for manatee protection.
<i>Convoy Point Channel</i>	Provide educational information and regulatory markers to indicate that PWCs are prohibited in Biscayne National Park, manatee low-speed zone, lobster sanctuary area, and park boundaries.
<i>Pelican Bank</i>	Inspect informational markers for proper maintenance and design consistency; replace, if necessary.
<i>Elliott Key Harbor and Vicinity</i>	Add up to 10 mooring buoys outside the harbor and prohibit anchoring. Place informational/regulatory marker which addresses noise concerns and indicates quiet hours, consistent with regulations included in the Superintendent's Compendium.
<i>East of Keys</i>	Add mooring buoy that is designated for NPS / concession use. Add additional mooring buoys for the wrecks <i>Erl King</i> , <i>Alicia</i> , and <i>Arratoon Apcar</i> for inclusion on the Maritime Heritage Trail; stipulate that anchor use is prohibited within mooring field. Add mooring buoys for visitor use of patch reefs.
<i>Billy's Point</i>	Add up to 10 mooring buoys; stipulate that anchor use is allowed when mooring buoys are occupied.

**Table 1. Proposed Site-Specific Management Actions under Alternative B**

Site	Management Action
<i>Caesar / Hawk / Pacific Channels</i>	<p>Pursue partnership/collaboration with USCG to improve markers in Hawk Channel and Pacific Channel.</p> <p>Place regulatory markers on existing navigational markers near Adams Key Dock to enforce slow-speed zone.</p> <p>Place informational markers on southern and southeastern end of Caesar Creek bank to indicate shoals.</p> <p>Add navigational markers between markers 17 and 19 in Hawk Channel.</p>
<i>Jones Lagoon and Southern Islands</i>	<p>Add informational and regulatory markers to indicate vessel restrictions at entrances to Lagoon.</p> <p>Otherwise, limit markers and buoys to preserve viewshed.</p>
<i>Arsenicker Keys and Cutter Bank</i>	<p>Place navigational markers on the edge of Intracoastal Waterway to direct boaters between markers 8 and 9 to the Intracoastal Waterway and away from shallow areas.</p>





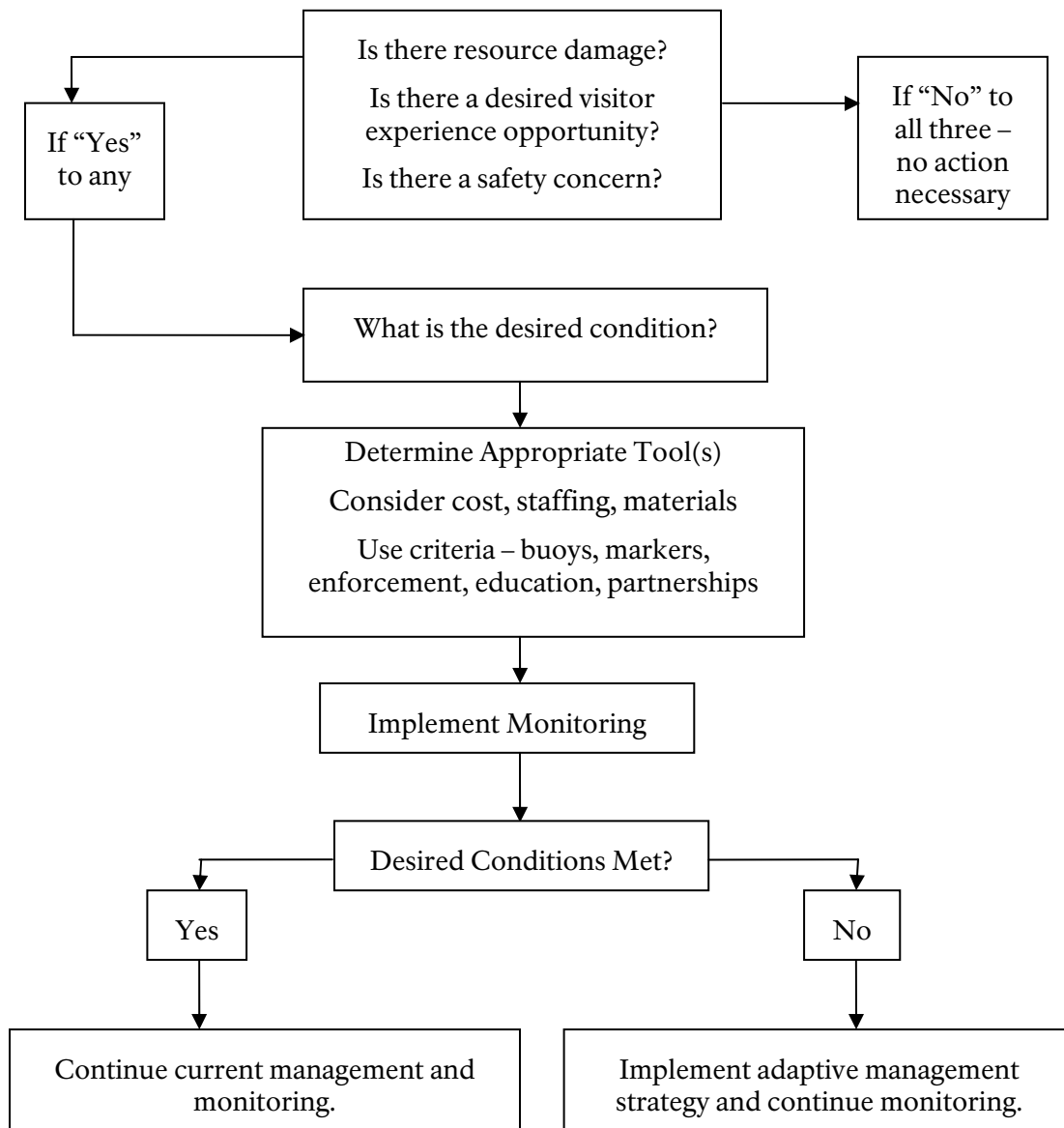
Note: Coral Shoal, Sands Cut, Elliott Key Anchorage, and Elliott Key Harbor are sites of proposed mooring fields. Mooring buoys are also proposed for various patch reefs.

**Figure 2. Existing Mooring Buoys / Proposed Mooring Buoys Under Alternative B**

### Potential Adaptive Management Strategies

Successful management of natural and cultural systems is a challenging and complicated undertaking. The Department of Interior requires that its agencies "... use adaptive management to fully comply" with the CEQ's guidance that requires "a monitoring and enforcement program to be adopted ... where applicable, for any mitigation" (516 DM 1.3 D(7); 40 CFR 1505.2). Adaptive management—management by experiment—is based on the assumption that current resources and scientific knowledge are limited. Nevertheless, an adaptive management approach attempts to apply available resources and knowledge and adjusts management techniques as new information is revealed.

The adaptive management approach can be divided into the following basic steps: (1) assessment, (2) design, (3) implementation, (4) monitoring, (5) evaluation, and (6) adjustment or continuation (Nyberg 1998). Ideally, the resulting management will improve as more information is gathered, analyzed, and incorporated into the process. Adaptive management integrates setting quantitative objectives, exploring alternative management strategies, monitoring progress, and evaluating performance in terms of risks and benefits (Goodman and Sojda 2004). Figure 3 illustrates the process for adaptive management of mooring buoys and markers at Biscayne National Park.



**Figure 3. Decision-Tree for Adaptive Management of Mooring Buoys and Markers**

Implementation of an adaptive management approach requires constant evaluation and includes an amount of uncertainty. Uncertainty inherent in this approach stems from four sources: (1)

uncontrollable environmental variation, (2) partial controllability (discrepancy between intended and actual management), (3) lack of understanding among those responsible for implementation, and (4) precision of monitoring, i.e., the applicability and success of decisions are dependent on the frequency and precision of monitoring (Williams 1997).

Adaptive management incorporates the scientific experimental method with the management process while remaining flexible enough to adjust to changes in resources and visitor use. The goal is to give decision-makers and resource managers a better framework for applying scientific principles to management decisions (Wall 2004).

After deciding on desired conditions for a particular resource or specific area of the park, the management team would then determine appropriate management tools for obtaining the desired outcome, while considering costs, staffing, and materials. Management tools could be any combination of additional or fewer mooring buoys or markers, increased visitor protection, enhanced education, or pursuit of partnerships with other agencies. Table 2 below provides examples of how mooring buoy and markers would be used adaptively to meet plan objectives. Note that all management actions will be preceded by consideration of costs, staffing, and materials.

**Table 2. Adaptive Management Framework for Mooring Buoy and Marker Management**

<i>Plan Objective</i>				
Resource	Desired Condition	Threshold for Management Action	Potential Management Tools	Example Adaptive Management Tools if Desired Condition Not Achieved
<i>Improve Resource Protection</i>				
Benthic Habitats	Condition of seagrasses and coral communities is maintained or improved by reducing anchor and propeller scarring and grounding damage.	Recorded instances of strikes or damage to benthic habitats exceed established baseline (e.g. – number of strikes or amount of damage in 2009).	Improve marking of shallows and navigation channels; install mooring buoys to limit anchor damage.	Select and implement appropriate tools to achieve desired condition.
<i>Special Status Species</i>				
Manatee	No serious injuries or fatalities occur in park from boating activities.	Number of reported and discovered manatee strikes and/or mortalities increases from baseline conditions (e.g. – number of strikes in 2009).	Improve slow-speed zone markings in manatee areas; increase visitor protection of speed zones near park's western shoreline.	Install regulatory markers to expand slow-speed areas or limit motorized boat activities in some areas of the park.
Sea Turtles	No serious injuries or fatalities occur in park from boating activities.	Any loss of suitable nesting habitat for sea turtles from baseline conditions (e.g. – habitat conditions in 2009).	Improve information markings and educational information on protection of sea turtle habitat.	Install informational and regulatory markers to indicate closed/restricted access areas.

**Table 2. Adaptive Management Framework for Mooring Buoy and Marker Management (Continued)**

<i>Plan Objective</i>				
Resource	Desired Condition	Threshold for Management Action	Potential Management Tools	Example Adaptive Management Tools if Desired Condition Not Achieved
Special-status Coral Species	Special-status corals are protected from vessel or anchor strike and from impacts of visitor use.	Recorded incidents of strikes or damage to listed coral species increases from baseline conditions (e.g. – number of strikes or amount of damage in 2009).	Improve markings of shallows and navigation channels; install mooring buoys to limit anchor damage; ensure that access to other visitor use sites does not endanger these species.	Relocate mooring buoys farther from sensitive sites; restrict access to these sites.
Cultural Resources	No degradation from current condition due to visitor use (some resources such as shipwrecks naturally erode in a marine environment).	Detectable decline in resource conditions (e.g., removal of portable artifacts, anchor damage).	Improve information markings and visitor education regarding protection of cultural resources from anchor damage, looting, and other inappropriate uses during boating activities.	Relocate mooring buoys farther from sensitive sites; restrict access to these sites.

**Table 2. Adaptive Management Framework for Mooring Buoy and Marker Management (Continued)**

<i>Plan Objective</i>				
Resource	Desired Condition	Threshold for Management Action	Potential Management Tools	Example Adaptive Management Tools if Desired Condition Not Achieved
<i>Improve Visitor Opportunities and Appreciation</i>				
Marine Resource Experience	Visitors have improved ability to experience the marine resources of the park in a safe and sustainable manner. Limit damaging effects of visitor use on sensitive resources.	Conditions at high-use sites are degraded and do not support appreciation of park resources.	Install mooring buoys, or mooring fields to limit anchor damage. Install mooring buoys at least 1,000 feet from sensitive resources (e.g. – special status corals or portable cultural resources) and prohibit anchoring.	Prohibit anchoring within mooring fields; specify visitor uses allowed at mooring buoy sites.
Solitary Experience	Visitors have improved opportunities to experience solitude and tranquility.	The park receives a written (through survey, email, etc) or verbal complaint about the inability to have a solitary experience.	Ensure sufficient areas in park without mooring fields.	Reduce number of mooring buoys within mooring fields and prohibit anchoring.
Reduce periodic or chronic crowding	Visitors have improved opportunities to experience park resources without excessive crowding or user conflict.	1) Visitor protection rangers deem an area to be unsafe because they have difficulty accessing an area; or 2) the park receives a written (through survey, email, etc) or verbal complaint stating that an area is overcrowded or unsafe.	Eliminate beaching; install mooring buoys or mooring buoy fields to reduce densities.	Use information and regulatory markings to control boating activities (e.g., define swim areas and limit boat access).

**Table 2. Adaptive Management Framework for Mooring Buoy and Marker Management (Continued)**

<i>Plan Objective</i>				
Resource	Desired Condition	Threshold for Management Action	Potential Management Tools	Example Adaptive Management Tools if Desired Condition Not Achieved
<i>Improve Public Health and Safety</i>				
Improve safety of navigation	Access to park is provided along safe and well-marked navigation routes; park has reduced boating accidents, including groundings, by more effective marking.	Number of reported groundings and boating accidents is not reduced from current rates.	Improve marking of shallows and navigation channels.	Use information and regulatory and navigational markings to control boating activities.
Reduce boat densities during high-use season and at special events	Reduced densities will decrease visitor conflicts, limit resource damage, and allow safe access by visitor protection and emergency services, if needed.	Number of visitor conflicts and visitor protection incidents related to crowding at sites and events is not reduced from current levels.	Eliminate beaching; install mooring buoys or mooring buoy fields to reduce densities	Use information and regulatory markings to control boating activities (e.g., define swim areas and limit boat access).

**ENVIRONMENTALLY PREFERRED ALTERNATIVE:** In accordance with DO-12, the NPS is required to identify the “environmentally preferred alternative” in all environmental documents, including EAs. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. The CEQ provides direction that “[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of NEPA, which considers:

- fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
- assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserving important historic, cultural and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
- achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life’s amenities; and
- enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (NEPA, section 101).”

Generally, these criteria mean the environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (Federal Register 1981). Based on the above evaluation, it has been determined that Alternative B would be considered the environmentally preferred alternative. Alternative B (the Preferred Alternative) includes actions to address immediate needs within the park to protect both natural and cultural resources, which fulfills the role of the park as trustee of the environment for future generations. Additionally, enhancement of the Maritime Heritage Trail extends the range of visitor experience while also promoting the protection of the park’s submerged archeological resources. The plan also includes measures to reduce visitor crowding, thus assuring a safe and healthful surrounding for park visitors. Finally, the plan includes elements designed to improve safety of navigation, thereby reducing risk of health or safety within the park.

## **COMPARISON OF THE ALTERNATIVES**

Table 3 shows the ability of the two alternatives to meet the project objectives. This provides a way to quickly compare and contrast the degree to which each alternative accomplishes the purpose or fulfills the need identified in the “Purpose and Need” section above.



**Table 3. Objectives and the Ability of the Alternatives to Meet Them**

Objective	Alternative A	Alternative B
<b>Navigational Aide and Mooring Buoy Management</b>		
<i>Establish siting criteria for mooring buoys and markers that would identify appropriate areas for installation.</i>	Under Alternative A, such criteria would not be established. This objective would not be met.	Under Alternative B, such criteria would be established by the management team. This objective would be met.
<i>Define who would be responsible for planning and decision-making for future sites (such as the management team).</i>	Under Alternative A, planning and decision-making would continue to take place in an <i>ad hoc</i> fashion. This objective would not be met.	Under Alternative B, the management team would be responsible for planning and decision-making pertaining to mooring buoys and markers. This objective would be met.
<b>Natural and Cultural Resources</b>		
<i>Install additional mooring buoys for enhancement of interpretation and visitor experience of the park's cultural resources, such as the Maritime Heritage Trail.</i>	Under Alternative A, the installation of additional mooring buoys along the Maritime Heritage Trail would not occur; therefore, interpretation and visitor experience would not be enhanced. This objective would not be met.	Under Alternative B, all six shipwrecks currently eligible for inclusion on the Maritime Heritage Trail would be buoyed, increasing opportunities for visitor experience and appreciation of the park's cultural resources. This objective would be met.
<i>Install additional mooring buoys on and near benthic communities frequented by park visitors.</i>	Under Alternative A, the installation of additional mooring buoys on and near benthic communities would not occur. This objective would not be met.	Under Alternative B, additional mooring buoys would be installed in Biscayne Bay and along the Florida reef tract, near benthic communities that support high-quality visitor experiences. This objective would be met.
<i>Provide better marking of restricted and hazardous areas to prevent resource damage.</i>	Under Alternative A, the park's system of markers would not be improved and therefore not contribute to prevention of resource damage. This objective would not be met.	Under Alternative B, the park's system of markers would be improved and therefore help to prevent resource damage. This objective would be met.

**Table 3. Objectives and the Ability of the Alternatives to Meet Them  
(Continued)**

Objective	Alternative A	Alternative B
<b>Visitor Use / Public Safety</b>		
<i>Prevent groundings to ensure public health and safety.</i>	Under Alternative A, existing markers would remain in place; no added measures would be enacted to help prevent groundings.  This objective would be partially met by existing markers.	Under Alternative B, increased navigational markers would be installed to help prevent groundings, thus promoting an increased level of public health and safety in the park.  This objective would be met.
<i>Inform visitors of entry into Biscayne National Park through better boundary markers and signage (in appropriate languages).</i>	Under Alternative A, no added informational markers would be installed.  This objective would not be met.	Under Alternative B, increased informational markers would be installed, including those that delineate park boundaries and those that are bilingual.  This objective would be met.
<i>Facilitate safe navigation of hazardous areas in the park.</i>	Under Alternative A, existing navigation markers would remain in place; no added navigational markers would be installed.  This objective would be partially met by the existing markers.	Under Alternative B, navigational markers would be enhanced; thereby facilitating safer passage through the park's main channels.  This objective would be met.
<i>Increase variety of experiences related to diving and snorkeling sites while minimizing or avoiding impacts to sensitive natural resources such as corals and benthic communities.</i>	Under Alternative A, the number of mooring buoys would not change and no new visitor opportunities would be introduced.  This objective would not be met.	Under Alternative B, mooring buoys would be installed on the Maritime Heritage Trail, in Biscayne Bay, and at select sites along the Florida reef tract to provide visitor opportunities to experience and appreciate seagrass and coral communities.  This objective would be met.
<i>Re-establish appropriate visitor uses in the park.</i>	Under Alternative A, inappropriate visitor uses would continue, especially at high-use site during peak use. No specific actions would be taken to address the issues that result from crowding and visitor conflicts.  This objective would not be met.	Under Alternative B, visitor access to and use of specific areas would be better controlled by the park. Increased visitor protection presence during peak use would encourage appropriate behaviors and uses.  This objective would be met.

**Table 3. Objectives and the Ability of the Alternatives to Meet Them  
(Continued)**

Objective	Alternative A	Alternative B
<b>Park Operations</b>		
<i>Identify roles and responsibilities for maintenance of existing and new buoys and markers, including specification of the agency which is responsible and the division within the NPS which is responsible.</i>	<p>Under Alternative A, responsibilities for and maintenance of the park's buoys and markers would continue to take place in an <i>ad hoc</i> manner and without clear specifications of responsible agencies.</p> <p>This objective would not be met.</p>	<p>Under Alternative B, the maintenance division would be responsible for ensuring proper maintenance of the park's buoys and markers. The management team would communicate with other agencies that share responsibilities for placing and maintaining markers.</p> <p>This objective would be met.</p>
<i>Identify funding sources for plan implementation, including installation of new buoys and markers.</i>	<p>Under Alternative A, the party responsible or methods used to obtain funding would not be identified.</p> <p>This objective would not be met.</p>	<p>Under Alternative B, the management team would be responsible to ensure funding is available for proposed actions and long-term management of the system.</p> <p>This objective would be met.</p>
<i>Ensure that boat densities do not exceed levels that prevent or inhibit access for emergency service vehicles.</i>	<p>Under Alternative A, popular visitor use sites would continue to be crowded during peak use times, and difficulty in emergency access would persist.</p> <p>This objective would not be met.</p>	<p>Under Alternative B, access to popular visitor use sites would be controlled using mooring buoy fields and increased presence of visitor protection. Reduced boat densities at these sites would allow for safe emergency response, when needed.</p> <p>This objective would be met.</p>
<b>Education</b>		
<i>Provide navigational information on restricted areas.</i>	<p>Under Alternative A, navigational markers denoting restricted areas would not be enhanced.</p> <p>This objective would be partially met by the park's existing information and regulatory markers, navigation charts, and the Superintendent's Compendium.</p>	<p>Under Alternative B, navigational markers denoting restricted areas would be enhanced, thereby increasing protection of park resources such as Jones Lagoon.</p> <p>This objective would be met.</p>

**Table 3. Objectives and the Ability of the Alternatives to Meet Them  
(Continued)**

Objective	Alternative A	Alternative B
<i>Provide appropriate bilingual messaging to facilitate navigation and enhance protection of park resources.</i>	Under Alternative A, installation of bilingual markers is not anticipated. This objective would not be met.	Under Alternative B, bilingual markers would be installed, thereby facilitating improved navigation and enhanced resource protection. This objective would be met.
<i>Educate visitors on the importance of mooring buoys in protecting the park's resources.</i>	Under Alternative A, visitors are not actively educated on the importance of mooring buoys. This objective would not be met.	Under Alternative B, visitor education would include measures to emphasize the importance of mooring buoys in protecting the park's resources. This objective would be met.

## SUMMARY OF IMPACTS

Table 4 briefly summarizes the effects of each of the alternatives on the impact topics that were retained for analysis of the spreader swales pilot project. The impacts summarized in this table include both direct and cumulative impacts. More detailed information on the effects of the alternatives is provided in the "Affected Environment and Environmental Consequences"

**Table 4. Summary of the Impacts of the Alternatives**

Resource Topic	Alternative A	Alternative B
<i>Benthic Habitats</i>	For Alternative A, impacts from continuing current management in the park would be long-term, parkwide, minor to moderate, and adverse. Impacts from other projects and plans would be long-term, parkwide, minor to moderate, and beneficial. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, parkwide, minor, and beneficial.	For Alternative B, short-term impacts would be localized, negligible to minor, and adverse. Adverse long-term impacts would be localized and negligible to minor. Beneficial long-term impacts would be localized (offshore) and minor to moderate. Impacts from other projects and plans would be long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial.

**Table 4. Summary of the Impacts of the Alternatives  
(continued)**

Resource Topic	Alternative A	Alternative B
<i>Water Resources</i>	For Alternative A, impacts would be short to long-term, localized, negligible to minor, and adverse. Impacts from other project and plans would be long-term, localized (i.e., nearshore), minor to moderate, and beneficial. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, localized, minor to moderate, and beneficial.	For Alternative B, impacts to water quality would be long-term, localized (offshore), negligible to minor, and beneficial. Impacts from other projects and plans would be long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial
<i>Wildlife, Fish, and Essential Fish Habitat</i>	For Alternative A, impacts would be short-term, localized, and negligible to minor. Adverse impacts on wildlife would result from temporary disturbances. Impact to habitat would be long-term, localized, negligible to minor, and adverse. The No Action Alternative would have no adverse effect on essential fish habitat. The impacts of the other plans and projects would be long-term, parkwide, moderate, and adverse. Other plans and projects would have adverse effects on essential fish habitat. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, moderate, and adverse.	For Alternative B, impacts would be short-term, localized, and negligible to minor. Adverse impacts on wildlife would result from temporary disturbances. Impact to habitat would be long-term, localized, negligible to minor, and beneficial. Alternative B would have no adverse effect on essential fish habitat. The impacts of the other plans and projects would be long-term, parkwide, moderate, and adverse. Other plans and projects would have adverse effects on essential fish habitat. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, moderate, and adverse.
<i>Special Status Species</i>	For Alternative A, impacts would be long-term, localized, and moderate adverse. This equates to a <i>may affect, likely to adversely affect</i> finding under Section 7 of the Endangered Species Act. Overall cumulative effects would be widespread, long-term, adverse, and major. Actions under the No Action Alternative would contribute incrementally to these effects.	For Alternative B, adaptive management would provide long-term minor benefits to elkhorn and staghorn coral. This would result in a <i>may affect, not likely to adversely affect</i> finding under Section 7 of the Endangered Species Act. Cumulative effects would continue to be widespread, long-term, major and adverse. Actions under Alternative B would not notably reduce the overall adverse effects.

**Table 4. Summary of the Impacts of the Alternatives**

Resource Topic	Alternative A	Alternative B
<i>Cultural Resources - Archeology</i>	For Alternative A, impacts would be direct, localized moderate, long-term, and adverse. The combined effects of past actions and events, ongoing natural threats (time, weather and wave action), and future projects would have a long-term, moderate, adverse cumulative effect on the submerged archeological resources on the Maritime Heritage Trail and on the Offshore Reefs Archeological District. For Section 106 compliance purposes, implementation of Alternative A would have <i>an adverse effect</i> on the historic properties of Biscayne National Park.	For Alternative B, impacts would be direct, localized moderate, long-term and beneficial. The combined effects of past actions and events, ongoing natural threats (time, weather and wave action), and future projects would have a long-term, minor, adverse cumulative effect on the submerged archeological resources on the Maritime Heritage Trail, and to a greater extent, on the Offshore Reefs Archeological District. For Section 106 compliance purposes, implementation of Alternative B would have <i>no adverse effects</i> on the historic properties of Biscayne National Park.
<i>Visitor Use and Experience</i>	For Alternative A, impacts would be parkwide, long-term, minor to moderate, and adverse. In combination with the long-term, parkwide, minor, and beneficial effects from other projects, plans, and local and regional actions, cumulative effects on visitor experience and appreciation would be parkwide, long-term, negligible, and adverse.	For Alternative B, impacts would be parkwide, long-term, minor, and beneficial. In combination with the long-term, minor, and beneficial effects from other projects, plans, and local and regional actions, cumulative effects on visitor experience and appreciation would be long-term, parkwide, minor, and beneficial.
<i>Public Health and Safety</i>	For Alternative A, impacts would be long-term, localized, negligible to moderate, and adverse. Cumulatively, the effects of other projects and safety hazards in the park, combined with the effects of the No Action Alternative, would result in short- and long-term, minor to moderate, adverse impacts on public health and safety in the park.	For Alternative B, impacts would be long-term, localized, negligible to minor, and beneficial. Cumulatively, the effects of other projects and safety hazards in the park, combined with the effects of the No Action Alternative, would result in long-term, negligible to minor beneficial impacts on public health and safety.

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**Table 4. Summary of the Impacts of the Alternatives**

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<b>Resource Topic</b>	<b>Alternative A</b>	<b>Alternative B</b>
<i>Park Operations</i>	For Alternative A, impacts would be long-term, negligible to moderate, and adverse. Cumulatively, the effects of other projects and park operations, combined with the effects of the No Action Alternative, would result in long-term, minor to moderate, adverse impacts on the operations and management of the park.	For Alternative B, impacts would be long-term, parkwide, negligible to moderate, and beneficial; as well as long-term, localized, negligible to minor, and adverse. Cumulatively, the impacts of Alternative B in combination with the impacts of other plans and projects would result in long-term, minor to moderate beneficial cumulative impacts.

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## CHAPTER 3: AFFECTED ENVIRONMENT

Detailed information on resources in (park) may be found in the park's General Management Plan. A summary of the resources that may be affected by this project follows.

### BENTHIC HABITATS

#### Introduction

Because of the park's shallow depths and clear water, its productivity is largely based on benthic (bottom) habitat. Submerged habitat in Biscayne National Park constitutes over 95 percent of the park. Of this submerged habitat, dense seagrass beds cover almost half, and hardbottom areas (hard and soft corals and sponges) another 25 percent (Lewis *et al.* 2000; Browder *et al.* 2005). Corals and seagrass meadows also have important algal components. Each of these communities supports various life stages for a variety of marine mammals, birds, reptiles, fish, and invertebrates. Several of these organisms are legally protected species, such as manatees and sea turtles, and many others are of recreational and commercial value. Other habitats in the park include mangroves, hardwood hammocks, sandy beaches, and rocky intertidal areas (Browder *et al.* 2005; Lirman *et al.* 2008). Because the proposed action involves placement of buoys and markers in open water areas of the park, no impacts to terrestrial habitats are expected. Similarly, mangrove forests are an important component of the park's marine ecosystem (Sasso and Patterson 2000).

#### Seagrass Meadows

Seagrasses are unique marine flowering plants that grow in shallow, subtidal, or intertidal unconsolidated sediments. Seagrass beds are valuable natural resources that provide a variety of benefits to the marine environment. These benefits include stabilizing marine sediments, biogeochemical cycling, decreasing wave energy, and providing nursery habitat and feeding grounds for many vertebrate and invertebrate species, including several endangered species (Porter and Porter 2002). Seagrass beds are highly productive. A single acre of seagrass can produce over 10 tons of leaves per year and can support as many as 40,000 fish and 50,000,000 invertebrates (Smithsonian Marine Station at Fort Pierce 2010). Nutrient uptake by seagrass blades, the plants growing on the seagrass ("epiphytes"), and macroalgae growing among the seagrass can improve water quality (Fonseca *et al.* 1998). Three species are predominant in the park – turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*) (Figures 3, 4, and 5)(Browder *et al.* 2005; Lirman *et al.* 2008). Another species – *Ruppia maritima* (Johnson seagrass) is federally listed as threatened. It occurs on sandbars exposed during low tide as well as deep tidal channels (U.S. Fish and Wildlife Service 1999c).

Turtle grass, the most common, has wide leafy blades with rounded tips and a deep root structure; it forms most of the large, extensive seagrass meadows found in the park. The thick, fibrous rhizomes from which the individual shoots originate are often located in excess of 8 inches into the sediment (Dawes *et al.* 2004).

Shoal grass is an early colonizer of disturbed areas. It usually grows in water too shallow for other species, and often experiences regular exposure at low tides. It is noted for its relative tolerance to desiccation once rooted and commonly forms large round patches reaching 100 feet in diameter on extensive meadows on shallow shoals and flats. Rhizomes are fairly shallow, rarely deeper than two inches, and roots may extend for 10 inches or more.



Rhizomes may extend into the water column with attached short shoots (U.S. Fish and Wildlife Service 1999c, Dawes *et al.* 2004).

Manatee grass is easily recognizable because its leaves are cylindrical with rounded tips that arise in groups of two from short shoots. The rhizome system varies in depth between 1 and 10 cm (0.4 and 4 in.) and rhizomes may extend into the water column with attached shoots. Manatee grass is usually found together with *Halodule* spp. (Dawes *et al.* 2004).



**Figure 4. Turtle grass (*Thalassia testudinum*)**



**Figure 5. Shoal grass (*Halodule wrightii*)**



**Figure 6. Manatee grass (*Syringodium filiforme*)**

Commercial and recreational boating and fishing can cause significant physical damage to seagrass habitats. Most of the seagrass beds in the park show some signs of boat scarring. According to Lewis *et al.* (2000), there are over 11,220 acres of propeller scarred seagrass

beds in Miami-Dade County marine waters, much of it in the park. Recovery may take months to years (Browder *et al.* 2005). According to Sargent *et al.* (1995), areas of moderate to severe scarring include Cutter Bank, Midnight Pass/Arsenicker keys, Caesar Creek, Sands Cut, Pelican Bank, Featherbed Bank, Boca Chita Key, Black Ledge, and Biscayne Channel-Stiltsville (Figure 1).

## Coral

Areas of the benthic environment lacking sediment are called hardbottom. The exposed limestone substrate provides habitat for attachment of sessile organisms such as hard and soft corals, sponges, and algae (Cropper *et al.* 2001; Lirman *et al.* 2004). Coral habitats are important for the development of many juvenile fish and invertebrate species, such as the spiny lobster (*Panulirus argus*) (Marx and Herrnkind 1986). Coral reefs are among the most biologically diverse and productive ecosystems in the world (Robles *et al.* 2005).

The coral reef tract (“reef platform”) lies due east of the keys and comprises the northernmost extension of living coral reefs in the United States. Common reefs types in the park include patch reefs and bank-barrier reefs. There are about 4,000 patch reefs in the park. Common circular reef corals include *Montastrea* spp., *Porites* spp., *Siderastrea siderea*, *Colpophyllia natans* and *Diploria clivosa*; common linear reef corals include *Acropora palmata* (elkhorn) and *A. cervicornis* (staghorn) (Figures 6 and 7)(Robles *et al.* 2005).



Figure 7. Staghorn coral (*Acropora cervicornis*)



Figure 8. Elkhorn coral (*Acropora palmata*)

A west-to-east profile across the reef tract reveals two major zones: the back reef and outer reef (or fore reef). Intermittent patch reefs, sea grass beds, and sand lenses make up an

irregular pattern of shallow banks and relatively deeper channels within the back reef zone. The outer reef forms the seaward edge of the reef platform, and usually consists of a series of terraces that increase in depth to the east (Browder *et al.* 2004).

Declines in and poor recovery of two patch reef corals – staghorn and elkhorn coral – compelled the protection of both corals under the Endangered Species Act as threatened species in 2006. Population declines began in the late 1970s. Reasons include coral bleaching and disease (e.g., white band disease), as well as storm damage and predation from snails and damselfishes (National Oceanic and Atmospheric Association 2008). (See *Special Status Species* for more details.)

*Gorgonians* are one of the most characteristic and easily recognizable components of the shallow-water, hard-bottom, and coral-reef communities of the tropical Atlantic. As host or refuge for a large number of parasitic, symbiotic, commensal, and epizoid plants and animals, these corals are important elements in tropical marine ecosystems. *Gorgonians* do not participate directly in the reef-building process; however, they may contribute a significant amount of calcium carbonate, in the form of microscopic calcareous spicules, to the surrounding sediments (Opresko 1973). *Gorgonians* are common throughout the reef tract, in particular at Soldier Key, Boca Chita Pass, Red Reef, and also occur within Biscayne Bay proper, though likely with different compositions resulting from different ecological conditions; at least 29 species of *Gorgonians* occur within the park. Environmental variables influencing the distribution of *Gorgonians* in the park include temperature, salinity, illumination, sediments, and currents (Opresko 1973).

The decline of corals in southeast Florida has been a concern from some time (Gischler 2007). It is generally assumed that multiple stressors are acting locally, regionally, and globally to the decline in coral ecosystems (Wheaton *et al.* 2001). Several studies have documented the impact of human activity in the northern portions of the Florida Keys (e.g., Dustan and Halas 1987, Dupont *et al.* 2008). Within the park, coral reefs have been adversely affected by boating (e.g., strikes, anchors), snorkeling and diving activities (e.g., touching, collecting), fishing (e.g., anchors, line and other gear), degraded water quality, and the cascading ecological effects of overfishing. Recovery may require a few to several years (Done *et al.* 1991).

Sponges are most common in hard bottom areas with moderate currents, constant salinity, low rates of sedimentation, limited vegetation, and shallow, coarse substrate. Many of these areas are in the central bay (Cantillo *et al.* 2000). Within these hard bottom communities, the most common sponges are the loggerhead sponge (*Spheciospongia vesparia*) and the basket sponge (*Ircinia campana*) (Florida Department of Environmental Protection 2010a); other sponge species that occur in the park include the black-ball sponge (*Ircinia strobilina*) and the fire sponge (*Tedania ignis*) (NPS 2006j).

## Marine Algae

A variety of macroalgal species occur as parts of seagrass, reefs, and hard-bottom habitats. They occur primarily in the eastern and central portions of the bay (Browder *et al.* 2005) and may be attached (e.g., *Halimeda* spp., *Batophora* spp., and *Penicillus* spp.) or adrift (e.g., *Laurencia* spp., *Chondria* spp., and *Dictyota* spp.). Algae may be attached to sediments, rocky outcroppings, and to seagrass itself. Drift algae form large unattached masses along the bay bottom and drift about with tides and currents. Calcareous green algae (*Halimeda* spp.) are recognized as major carbonate sediment producers and grow in compact clumps and large, cushion-like mats. These algal species represent components of reef and seagrass habitat that are important for many species of fish and invertebrates. Like seagrass and corals, algal

species can be adversely impacted by changes in water quality and vessel groundings (Lirman *et al.* 2004, Biber and Irlandi 2006).

Algal “blooms” have been implicated in the decline of seagrass (Hall *et al.* 1999). The blooms are sudden, and sometimes persistent, increases in microscopic blue-green algae (“phytoplankton”) that naturally occur in the marine environment, although usually in low numbers. Algal blooms have been noted for southern Biscayne Bay, but are most likely linked to hurricane storm surges and related increases in storm runoff from land that increase the amount of phosphorus in the water (Rudnick *et al.* 2006).

## WATER RESOURCES

Biscayne Bay sits within a shallow limestone basin bounded on the east by the Florida Keys and on the west by the Atlantic Coastal Ridge. It covers about 270 square miles and drains a watershed of about 1,200 square miles (Florida Department of Environmental Protection 2010b). The average depth is approximately six feet, with a maximum depth of about 13 feet, although some dredged areas are more than 40 feet deep (Browder *et al.* 2005). Fresh water sources include direct precipitation (roughly half), diversion canals, small tributaries, runoff, and groundwater (Caccia and Boyer 2005). Rainfall occurs in distinct seasonal cycles with a rainy season between June and November (75 percent of annual precipitation) and a dry season between December and May (Duever *et al.* 1994; Lodge 2005). The waters of Biscayne Bay and its natural tributaries are designated as Outstanding Florida Waters (§ 403.061[27], Florida Statutes). As such, they receive the highest level of state protection from degradation.

Prior to the 20<sup>th</sup> century, Biscayne Bay was hydrologically connected to the larger South Florida ecosystem through small streams, sloughs, surface sheet flows, and groundwater flows. As this water moved through extensive wetlands, mangrove forests, and limestone aquifers, it became clear, highly oxygenated, and naturally low in nutrients. Natural sediments were primarily quartz sand carried by longshore coastal transport, carbonate shell sand, carbonate mud, and organic material derived from organisms within the bay or generated in nearby mangrove forests (Browder *et al.* 2005).

To accommodate development in south Florida in the 20<sup>th</sup> century, an extensive system of levees, canals, and water control structures was constructed to provide flood control, and water supply for municipal, industrial, and agricultural uses; and to prevent saltwater intrusion. Much of this work commenced in the middle of the last century (Comprehensive Everglades Restoration Plan 2010). Today, the bay's watershed is the most highly urbanized area in Florida, with much of the surrounding land converted to agriculture (U.S. Fish and Wildlife Service 1999c). Direct impacts to the natural flow regime include disruption or elimination of overland sheet flows, changes in the location and timing of flows, and changes in water quality (Sklar *et al.* 1999; Browder *et al.* 2005). Surface flows into Biscayne Bay are now predominantly controlled by the South Florida Water Management District. Surface water flows from 17 surface water management basins that enter Biscayne Bay by way of 19 canals (Cooper and Lane 1987). Overall, the flow of freshwater to the bay has decreased (McPherson and Halley 1996). Development also eliminated many of the inland and nearshore wetlands that once cleansed surface flows entering the bay (Browder *et al.* 2005).

The position of the northern end of the Florida Keys typically limits the mixing of the bay's fresh-to-brackish waters from the Atlantic's saltier water. However, dredging of navigation inlets has increased the direct exchange with the ocean (Browder *et al.* 2005; Caccia and Boyer 2007) and made bay water saltier and, under some conditions, hypersaline. These changes adversely impact the overall health of the bay ecosystem (Davis and Ogden 1994, McPherson and Halley 1996).

Although water in the bay meets or exceeds standards for recreation and fish and wildlife, the bay "still receives dissolved nutrients, trace metals, organic chemicals, and suspended sediments via stormwater runoff, sewage overflows, discharges from industrial facilities or vessels, and canal discharges. Canal water typically has lower dissolved oxygen and clarity and higher concentrations of contaminants than receiving waters of the bay" (Browder *et al.* 2005).

Algal "blooms" are sudden, and sometimes persistent, increases in microscopic blue-green algae ("phytoplankton") that naturally occur in the marine environment, although usually in

low numbers. Blooms can cause normally clear water to become cloudy. Such blooms have been noted for southern Biscayne Bay, but are most likely linked to hurricane storm surges and related increases in storm runoff from land that increase the amount of phosphorus in the water (Rudnick *et al.* 2006).

## WILDLIFE, FISH, AND ESSENTIAL FISH HABITAT

### Introduction

Biscayne National Park supports rich, diverse biological communities that include sand and mud flats, estuaries, seagrass meadows, mangrove forests, and hard-bottom habitats (e.g., soft and hard corals, and sponges). Fully 95 percent of the park is submerged or regularly inundated, but uplands such as hardwood hammocks and beaches provide other important habitats as well (Sasso and Patterson 2000, Browder *et al.* 2005). These communities provide shelter, and important nesting, nursery, and roosting areas for 512 species of fish, approximately 190 bird species, 34 species of reptiles, 28 mammal species, 6 species of amphibians, 8 crustacean species, and a multitude of insects and other invertebrates (NPS 2008).

### Fishes

Submerged habitats provide important nursery habitats and food web links for both tropical and temperate fish species (Florida Department of Environmental Protection 2010a). Although tropical species make up the majority, species composition differs seasonally, with more tropical species found in the summer months and temperate species partially replacing tropical species at the edge of their range in the winter months. Biscayne Bay supports a large year-round fishery with over 100 species of commercial and recreational importance. Gray snapper (*Lutjanus griseus*), schoolmaster snapper (*Lutjanus apodus*), barracuda (*Sphyræna barracuda*), and various grunts (*Haemulon spp*) use mangrove forests for nursery habitat, feeding, and shelter; and, tarpon (*Megalops atlanticus*) frequent waters adjacent to mangrove roots (Ault *et al.* 2001; NPS 2008a; Florida Department of Environmental Protection 2010a; Florida Museum of Natural History no date). Total species richness is highest in habitats near mangroves (Nagelkerken *et al.* 2001). The coastal and coral reef habitats in the park also play a critical role in the function and dynamics of the larger Florida Keys coral reef ecosystem by providing nursery habitat and food web links. Notable reef species that depend on bay-wide habitats include snapper, grouper, grunts, barracuda, spadefish, parrotfish, and surgeonfish and triggerfish (Cantillo *et al.* 2000; Ault *et al.* 2001; Serafy *et al.* 2003; Browder *et al.* 2005).

The park's fish communities are under increasing pressure from commercial and recreational fishing in the bay. Fishing has adversely impacted several stocks, with several species overfished according to federal standards. A series of management actions (e.g., closures, and size, season, and bag limits) were implemented by federal and state agencies to address the situation. Fishing stocks are also adversely affected by habitat degradation, such as low water quality, changes in salinity, direct watercraft impacts to seagrass and coral, and commercial trawling (Ault *et al.* 2001; Robles *et al.* 2005; National Oceanic and Atmospheric Administration 2008). The smalltooth sawfish (*Pristis pectinata*) is the only federally listed fish species in Biscayne Bay (endangered). However, various conservation organizations have expressed concern about several other fish species that use the bay (National Oceanic and Atmospheric Administration 2008). There may be need for more comprehensive documentation of fish species in the park (Sasso and Patterson 2000).

### Invertebrates

The habitats of the park support over 800 species of invertebrates, including more than 150 species of shrimp, crabs, and lobster (Florida Department of Environmental Protection



2010a). Like fishes, the park's coastal and coral reef habitats provide critical nursery habitats and food web links for many important commercial and recreational species, including pink shrimp (*Farfantepenaeus [Penaeus] duorarum*), spiny lobster (*Panulirus argus* and *P. guttatus*) (Figure 9), oysters (*Crassostrea virginica*) and other molluscs, blue crab (*Callinectes sapidus*), and stone crab (*Menippe mercenaria*) (Ault *et al.* 2001; Nagelkerken *et al.* 2008). Pink shrimp alone supports a multimillion dollar commercial fishery in the waters off south Florida (Criales 2010).



**Figure 9. Spiny Lobster (*Panulirus argus*)**

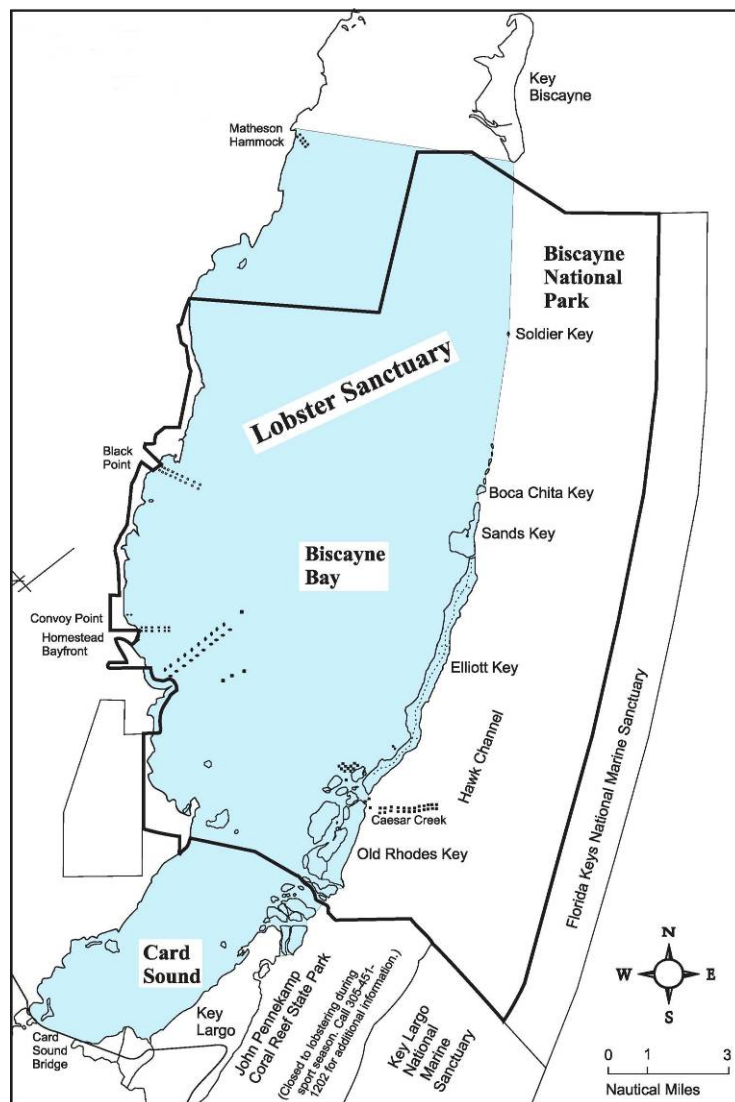
Like many fish species, invertebrates use one or more of the park's habitats during their lifecycles. Tidal and surface currents move the larvae of many marine invertebrates into and out of nearshore habitats (Ault *et al.* 2001; Browder *et al.* 2005). Seagrass meadows provide food and habitat (Dawes *et al.* 2004) and many small invertebrates, from nematodes to crabs and shrimp, feed on the detritus produced by mangrove forests. These, in turn, are eaten by the larger predators, including commercial and game fish (Cantillo *et al.* 2000; Nagelkerken *et al.* 2008). The mud and sand of the bay bottom also provide important refuge habitat. Shelter within rocky outcrops and coral reef crevices are important for large juveniles and adults. Deeper reef margins are used for spawning (Marx and Herrnkind 1986).

The park's marine invertebrate communities are currently affected by habitat degradation. Changes in the quantity, quality and timing of fresh water entering Biscayne Bay have adversely impacted the bay's overall ecosystem (McPherson and Halley 1997). Loss of freshwater has increased the bay's salinity and decreased its suitability for invertebrates such as pink shrimp and eastern oysters (Diersing 2007/8). Seagrass habitat continues to be adversely impacted by commercial and recreational boating and fishing activities. Most of the seagrass beds in Biscayne Bay show some signs of boat scarring. According to Lewis *et al.* (2000), there are over 11,220 acres of propeller scarred seagrass beds in Miami-Dade County marine waters, much of it in the park. Recovery can take months to years (Browder *et al.* 2005). Somerfield *et al.* (2008) noted that both shallow and deep corals reefs in southeast Florida have declined in total cover and species diversity due to bleaching events and the impacts of Hurricane George in the late 1990s. They also noted that there was "only scant evidence of recovery in species numbers by 2003." The importance of Biscayne Bay to juvenile spiny lobster resulted in a large portion of the bay—and the park—being designated as the Biscayne Bay-Card Sound Spiny Lobster Sanctuary (Chapter 68B-11, F.A.C.; see Figure 9).



## Essential Fish Habitat

Essential Fish Habitat (EFH) includes water and substrates necessary to fish and invertebrates for spawning, breeding, feeding, or growing to maturity. Specific components include aquatic areas (physical, chemical, and biological aspects), sediments and hard substrates, and related biological communities (National Marine Fisheries Service 2004). For all the species managed by the South Atlantic Fishery Management Council (SAFMC) of concern to this document – peneaid shrimp, snapper-grouper, spiny lobster (Figure 10), and corals – all of Biscayne National Park is designated essential fish habitat as well as a habitat area of particular concern. Specific park habitats include intertidal marshes, mangroves, seagrasses, unvegetated flats and soft sediments, ocean inlets, nearshore hard-bottom habitat, reef tracts, and algal communities (South Atlantic Fishery Management Council 1998).



**Figure 10. Shaded Area Denotes Biscayne Bay-Card Sound Spiny Lobster Sanctuary**

Essential fish habitat (EFH) is designated by regional fisheries councils under the authority of the federal Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq.). For Biscayne Bay, the council is the South Atlantic Fishery Management Council (SAFMC). Regulations implementing the Magnuson-Stevens Act further define “habitat areas of particular concern” as discrete areas within EFH that either play especially important ecological roles in the life cycles of federally managed fish species or are especially vulnerable to degradation from fishing or other activities (50 CFR 600.815[a][8]). More details regarding the regulatory aspects of the Magnuson-Stevens Act, EFH, and related topics are provided in the Environmental Consequences discussion in Chapter Four. Federal agencies are required to assess potential impacts to EFH from the proposed action. If the analysis indicates potential for adverse impacts to EFH, the federal agency is required to consult with the National Marine Fisheries Service (NMFS).

## Birds

The park provides habitat for many bird species. The shallow waters and exposed mudflats of the park make this habitat ideal for probing shoreline birds such as terns, gulls, plovers and sandpipers. Long-legged wading birds utilize these and deeper waters along mangrove-lined waterways. Mangroves provide a variety of prey (crabs, crayfish, molluscs, frogs, mice, and small fishes) for wading birds including herons, egrets, bitterns, spoonbills, limpkins, and ibis (Florida Museum of Natural History no date). Some of the common wading birds in the mangroves of the park include the white ibis (*Eudocimus albus*), yellow-crowned night herons (*Nyctasnassa violacea*), and the great egret (*Ardea alba*). Mangroves also provide breeding habitat for some wading birds (Florida Museum of Natural History no date).

Several species of ducks, grebes, loons, and cormorants have been observed in Biscayne National Park (NPS 2008d). These floating/diving birds feed on fishes, plant materials, and invertebrates. Some of these waterfowl are year-round residents, while others occur during migration or as winter visitors. These species include the brown pelican (*Pelecanus occidentalis*), anhinga (*Anhinga anhinga*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), lesser scaup (*Aythya affinis*), canvasback (*Aythya valisineria*), and the double-crested cormorant (*Phalacrocorax auritus*) (Florida Museum of Natural History no date).

Birds of prey include permanent residents, summer residents, and winter visitors of mangrove habitats. The southern bald eagle (*Haliaeetus leucocephalus leucocephalus*) and osprey (*Pandion haliaetus*) depend upon mangroves for their survival in south Florida. The bald eagle and osprey feed extensively on the fishes that occur in mangroves. These species also roost and nest within the mangrove tree canopy. Other birds of prey that occur in the park include vultures, hawks, owls, peregrine falcons (*Falco columbarius*) and the American kestrel (*Falco sparverius*) (Florida Museum of Natural History no date).

## Reptiles

Only reptiles that inhabit brackish and marine waters would be potentially impacted by the proposed project. Sea turtles nest on park beaches of the keys and feed in the seagrass meadows and coral reefs of the park, such as the green sea turtle (*Chelonia mydas*), hawksbill (*Eretmochelys imbricate*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*). The American alligator (*Alligator mississippiensis*) is sometimes found in brackish water, while the American crocodile (*Crocodylus acutus*) has a large breeding area adjacent to the park (NPS 2008d). The species federally listed as threatened or endangered and are discussed further in the special status species section.

## Mammals

Mammals common to Biscayne Bay include the bottlenose dolphin and the Florida manatee.

The bottlenose dolphin (*Tursiops truncatus*) is the most common marine mammal in South Florida, feeding in seagrass beds for large fish, squid, and invertebrates, even in waters less than 3 feet deep (Florida Museum of Natural History no date). The bottlenose dolphin ranges primarily in temperate and tropical waters of the Atlantic Ocean and adjoining seas. It is commonly seen in bays and lagoons, and sometimes in large rivers. The bottlenose dolphin is social, often traveling in groups of up to 12 individuals, though occasionally they aggregate in groups of several hundred. Dolphins in Biscayne Bay include both permanent residents and nearshore migrants (Browder *et al.* 2005). Recent surveys have identified 157 individual dolphins in the bay. There is a resident family group in the southern part of the Bay. However, minimum population size or population trends cannot be determined with current information (National Marine Fisheries Service 2009). Although not listed under the federal Endangered Species Act, bottlenose dolphins are protected under the federal Marine Mammals Protection Act of 1972 (16 USC 1361, et seq.).

The Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian manatee, occurs in the park and is discussed further in the special status species section.

## SPECIAL-STATUS SPECIES

The following species are listed under the Endangered Species Act as special-status species (endangered or threatened) and may be affected by actions in the park.

### Florida Manatee

The Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian manatee (U.S. Fish and Wildlife Service 2007a), is a hairless, fully aquatic vegetarian that grazes on submerged vegetation. Manatees were initially hunted by natives and subsequently by Europeans for oil and meat (Van Meter 1989). Past hunting and poaching, along with the present-day effects of boat impacts and propeller injuries (U.S. Fish and Wildlife Service 2001) contribute to the manatee's endangered status. The Florida manatee was first listed as endangered in 1967, while critical habitat was designated 1976. Both the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission list the manatee as an endangered species. This large, herbivorous mammal lives in freshwater, brackish, and marine habitats and eats submerged, emergent, and floating vegetation. Manatees occur in both fresh and saltwater habitats, and are believed to prefer waters with salinity levels less than 25 parts per trillion.

Manatees generally prefer and seek out warm water refuges in quiet areas in canals, creeks, lagoons, or rivers. Water temperatures colder than 68 degrees F increase manatee susceptibility to cold stress and cold-induced mortality. The primary threats to manatees, aside from low temperatures, are collisions with watercraft, degradation of seagrasses, and entrapment in water-control structures. During winter, manatees gather in Biscayne Bay, depending on warm water flows from natural springs and power plant outfalls (Florida Department of Environmental Protection 2010b). Additionally, the manatees graze on the productive seagrass beds in Biscayne Bay (Florida Department of Environmental Protection 2010a).

Biscayne National Park does not include any federally designated critical habitat for the Florida manatee. Designated critical habitat near the park includes Card, Barnes, Blackwater, Manatee, and Buttonwood Sounds, south of the park, and Biscayne Bay from the southern tip of Key Biscayne northward (Federal Register 2010). Biscayne Bay contains multiple areas of essential manatee habitat. Within the park, essential habitat is located south of Black Point, an area with the breakwater and lead into Black Creek. There are marine habitat areas in the bay north of the park as well, and the cooling canals of Turkey Point adjacent to the park are also designated as essential habitat (Metropolitan Dade County, Florida 1996). There are specially designated no-wake manatee zones in the park, for example in Homestead Bayfront Channel and Black Point Channel. Manatees are often observed near the mainland shoreline, in canal mouths, and in the docks near the park's visitor center during winter months.

According to data from the Fish and Wildlife Research Institute, of the Florida Fish and Wildlife Conservation Commission, there have been 20 manatee mortalities in the park through October 2009 (Florida Fish and Wildlife Conservation Commission 2009).

### Sea Turtles

Global populations of sea turtles have been dramatically reduced by hunting and egg collecting, and are now further threatened by effects of commercial fishing and shoreline habitat loss (Florida Fish and Wildlife Conservation Commission 2010a). There are four special-status sea turtles that occur in Biscayne National Park: the green turtle (*Chelonia*

*mydas*), the hawksbill turtle (*Eretmochelys imbricate*), the leatherback turtle (*Dermochelys coriacea*), and the loggerhead turtle (*Caretta caretta*). Sea turtle nests in the park are almost always loggerhead turtle nests.

The green sea turtle was originally protected under the Endangered Species Act on July 28, 1978. The breeding populations off Florida and the Pacific coast of Mexico are listed as endangered, while all others are threatened (National Marine Fisheries Service 2003b).

Green sea turtles range throughout the tropics worldwide. The greatest cause of decline in green turtle populations is commercial harvest for eggs, food, skin, and shells for jewelry curios. Incidental catch during commercial shrimp trawling is a continuing source of mortality that adversely affects recovery (National Marine Fisheries Service 2003b).

Total population estimates for the green turtle are unavailable, and trends are particularly difficult to assess because of wide year-to-year fluctuations in numbers of nesting females, difficulties of conducting research on early life stages, and long generation time. The recovery team for the green turtle concluded that the species status has not improved appreciably since listing. Present estimates range from 200 to 1,100 females nesting on U.S. beaches (National Marine Fisheries Service 2003b), and almost all U.S. nesting occurs on eastern Florida beaches between May and September (Guseman and Ehrhart 1992). The green sea turtle is known to occur regularly in the park. Seagrass beds in the park provide the predominantly vegetarian green turtle with forage and feeding habitat (NPS 2008a; Florida Department of Environmental Protection 2010a).

The hawksbill sea turtle was listed as endangered in 1970, and its status has not changed since. The hawksbill sea turtle is a small to medium-sized sea turtle ranging worldwide throughout the tropics. The hawksbill is a solitary nester, and thus population trends or estimates are difficult to determine; however, most researchers agree that the nesting population is declining. The major cause for the hawksbill's continued decline is commercial exploitation for its shell and for other products, including leather, oil, perfume, and cosmetics (National Marine Fisheries Service 2003c). Significant incidental take from fisheries, threats from petroleum pollution in offshore waters, and entanglement in marine debris such as monofilament line have also been documented.

Post-hatchling hawksbills occupy the pelagic environment, but juveniles through adults use coral reefs as foraging habitat and prey on sponges. Hawksbills are also known to inhabit mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent. Both insular and mainland nesting sites are known. Hawksbills will nest on small pocket beaches and exhibit a wide tolerance for nesting substrate type. Nests are typically placed under vegetation (National Marine Fisheries Service 2003c).

Hawksbill sea turtles are observed with some regularity in the waters near the Florida Keys. Within the continental U.S., nesting is restricted to the southeastern coast of Florida, and has been reported from Broward, Miami-Dade, Martin, Monroe, Palm Beach, and Volusia counties (U.S. Fish and Wildlife Service 1999a); however, only a few hawksbill nests are documented each year in Florida (Meylan 1992). Nesting by hawksbills has been recorded several times on Soldier Key, a small, mangrove-fringed islet in the park (U.S. Fish and Wildlife Service 1999a).

The leatherback sea turtle was listed as endangered throughout its range in 1970. Nesting populations of leatherback sea turtles are especially difficult to discern because the females frequently change beaches. However, current estimates are that 20,000 to 30,000 female leatherbacks exist worldwide. Leatherbacks do not nest frequently enough in the United States to assess an accurate trend. In the Atlantic and Caribbean, the largest nesting assemblages are found in the U.S. Virgin Islands, Puerto Rico, and Florida. Nesting data for

these locations since the 1980s suggest that the annual number of nests is likely stable; however, information regarding the status of the entire leatherback population in the Atlantic is lacking. The population faces significant threats from incidental take in commercial fisheries, marine pollution, harvest of eggs and flesh, and habitat destruction (National Marine Fisheries Service 2003d).

The leatherback turtle is an extremely wide-ranging species. Non-breeding turtles in the Atlantic have been found from Canada to Argentina, while breeding adults nest on tropical, usually mainland, shores in the Atlantic, Indian, and Pacific oceans (Pritchard 1992). Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands. In the United States, nesting occurs from February to July at sites from Georgia to the U.S. Virgin Islands. During the summer, leatherbacks tend to be found along the east coast of the United States from the Gulf of Maine south to the middle of Florida (National Marine Fisheries Service 2003d). The leatherback is known to nest regularly, though not abundantly, in small numbers on Florida's east coast (U.S. Fish and Wildlife Service 1999b). Leatherbacks mostly nest along the mid-Atlantic coast (Pritchard 1992). Leatherbacks are believed to occur infrequently in Biscayne Bay.

Loggerhead sea turtles were federally listed as threatened in 1978 due to past overhunting for its meat, leather, eggs, and fat. They winter in shallow waters and feed near the water surface, which makes them susceptible to entrapment in shrimp trawl nets and consequential drowning (Texas Parks and Wildlife 2009). Recent population and nesting declines have prompted a federal review to determine if this species should be listed as endangered (NPS no date).

Additionally, there are a variety of threats posed to the loggerhead and its nesting areas in the park, including marine and woody debris, exotic plants, nest predation, and collisions with boaters. These threats have resulted in a proposal to designate critical habitat within the park for the loggerhead turtle (NPS 2010n). In the park, there are several beaches on Elliott and Sands Key where loggerheads routinely nest from May to October. In 2009, only four nests were observed (NPS no date).

Loggerheads have characteristically large, block-like heads, strong jaws, and a ruddy brown carapace on top. They are among the larger sea turtles; growing up to 45 inches in length and weighing an average of 275 pounds. A slow swimmer compared to other sea turtles, this species is more likely to fall prey to larger, faster predators. Throughout their entire lives, they are at risk of becoming prey to different predator species, from crabs when they are hatchlings to sharks when they are fully grown. Their life span is about 30 years but can surpass 50 years. Loggerhead turtles are carnivorous from the time of their hatching, feeding on fish, crabs, shrimps, sponges, squids, jellyfishes, and various other animals throughout the stages of their life (Florida Fish and Wildlife Conservation Commission 2010b).

Loggerhead turtles can be found in various environments: the brackish waters of coastal lagoons, the open sea, and at the bottom of sounds, bays, and estuaries, where they remain dormant in winter. Their primary nesting beaches are along the southeastern coast of the United States, from North Carolina to Florida, where each female can lay up to 190 eggs per nest. They are the only sea turtle that can nest outside the tropics, as long as the water temperature is above 68 degree Fahrenheit (Florida Fish and Wildlife Conservation Commission 2010a).

## Corals

Staghorn coral (*Acropora cervicornis*) and elkhorn coral (*Acropora palmata*) were listed as federally threatened species under the Endangered Species Act in 2006 (Federal Register 2008). The Acroporid corals are widely distributed throughout the Caribbean. The maximum range of staghorn coral extends to Palm Beach County, Florida and to Broward County for elkhorn coral. In 2008, Congress designated critical habitat for the Acroporid corals in Florida, the U.S. Virgin Islands, and Puerto Rico. Critical habitat areas in Florida are shown in Figure 11. This ruling designated critical habitat on the reef tract in the park (Federal Register 2008). Within the park, *A. cervicornis* is found scattered throughout the reef tract in sparse colonies, whereas *A. palmata* is concentrated in a few discrete areas.

Staghorn coral is a branching coral with cylindrical branches that reach over 6.5 feet in length. The dominant mode of reproduction for staghorn coral is asexual fragmentation, and new colonies form when branches break off a colony and reattach to the substrate; sexual reproduction occurs once each year in August or September. Individual colonies are both male and female (simultaneous hermaphrodites) (National Marine Fisheries Service 2003e).

Staghorn coral exhibits the fastest growth of all known western Atlantic corals, with branches increasing in length by 4 to 8 inches (10 to 20 cm) per year. Staghorn coral has been one of the three most important Caribbean reef-building corals (National Marine Fisheries Service 2003e). This coral commonly grows in more protected, deeper water ranging from 5 to 20 meters in depth, though it has occasionally been found as deep as 60 meters (Federal Register 2008).

Fore reef zones at intermediate depths of 16 to 82 feet (5 to 25 m) were formerly dominated by extensive single species stands of staghorn coral until the mid 1980s. Since 1980, populations have collapsed throughout their range from various threats as detailed below; populations have declined by up to 98 percent throughout the range, and localized extirpations have occurred (National Marine Fisheries Service 2003e).

The greatest direct source of region-wide mortality for staghorn coral has been disease outbreaks, mainly of white band disease. Other, more localized losses have been caused by hurricanes, increased predation, bleaching, algae overgrowth, human impacts, and other factors. This species is also particularly susceptible to damage from sedimentation and is sensitive to temperature and salinity variation (National Marine Fisheries Service 2003e).

Elkhorn coral shares the same genus as staghorn coral and exhibits many similar features (Federal Register 2008). It is a large, branching coral with branches that increase in length by 2 to 4 inches (5 to 10 cm) per year; colonies reach their maximum size in approximately 10 to 12 years. Elkhorn coral was formerly the dominant species in shallow water (3 ft to 16 ft [1 to 5 m] deep) throughout the Caribbean and on the Florida reef tract, forming extensive, densely aggregated thickets (stands) in areas of heavy surf. Coral colonies prefer exposed reef crest and fore reef environments in depths of less than 20 feet (6 m), although isolated corals may occur to 65 feet (20 m). Reproduction for elkhorn corals is the same as that of the staghorn coral (National Marine Fisheries Service 2003a). The species uses both sexual

fragmentation as colonies form when branches break off , and sexual reproduction occurring once each year in late summer.

Elkhorn coral is found on coral reefs in southern Florida, the Bahamas, and throughout the Caribbean. Its northern limit is Broward County, Florida, and it extends south to Venezuela. Once found in continuous stands that extended along the front side of most coral reefs, the characteristic "*Acropora palmata* zone" supported a diverse assemblage of other invertebrates and fish. These zones have been largely transformed into rubble fields with few, isolated living colonies (National Marine Fisheries Service 2003a).

In areas where loss has been quantified, estimates are in the range of 90 to 95 percent reduction in abundance of elkhorn coral since 1980. Bleaching and hurricane damage has led to additional drastic reductions (e.g., 75 to 90 percent) observed in some areas such as the Florida Keys. Population collapses are attributable to disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. This species is also particularly susceptible to damage from sedimentation (National Marine Fisheries Service 2003a).



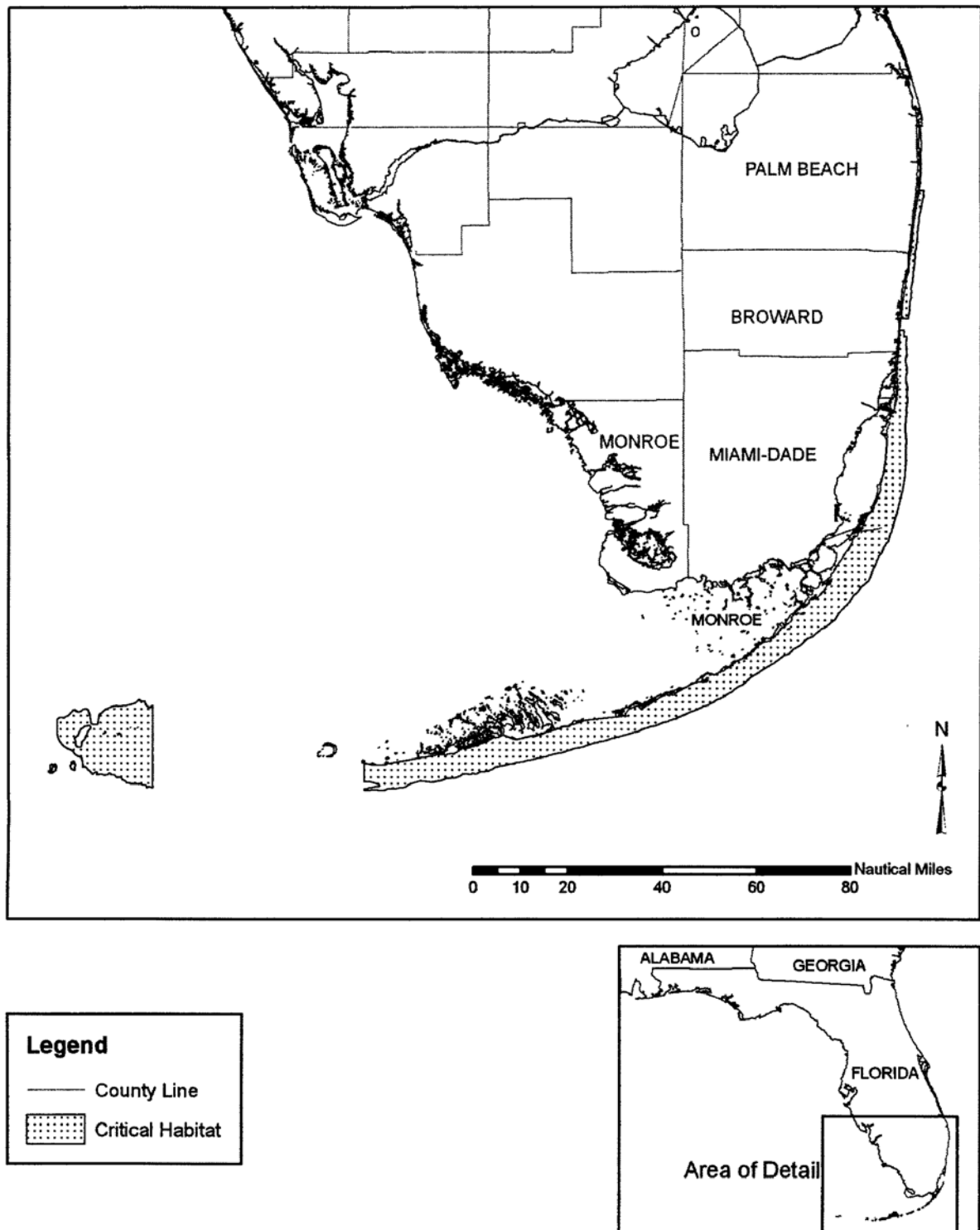


Figure 11. Critical Habitat Designation for Acroporid Corals (staghorn and elkhorn corals) in Florida (Federal Register 2008)

## CULTURAL RESOURCES

### Introduction

The lands and submerged bottomlands of Biscayne National Park are rich with archeological remains that document the cultural history of southern Florida and the Florida Keys. Submerged archeological sites include an array of shipwrecks and other representations of maritime casualties, demonstrating the international maritime heritage encompassed in the waters of Biscayne National Park. The archeological remains of many shipwrecks have been found in the park's waters. The earliest identified shipwreck site is from the mid 18th century. Since historical records document that early European exploration of the region began in the early 16th century, it is possible that earlier remains have yet to be discovered.

Since the arrival of Europeans, the Florida Keys (including what is now Biscayne National Park) have been a converging point for maritime trade routes from Europe and the northeast American continent to the Caribbean, Central and South America, and the Gulf of Mexico. The geography and geology of Biscayne National Park present a series of natural factors — the Florida reef tract, the Gulf Stream, narrow shallow channels, and hurricanes — that have caused many ships to founder and wreck. These shipwrecks, as well as other material remains, are now submerged archeological sites within the park and some are listed in the National Register of Historic Places (NRHP).

### Offshore Reefs Archeological Historic District

The Offshore Reefs Archeological District includes wrecks from every historical period associated with the region, from Florida's First Spanish Period well into the twentieth century. The wrecks have yielded and continue to yield technological, cultural, and historical information about the types of ships used over that time, the nations involved in American trade, and the types of cargoes carried. Because there are such a large number of shipwrecks, the district may also yield archeological information concerning the nature of shipwrecks and contribute to the refinement of theories concerning the patterns of shipwreck occurrence. Because the wrecks are located within a national park which is closely monitored, they may also yield information concerning the stability of shipwrecks over time, and provide data which can be used to devise better ways to preserve such cultural resources. The district was listed in the NRHP in 1984 and is nationally significant under **Criterion A** in the areas of **Commerce** and **Transportation** and under **Criterion D** in the area of **Historical Archeology--Non-Aboriginal** as one of the largest concentrations of shipwrecks associated with the American southeastern seaboard, historically a major trading zone between Europe and the Americas.

Geography has been a major factor in the history of the Offshore Reefs Archeological District. As early as the second voyage of Ponce De Leon, the Florida Straits were recognized as an excellent means to reach the westerly winds which would take ships back to Spain from the New World colonies. For centuries also, the strong, northerly flowing Gulf Stream, which runs just east of the offshore reefs, was recognized and avoided by ships attempting to make the journey south toward Key West, Cuba, and South and Central America. In attempting to avoid the Gulf Stream, many southbound ships strayed too close to the offshore reefs and wrecked. Northbound ships, usually without adequate charts and navigational devices, often grounded or wrecked on the treacherous patch reefs or the keys as they attempted to course through Hawk Channel.

As a result of these geographical factors, the Offshore Reefs Archeological District has become a graveyard for ships which have plied waters off the southeast coast of Florida from the sixteenth century until the present day. Ships dating from the early eighteenth century to the twentieth century, and representing various types of activities are represented in the district. (NPS 1993)

Cultural resources in Biscayne National Park consist also consist of museum objects, other archeological sites, ethnographic resources, historic structures, and cultural landscapes that represent over 2,000 years of human history. However, based on proposed activities related to this environmental assessment, the potentially affected environment is restricted to only those shipwrecks that are included in or proposed for inclusion in the Maritime Heritage Trail.

### **Maritime Heritage Trail**

Biscayne National Park's Maritime Heritage Trail consists of six wrecks, spanning nearly a century and a wide variety of sizes and vessel types, which have been prepared for public viewing. Viewing preparations include mapping, the installation of mooring buoys, and production of individual, waterproof site cards for each of the wrecks.

The shipwrecks that make up the Maritime Heritage Trail are the *Arratoon Apcar*, the *Erl King*, the *Alicia*, the *Lugano*, the *Mandalay*, and the *19th Century Wooden Sailing Vessel*. The following is a description of each:

#### **Arratoon Apcar**

This vessel was built by James Henderson and Son of Renfrew, Scotland in 1861. The iron-hulled steamer measured 262 feet long, had a 35-foot beam, displaced 1480 tons, and was powered by a 250-horsepower engine.

The ship was named after the founder of her original owners (Apcar and Co.), an Armenian family who established a furniture business in Bombay, India. In 1872, the Apcar family acquired a much larger vessel, which they also christened “Arratoon Apcar”, while the original ship was sold to H.F. Swan and registered in London.

The original *Arratoon Apcar* met its demise steaming to Havana on the evening of February 20, 1878 when Captain Pottinger miscalculated his position and ran aground at Fowey Rocks. Interestingly enough, lighthouse construction was well underway at that site, and the steamship narrowly missed the platform where several workers were encamped. The crew attempted to de-water the ship for three days, after which point they manned their lifeboats and headed ashore. The nearby Tappahannock rescued the captain and all 24 of his crew. By March 12, foul winter weather had made the coal-laden ship a total loss.

Today, the wreck of *Arratoon Apcar* lies in ten to twenty feet of water near Fowey Rocks. The coral-encrusted lower hull and iron beams of the vessel can still be seen, along with some evidence of other structures, including remnants of the rudder and mast. The shallow depth of the wreck and the abundance of fish make it an attractive site for diving or snorkeling (NPS 2006d).



**Figure 12. The *Arratoon Apcar* aground near Fowey Rocks lighthouse.**

### **Erl King**

This vessel was a 306-foot, iron-hulled, three-masted steamer built by A. and J. Inglis Shipbuilders and Engineers of Glasgow, Scotland in 1865. The barkentine-rigged steamship had a 34-foot beam and displaced 2178 tons. The ship's name is an English translation of the German *Erlkonig*, which was a mythical mischief-making elf in German literature. *Erl King* was primarily a cargo ship, but also had first-class accommodations for 50 passengers.

Robertson and Company of London were the first owners, but *Erl King* sailed for several other firms under charter, and was captained by John Pinel while trading between China and Australia for the first few years of service.

*Erl King* ran aground at Tennessee Reef on January 18, 1881, but was removed, repaired, and returned to service. On December 16, 1891, she ran aground on Long Reef while on the way to New Orleans from Swansea, England. The steamer *Feliciano* noted that she was "afloat with two anchors out," apparently while the crew was attempting to conduct repairs. Insurers from Key West reported that cargo was being salvaged, but the ship itself was doomed. Some of her machinery, as well as 200 tons of cargo were saved. Hull plates were reportedly used as scrap metal during World War II.

The outline of *Erl King's* hull and remains of its cargo can now be seen in 18 feet of water on Long Reef. All that remains of its cargo are barrel-shaped concrete objects that were once wooden barrels filled with dry concrete mix. The wooden barrels have long since been consumed by shipworms, leaving the concrete casts we can see today (NPS 2006e).

### **Alicia**

The steamer, *Alicia*, owned by *Linea de Vapores Serra*, and ported in Bilbao, Spain, left Liverpool in early April, 1905 bound for Havana. Her cargo was valued at greater than one million dollars and included fine silks, linens, silverware, household furniture, machetes, paint, pianos, wine, English ale and liquor, shoes, buggies, harnesses, and even a complete iron bridge.

On April 20, 1905 *Alicia* slammed into Long Reef during a storm, and was bilged and waterlogged. A passing ship took her crew to Havana. Captain "Hog" Johnson, master wrecker and Captain of the Key West schooner *Mount Olive*, was first on the scene, and was

later joined by over 70 other salvors. There was a joyful atmosphere with laughing and joking. “It was the fun of wrecking at its best,” according to Vincent Gilpin, on a ship that chanced to be nearby.

When the Black Fleet of the Bahamas arrived a dispute began, leading to a skirmish where several salvors were injured and a Bahamian launch was damaged. Aware that reinforcements from Nassau could get to the wreck more quickly than he could get help from Key West, Captain Johnson offered to split the salvage of the steamer equally. He painted a red line down the center of the deck and by the time the Customs Inspector, the Underwriter’s Surveyor, and the British gunboat arrived, all were working side by side in obvious good will.

Local residents observed that as cargo was lowered to the salvage boats, “frequently bundles would go overboard.....to be retrieved later by the wreckers and never be accounted for.” The Inspector of Customs noted many irregularities in wrecking procedures, including many uncorked bottles seen floating in the sea. During the salvage operation of the flooded cargo holds, the water became soapy from the many cases of washing powder, and the salvors wouldn’t go into the hold.

On April 25th, the tug boat *Three Friends*, whose Captain was Harry Fozzard, attempted to pull *Alicia* off the reef. However, a squall moved through the area the next day and sank the flooded ship to the bottom. Hope of refloating the *Alicia* was abandoned on July 25th and the wreck was sold to the highest bidder for scrap in September.

Work continued until December, and the salvors used explosives to tear the iron hull apart in order to recover machinery. *Alicia* eventually settled in 20 feet of water in what is now Biscayne National Park. Dead fish were all over the beach in December 1905, and it was noted that chemicals from the cargo likely killed the fish.

The salvors of *Alicia* were given cargo in lieu of money and it was reported, after the salvage was complete, that most of the men from Key West to Miami were wearing Edwin Clapp shoes while Queen Quality shoes became the fashion for women (NPS 2006f).



**Figure 13. Scuba divers explore the wreck of the *Alicia*.**

### **Lugano**

The British steamer, *Lugano*, from Liverpool, was headed for Havana with general cargo that included fine silks, wines, rice, and other foods valued at \$1 million. She was also carrying 116 passengers, including 12 women and children. All of the passengers except 2 were Spanish immigrants en route to Cuba.

On March 9, 1913 in high winds and heavy seas and significantly off course, Captain P. Penwill grounded on Long Reef. The tug Rescue was radioed, and safely took the passengers of *Lugano* to Key West while the Captain and crew remained aboard. Cargo was removed, and the hold was intentionally flooded to prevent further pounding on the rocks. By March 20<sup>th</sup>, seven large loads of cargo had been removed and taken to Key West. Wreckers were busily pumping water out of *Lugano* so that her boilers could be re-lit, allowing her own pumps to dewater the hull. By March 22<sup>nd</sup>, their efforts succeeded, but even with the ship's pumps working night and day, the ill-fated vessel was still lodged on the reef and listing heavily to port. On March 27<sup>th</sup>, the *Miami Herald* reported there were over 75 wrecking boats attempting to save the cargo. The ensuing confusion and foul weather made it easy for unscrupulous salvors to slip away and stash cargo on nearby reefs. Much cargo was stolen by the Key West wreckers of Dr. Lykes, including linens and 350 cases of brandy. Rumors of the thefts prompted U.S. Customs to dispatch officials to monitor the wreck.

By April 4<sup>th</sup>, the crew had abandoned *Lugano*, which was again full of water. The Lee Brothers, wreckers from Miami, were later contracted to deliver the ship to Key West for \$17,000.00. The estimated value of the saved cargo was \$150,000.00. *Lugano* was three stories deep below the water line and was the largest boat to ever go on the rocks of the Florida reefs up to that time.

All efforts to refloat *Lugano* were abandoned on April 15<sup>th</sup>. Two days of high winds pounded the already battered vessel until it was considered a total loss. Wreckers removed nearly everything, leaving only the hull. A settlement on May 28, 1914, gave the primary salvors \$64,126.67, the secondary salvors \$14,084.30, and the remaining salvors \$2,228.18. The schooner Dr. Lykes' share was forfeited because of discrepancies between cargo collected and cargo delivered.

In February, 1917, the yacht *Ada M* struck *Lugano*, which was the first report of a ship hitting this wreck. A warning to mariners was issued on January 13, 1920 stating that the wreck of *Lugano* was a danger to navigation. The wreck was estimated to be 3,000 tons and had a broken mast and stack visible under water. *Lugano* now lies 25 feet underwater on Long Reef in Biscayne National Park (NPS 2006g).

### **Mandalay**

On New Year's Day, 1966, the schooner *Mandalay* ran aground on Long Reef. The wreck now lies in the eastern part of Biscayne National Park and is one of the best shallow dive spots in the park.

John G. Alden Naval Architects, Inc. designed *Mandalay*, originally named *Hardi Biou*, for Dr. Henry D. Lloyd of Brookline, Massachusetts. The 110' 6" long, steel-hulled schooner was built by George Lawley & Son, Corporation in 1928, at a cost of \$177,000. The schooner was sold in 1931 and renamed *Valor*, and subsequently had 5 other owners under that name. Michael Burke, owner of Windjammer Cruises, Inc., purchased, refitted, and renamed the vessel *Mandalay* in 1965, for use as a luxury cruise ship.

*Mandalay* was beautifully outfitted in mahogany, brass, and ivory, and had a teak deck. Aft quarters were a suite of 2 rooms with an adjoining bath for the owner, 3 single staterooms, each with a bath, and a large guest room with an individual bath. Forward of the main mast were a large saloon and living room, 3 officer's staterooms with a bath, and ample forecabin for 6 men with a washroom and shower. All bathrooms had hot and cold water and all waste connected to a complete sanitary system. There were electrical lights and fans and other electrical equipment, and every stateroom had individual ventilation.

In late 1965, *Mandalay* was headed toward Miami with 23 vacationers and 12 crew aboard, returning from a 10-day Bahaman cruise. Passengers had retired to their rooms after celebrating the arrival of the New Year, 1966, and Captain Asmund [Jim] Gjevick, a 26 year old Norwegian, went to sleep about 1:00 AM, leaving a novice seaman at the helm. All were awakened when *Mandalay* was driven hard aground on Long Reef. Later, Captain Gjevick admitted he had miscalculated the distance from Fowey Rocks, causing *Mandalay* to be 20 miles off course. At the request of Capt. Gjevick, an SOS was sent by A.E. Lundquist, President of the Coca Cola Bottling Co. of Boston at 3:45 AM, which brought Coast Guard helicopters and patrol boats to the scene. Flares were dropped by the helicopters, and fired by *Mandalay* crew to illuminate the rescue operation that took place in windy conditions with 10 foot waves. Three helicopters lifted 24 persons, one by one, and flew them to Homestead Air Force Base. The only injury was to L. Quinn Hal, an Indianapolis real estate man, who cut his hand.

Scavengers stripped the vessel, taking the ship's compass, sextant, chronometers, passenger cameras, watches, and purses, and the owner's personal gear. Tons of lead ballast blocks, taken by small outboard motorboats and melted into lead diving weights, were resold at \$1.00 per pound. The ½ ton anchor and stud link chain were also taken. On the Sunday after *Mandalay* was grounded she was "picked to her skin and bones" by average work-a-day boat owners, before salvage tugs could arrive. The tugs failed to pull the ship off the reef, and so the masts were removed, by contract with the owners, for eventual use in the re-creation of a Spanish Galleon called *Golden Doubloon*. Today the skeleton of *Mandalay*, "red carpet ship of the Windjammer fleet", can be found embedded on Long Reef in Biscayne National Park (NPS 2006h).

#### **Nineteenth Century Wooden Sailing Vessel**

Very little is known about the 19<sup>th</sup> Century Wooden Sailing Vessel shipwreck – a site known commonly as the "Schooner Wreck." In fact it is not clear that the ship actually was a schooner, or if the term was generally attributed to a shipwreck of unknown type or origin. The site contains little evidence of cargo and it is likely that, like most of the shipwrecks in the park, the ship was salvaged after sinking. The ship's stone ballast is basalt, though the exact origins of the basalt are unclear. Ballast is not a unique marker for a ship's origin or even last port of call as it was commonly loaded and offloaded as needed and it would not be unusual for ballast from one site to be moved to another and shared after offloading between two or more ships for ongoing voyages.

The presence of rigging elements and iron fasteners throughout the site as well as the size of the ballast piles and remaining wooden structural elements points to a small- to medium-sized sailing vessel from the 19th century and she probably represents a fairly typical working sailing vessel from the Florida Keys. Her port of origin, destination, and the fate of those on board is at this point unknown (NPS 2010c).

## VISITOR USE AND EXPERIENCE

### Introduction

Biscayne National Park is open to the public year-round and hosts an average of over 500,000 visitors per year. Visitation is typically highest from May through October (NPS 2010b). Biscayne National Park provides a wealth of opportunities for outdoors enthusiasts. Activities pursued within the park include fishing, snorkeling, scuba diving, water skiing, windsurfing, boating, camping, and overnight stays in private boats. Most users are day-use visitors who pursue a variety of activities in dispersed locations.

Unlike many parks where visitors are generally confined to roads, trails and developed areas, Biscayne's visitation is much more dispersed. Visitor use is spread throughout the park to all areas accessible by boat. Annual boat launch estimates from four nearby county facilities range up to 85,000 (NPS 2008a), which likely underestimates the true usage because it does not reflect boating use originating from points outside Miami-Dade County. Boating is an important recreational activity for many South Florida and Miami-area residents (NPS 2008a), and there are traditional periods of high use and heavy boat traffic in the park during holidays and special events (e.g., Memorial Day, July 4<sup>th</sup>, Labor Day, and the Columbus Day Regatta weekend).

The quality of recreational experiences in Biscayne National Park is directly related to a number of factors, including safety and ease of navigation through the park, condition of park resources (corals, seagrasses, and their associated wildlife communities, as well as submerged cultural resources), weather, and water **temperature**. The proposed mooring buoy and marker plan has the potential to affect visitor use by changing navigational markers and mooring buoy numbers and locations. Subsequently, the plan may affect safety and ease of navigation, along with the condition of the natural and cultural resources on which visitor experience is ultimately based.

Recreational fishing is among the most popular activities in the park. The park's 2008 Draft Fisheries Management Plan (NPS 2008a) estimates that in 1997, an estimated 50,000 vessels used the park for a variety of activities, and by 2004, that estimate had increased to 85,000. Of the 1997 total, it was estimated that almost 30,000 boats participated in fishing activities. Because fishing activities in the park are managed under a separate NPS plan and regulations of the Florida Fish and Wildlife Commission, this activity is not addressed further in this plan and environmental assessment.

### Recreating in the Park

Biscayne National Park has over 160,000 acres of marine environments for visitors to experience and appreciate. With few exceptions, the park is available for exploration and appropriate visitor uses year-round. Visitors have access to a variety of experiences from motorized and crowded to solitary and quiet for many months of the year. Several types of visitor activities may be affected by implementing a formal mooring buoy and marker plan. Among these are use of popular visitor sites such as the sandbar at Sands Cut and access to snorkel and dive sites on the Florida reef tract.

### Popular Visitor Use Areas

During holiday weekends and special events, specific locations within the park have traditionally drawn large crowds of boaters, concentrating use at these sites. A few of the



locations where visitors and boats congregate include the shallows near Biscayne Channel and Stiltsville near the park's northern boundary, the sandbar at Sands Key just west of Sands Cut, and the Elliott Key Harbor vicinity. These sites generally provide still waters for swimming, beach and sandbar volleyball, and experiencing seagrass habitats and communities.



**Figure 14. Sands Cut and Sandbar on Quiet Summer Day**



**Figure 15. Sands Cut and Sandbar on Busy Summer Day**

#### **Mooring Buoy Sites**

There are 35 sites within the park that have been established for mooring buoys. At this time there are 23 buoys in use. These mooring sites provide access to coral reef resources at a variety of depths – from several feet to nearly 60 feet. At these sites, visitors can expect to experience reef and soft-bottom environments, a variety of tropical and sub-tropical fishes, corals and other invertebrates, and occasionally a topline predator such as a barracuda or moray eel. Visitors generally use these buoys for snorkeling, scuba diving, and fishing. When mooring buoys are occupied, visitors may drop anchor to gain access to these sites.



**Figure 16. Visitor Boat Moored at Buoy on Reef Tract**

### **Maritime Heritage Trail**

This plan proposes to formalize Biscayne National Park's Maritime Heritage Trail. The trail consists of six wrecks, spanning nearly a century and a wide variety of sizes and vessel types, lying along the Florida reef tract. The shipwrecks that make up the Maritime Heritage Trail are the *Arratoon Apcar*, the *Erl King*, the *Alicia*, the *Lugano*, the *Mandalay*, and the *19<sup>th</sup> Century Wooden Sailing Vessel*. (Descriptions of each of the wrecks can be found in the Cultural Resources section.) Access to the wrecks is by boat only, and all but the *Mandalay* are best suited to scuba divers. Currently three of the six wrecks have mooring buoys placed appropriately for exploring these resources – the *Mandalay*, *Lugano*, and the *19<sup>th</sup> Century Wooden Sailing Vessel*. The *Mandalay* offers an unparalleled opportunity for snorkelers to experience a wreck. The remaining three wrecks do not have mooring buoys specifically located to provide visitor experience and understanding of these resources.

Currently, the park has little educational information on the Maritime Heritage Trail available for park visitors. Information may be access on the park's website at <http://www.nps.gov/bisc/historyculture/maritime-heritage-trail.htm>.

### **Commercial Visitor Services**

For visitors without a private boat, the park's concessioner offers guided boat trips. The park has a contract with a single concessionaire (Biscayne National Underwater Park), which operates snorkel, scuba and glass-bottom boat trips to patch reefs, reef tract, and other areas in the bay. Boats sail twice a day, in-season (summer), and when wind and wave conditions are appropriate for sightseeing, snorkeling, and diving (Biscayne National Underwater Park, no date). Along the reef tract, the concession boat uses specific, higher weight capacity mooring buoys when accessing recreational sites for its customers. During periods of high visitation, however, some tours may be disrupted as the concession boat is unable to access popular visitor sites due to crowding or if the high-capacity mooring buoy is occupied by other visitors.

## **Navigating in the Park**

Boating is the optimal way to explore Biscayne National Park. By boat, you can experience the protected waters of Biscayne Bay, travel to the northernmost Florida Keys, and visit and explore living coral reefs. Access to all of these resources is limited only by available time and the skills of the boat operator.

### **Entering and Exiting the Park**

The boundaries of Biscayne National Park include an irregular area extending eastward from the coast of South Florida, across Biscayne Bay and the Keys, to a water depth of 60 feet on the Florida reef tract. Boundary markers that indicate visitors have entered national park waters are scarce, with locations at the Black Point Marine channel, leaving the harbor at Dante Fascell Visitor Center, and select entrance points along the Intracoastal Waterway. There are three lighted boundary markers on the Florida reef tract side of the park – a distance of over 12 miles. This scarcity of boundary markers makes it difficult for boaters to be certain when/if they have entered park waters, and thus what regulations are in place and what behaviors are required. For example, use of personal watercraft (jet-skis) is not permitted in Biscayne National Park. However, visitors using these craft frequently enter the park from the north, from launch points on Key Biscayne. In addition, large portions of Biscayne National Park are included in the Biscayne Bay-Card Sound Lobster Sanctuary, and visitors may not be aware that they have entered the sanctuary due to scarce boundary markings.

### **Marked Channels**

Within the park, marked navigation channels serve as “highways” to provide safe travel routes through the park’s marine environment. There are four main routes within the park, managed and maintained by both the NPS and the U.S. Coast Guard. Markers on these routes are red and green channel markings, generally placed on wooden or concrete pilings.

The primary north-south routes in the park are the Intracoastal Waterway, within Biscayne Bay, and Hawk Channel, east of the keys along the reef tract. Both of these routes traverse the park and are marked and maintained by the U.S. Coast Guard. These routes are intended to provide safe passage for a variety of vessels, with minimum depths of five to six feet. The Intracoastal Waterway passes through at least one hazard area of shallows called the Featherbed Bank, located between Black Point Marina and Boca Chital on Elliott Key. Hawk Channel is in the southern portion of the park, and hazardous shallow coral reefs are present just outside this channel.

Marked east-west routes within the park include Biscayne Channel, near the park’s northern boundary, and Caesar Creek in the southern portions of the park. These routes provide access through the keys to the Florida reef tract environments of the park. These routes are also used by those passing through the park to access the Gulf Stream and locations beyond the park boundaries. The length of Biscayne Channel is within sandy, seagrass habitat, with shallows adjacent to the channel. Caesar Creek is located in a main tidal channel for southern Biscayne Bay, and is relatively wide with high water flow rates.

Along these main park transit routes, there are areas where markings are too widely spaced or of inadequate size to be readily visible by boaters in transit. For example, for boaters traveling westward from Pacific Reef, the junction of Hawk Channel and Caesar Creek may be difficult to identify. This area has shallow reefs near the surface that may present a grounding hazard. These types of conditions can make navigation through the park challenging to visitors without a thorough knowledge of local environmental conditions.



**Figure 17. East Entrance to Caesar Creek Channel**

### **Hazard Areas**

Boating in Biscayne National Park is not without risk. Both within Biscayne Bay and along the Florida reef tract, areas of shallows and navigational hazards are common. The bay has several high-use visitor areas that are common sites for groundings due to shallow water depth. For example, one commonly used boating route is from the mainland (Black Point or Homestead Bayfront parks) to Boca Chita. Boca Chita has a sheltered harbor, historic lighthouse, and camping and picnic area. Access to this site requires crossing a series of shallow sand/seagrass shoals known as Featherbed Bank (or the Featherbeds). Water depths here can be less than two feet. Although the Featherbeds are marked with “danger” or “shoal” markers, visitors do run aground here multiple times each year. Other locations within the bay with similar conditions are Black Ledge, Safety Valve in the northern part of the park, and Pelican Bank near Turkey Point.

Along the reef tract, areas of shallow corals also present navigational hazards. East of Hawk Channel, many areas of reef are near the surface. Groundings on the reef tract are of concern, not only for damage to resources, but also because hard bottom groundings (such as on reefs or rocks) cause greater damage to boats than sandy bottom groundings, and may immobilize the vessel in a high wave and wind environment.

Access to the Atlantic portions of the park requires that boaters travel through the key line and associated areas of shallow sand shoals. Breaks in the line of keys that are of sufficient depth for boat traffic are used as passes to access the Atlantic portions of the park, and environs beyond (such as the Gulf Stream). There are two navigable passes in the park that are described above – Biscayne Channel and Caesar Creek. However, other breaks in the key line are also used by boaters, even though water depth in these areas is not sufficient for safe navigation. These sites are commonly called “cuts” and are generally used by those with local boating knowledge. Two of the most used cuts are Lewis Cut and Sands Cut, on the north and south ends of Sands Key, respectively. Groundings occur in these locations each year, resulting in unsafe visitor conditions and resource damage.

## PUBLIC HEALTH AND SAFETY

Since 2005, Biscayne National Park has averaged more than 560,000 visitors per year (NPS 2009a), 90 percent of them on boats (NPS 2007), though 2009 had the lowest visitation of the last 5 years at approximately 437,000 visitors (NPS 2009a). Between 2003 and 2007, estimates of total annual boat use within the park, based on trailer count data from the closest three marinas to the park (Homestead Bayfront, Black Point, and Matheson Hammock), has ranged between approximately 68,700 and 84,500. It has been shown that the number of trailers at public marinas is generally good predictor of the number of boats in park waters (Ault *et al.* 2005). High boater use days occur during the spring and summer with the exception of a few special use times such as the Columbus Day Regatta weekend. Use in all seasons is typically higher on weekends and holidays.

Navigational, informational, and regulatory markers in the park are limited in some areas. As a result, on many shoal and shallow areas of the park, boat groundings are common occurrences. Park staff has recorded over 700 vessel groundings since 1995, a number which comprises only an estimated 10 to 20 percent of all groundings in the park (NPS 2006c). In addition to the extensive resource damage caused by groundings, running aground can cause severe damage to boats and other personal property. Boat groundings can leave visitors stranded in the water and present significant hazards, such as drowning. Grounding a boat may leave a visitor susceptible to exposure.

The park issued 64 grounding violations in 2009. Biscayne Channel and the Stiltsville area had the most groundings, followed by the Featherbed Bank and Caesar Creek areas. Of the 2009 groundings, 41 were by vessels between 21 and 40 feet long. Since 2004, these three areas have consistently had among the most groundings in the park. The ocean side of Sands Cut is not navigable and poses potential hazards because of the shallow nature of the area. Sands Cut should only be used with local knowledge and there is insufficient signage to inform the average boater. Though there were no groundings at Sands Cut in 2009, from 2005 to 2008 there were six to nine annual groundings (NPS 2010f).

During peak visitation times, boaters tend to congregate at various locations in the park, concentrating boat traffic and recreational activities in these areas. For example, the high concentration of boats and visitor uses at Sands Cut, Soldier Key, Stiltsville, and near Biscayne Channel cause a number of public safety concerns. These areas generally have shallow waters and high rates of visitor use, resulting in safety concerns from groundings (including deliberate beaching of boats) and conflicting visitor uses such swimming near marked boating routes. These conditions create potential hazards for visitors in the park, including an increased danger of boats striking swimmers and boats capsizing or throwing their passengers overboard. These conditions are exacerbated every year during high-use weekends and holidays when heavy alcohol consumption is an underlying theme. The park generally sees an influx of around 1,500 boats congregate off the northern end of Elliot Key and along Sands Key in a designated anchorage area over the Columbus Day weekend (NPS 2009b). There is a need for enhanced boating visitor education in the park through communication and information that increases the visitors understanding of appropriate boating behavior while on the water in a national park setting.

Alcohol factors heavily into the visitor boating experience in the park. Alcohol affects judgment, vision, balance and coordination. These impairments increase the likelihood of accidents afloat – for both passengers and boat operators. U.S. Coast Guard data shows that in boating deaths involving alcohol use, over half the victims capsized their boats or fell overboard. Alcohol can also be more dangerous to boaters because boat operators are often less experienced and less confident on the water than on the highway. Recreational boaters

don't have the benefit of experiencing daily boat operation and average only 110 hours on the water per year (U.S. Coast Guard 2009).



**Figure 18. High-use at Biscayne National Park.**

In 2009, Biscayne had a total of 1,084 incidents reported or incident numbers assigned, the highest number ever, although visitor use was down from the overall yearly average. The most common violations in the park were fishing (all types) and poaching violations, which are closely tied. Other prominent incident categories include vessel safety equipment and documentation; preservation or disturbance of natural resources; personal watercraft equipment and driving operations; prohibited vessel operation (e.g., bow riding, wake zone, dive flag); disregard of a Manatee Zone; boat groundings; and boating under the influence. The areas of the park with the most violations were Sands Cut (sand bar and ocean side of cut), Convoy Point Channel, Caesar Creek, Stiltsville-Biscayne Channel area, and the Convoy Point Land areas (NPS 2010f).



## **PARK OPERATIONS AND MANAGEMENT**

### **NPS Operations and Management**

Biscayne National Park is administered by a superintendent, an assistant superintendent, and several division chiefs. The Office of the Superintendent is responsible for management of the park, its staff and residents, all of its programs, and interactions with visitors, agencies, and organizations interested in the park. Park staff provides the full scope of functions and activities to accomplish management objectives and meet the requirements of park protection, emergency services, public health and safety, science, resource protection and management, emergency services, interpretation and education, utilities, and management support. As of July 2010, there were 49 full-time-equivalent (FTE) employees out of the 51.50 authorized positions at the park. Duties and assignments are distributed among five operational divisions described below (NPS 2010i).

To date, placement of any new buoys or markers has been determined by individuals within the Maintenance, Visitor and Resource Protection, and Resource Management Divisions. For example, installation of mooring buoys has often coincided with research needs or safety concerns. While grounding reports are logged by park staff, use of the information in managing markers is reactive rather than proactive in terms of safety or resource protection. No criteria exist for determining levels that would warrant relocation or addition of markers.

The divisions that would be most affected by mooring buoy and marker management would include facility management, visitor protection, interpretation and education, and the management team under administration. The affected environment and analysis in this assessment focuses on these divisions.

#### **Division of Interpretation and Education**

Interpretation is authorized for 10.5 FTE employees and includes education and outreach services for diverse audiences, interpretation of themes, visitor center functions, and information and orientation for visitors through personal services (e.g., guided activities) and nonpersonal services (e.g., web site, publications, exhibits, and park volunteering).

#### **Division of Resource Management**

The Resource Management Division is authorized for 10 FTE employees and is responsible for all activities related to the management, preservation, and protection of the park's cultural and natural resources. Activities include research, restoration, species-specific management, wildland fire management, archives and collections, historic site protection, and resource data collection and sharing activities. There are four programs within this division: Wildlife and Vegetation, Restoration, Physical Sciences, and Archeology.

#### **Division of Visitor and Resource Protection**

The resource and visitor protection division is authorized for 8 FTE employees and is responsible for visitor and employee safety, resource protection, emergency response, park and facility patrols, security, emergency medical services, search and rescue, visitor protection, and air operations.

Law enforcement in the park is part of the resource and visitor protection division and along with a number of other Federal, State and County law enforcement agencies, is responsible for enforcing boating safety and resource protection in the park. Biscayne National Park currently has eight sworn federal visitor protection officers, of whom five are involved in regular patrol activities in the park. Visitor protection in Biscayne is considered understaffed in its current capacity, which limits the area that the staff is able to enforce and patrol. The

size of the enforcement division has not increased in over 18 years while the population of South Florida has more than doubled in the same time period (NPS 2010g). This division is responsible for enforcing boating safety and resource protection requirements in the park. Park rangers regularly patrol park waters, warn and inform visitors, and issue citations when necessary.

### **Maintenance Division**

The maintenance division is authorized for 14 FTE employees and is responsible for operation and maintenance of park facilities and equipment, including structures and grounds, utilities, roads and parking areas, trails and trailheads, picnic areas, signs, vehicles, and maintenance of buoys and markers in the park. This division is also responsible for maintaining cultural resources at the park, including historic structures, cultural landscapes, and ethnographic resources.

A single volunteer is currently responsible for repairs and maintenance on mooring buoys and on some other markers in the park; this volunteer gets concurrence with the maintenance division before completing the work. Park personnel, generally from the maintenance division, are responsible for maintaining navigational, informational, and regulatory markers in the park.

The volunteer who maintains the buoy system visually inspects mooring buoy sites annually, and generally repairs or replaces mooring buoy components each year. Repairs and replacements are also made when buoys are reported missing or when deterioration is reported. The existing markers that are owned by the NPS are repaired and replaced on a less frequent basis, such as every few or as needed. The maintenance division staff is responsible for different components of the system such as purchasing of equipment and supplies. The maintenance of other markers found within the park boundary (Intracoastal Waterway, Hawk Channel, etc.) is the responsibility of the U.S. Coast Guard, Monroe and Miami-Dade Counties, or Florida Power and Light (FPL).

Mooring buoys need a complete replacement of the manta pin attachment every year. Every year, one-third of the buoys in the park require replacement. Navigational markers, signs or day boards are replaced every three years. Lighted markers require a monthly check, and replacement of batteries/solar charging system is necessary every two years. Solar panels must be cleaned at least 4 times per year. In order to dive with scuba equipment there is a regulation of two divers and a stand-by staff member (NPS 2010h).

### **Division of Administration**

The administration division is authorized for five FTE employees and is responsible for the park's budget, finances, purchasing, property management activities, and contracts. Administration also has responsibility for human resources, information technology, communications, and housing. The division chiefs are all part of the management team and help provide policy direction for the park.

### **Partnerships**

Partnerships are primarily administered through the superintendent's office, although all other divisions are involved in establishing partnerships. Park staff work with a variety of agencies and organizations to achieve the park's mission, both through projects within the park and in adjacent areas. The park protection staff and natural resources staff have cooperative agreements with many federal, state, and local agencies and organizations.



## **Volunteers**

Volunteers at Biscayne National Park provide thousands of hours of service each year. Volunteer assistance is crucial to the maintenance and inspection of mooring buoys in the park, as detailed above.

## **South Florida Natural Resources Center**

The South Florida Natural Resources Center provides scientific information and environmental assessments to the National Park Service units of south Florida and to the Department of the Interior. The center serves four National Park Service units: Everglades National Park, Dry Tortugas National Park, Biscayne National Park, and Big Cypress National Preserve. Scientists at the center seek to conserve and, where necessary, restore the normal suite of interactions between the biological and physical elements of the environment to ensure a functional ecosystem and its associated biological diversity. Reflecting the holistic nature of the ecosystem, the center works to integrate applied science with management actions toward the preservation of resources for the enjoyment of future generations (NPS 2009c). The center is responsible for natural resource management in the park and interfaces with outside agencies to work on ecosystem restoration South Florida.

## CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This section describes the environmental consequences associated with the alternatives. It is organized by impact topics, which distill the issues and concerns into distinct topics for discussion analysis. These topics focus on the presentation of environmental consequences, and allow a standardized comparison between alternatives based on the most relevant topics. NEPA requires consideration of context, intensity and duration of impacts, indirect impacts, cumulative impacts, and measures to mitigate for impacts. NPS policy also requires that “impairment” of resources be evaluated in all environmental documents.

**METHODOLOGY:** Overall, the NPS based these impact analyses and conclusions on the review of existing literature and (park) studies, information provided by experts within (park) and other agencies, professional judgments and park staff insights, the (state) state historic preservation office; interested local Tribes; and public input.

**General Definitions.** The following definitions were used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with project alternatives:

**Context** is the setting within which an impact is analyzed, such as the affected region, society as a whole, the affected interests, or a locality. In this EA, the intensity of impacts is evaluated within a local (i.e., project area) context, while the intensity of the contribution of effects to cumulative impacts is evaluated in a regional context.

### IMPACT INTENSITY

For this analysis, intensity or severity of the impact is defined as follows:

*Negligible* – impact to the resource or discipline is barely perceptible and not measurable and confined to a small area.

*Minor* – impact to the resource or discipline is perceptible and measurable and is localized.

*Moderate* – impact is clearly detectable and could have appreciable effect on the resource or discipline.

*Major* – impact would have a substantial, highly noticeable influence on the resource or discipline on a regional scale.

[Note: Intensity definitions tailored to specific impact topics are also acceptable.]

### DURATION

The duration of the impacts in this analysis is defined as follows:

*short-term* - when impacts occur only during construction or last less than one year;

or

*long-term* - impacts that last longer than one year.

## DIRECT VERSUS INDIRECT IMPACTS

The following definitions of direct and indirect impacts were used in this evaluation:

*direct* – an effect that is caused by an action and occurs at the same time and place

*indirect* – an effect that is caused by an action, but is later in time or farther removed in distance, but still reasonably foreseeable.

## CUMULATIVE EFFECTS

The CEQ regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for each alternative and are presented at the end of each impact topic discussion analysis.

## IMPAIRMENT OF (PARK) RESOURCES OR VALUES

In addition to determining the environmental consequences of the preferred and other alternatives, the 2006 NPS *Management Policies* and DO-12, require analysis of potential effects to determine if the Preferred Alternative or selected actions would impair (park) resources.

"Impairment is an impact, that in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, include the opportunities that otherwise would be present for the enjoyment of those resources or values" (NPS 2006b). As directed in a memorandum from the NPS dated July 6, 2010, the impairment determination for the Mooring Buoy and Marker Plan is included as Appendix B.

## IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT:

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, 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 NEPA 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 NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts to archeological and cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; 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 eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register, e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or

association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness 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 NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections for archeological and cultural resources and the cultural under the preferred alternative. The Section 106 Summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

## BENTHIC HABITATS

### Guiding Regulations and Policies

Servicewide NPS regulations, such as the Organic Act of 1916 and NPS *Management Policies*, direct parks to provide for the protection of park resources, including benthic habitats. The NPS protects these resources as part of the park's natural ecosystem that is perpetuated into the future.

### Methods and Assumptions for Analyzing Impacts

Available information on benthic habitats was evaluated and determined qualitatively, based on the professional judgment of NPS staff and consultants and consideration of NPS resources and mission. Primary sources included park management and planning documents, published reports and scientific literature, and unpublished observations and insights from knowledgeable park staff. Information from these sources was gathered, reviewed, and summarized. Impacts on benthic habitats were evaluated by comparing existing conditions – the No Action Alternative – to projected changes resulting from the proposed project alternative. Because the project alternatives only involve marine-based buoys and markers, mangrove habitat is dismissed from further analysis.

### Impact Criteria and Thresholds for Benthic Habitats

The thresholds to determine impacts to benthic habitats are defined below.

**Negligible** – The action would result in a change in benthic habitats in a small area, but the change would not be measurable or would be at the lowest level of detection.

**Minor** – The action would result in a detectable change in benthic habitats, but the change would involve slight alterations in the local abundance, distribution, or composition of such habitats. These changes would be within the natural range of variability and would not affect the viability of the habitats or local ecological processes. Once the disturbance is removed, the area would recover without assistance.

**Moderate** – The action would result in a clearly detectable change in benthic habitats over a fairly large area, such as changes in the abundance, distribution, or composition of such habitats. However, the changes would not affect the viability of the species populations or those habitats. Key ecological processes and community structure may be disrupted locally but would be retained regionally. If the disturbance is removed, the system would likely return to a normal state, although some intervention may be required.

**Major** – The action would result in substantial changes in benthic habitats on a regional level. The impacts would be highly noticeable and well outside the normal range of variability, including changes in the abundance, distribution, or composition of habitats or species populations. Key ecological processes and community structure would be altered. The system would not return to a normal state without substantial intervention, and the success of that intervention is not guaranteed.

### Duration

Impact duration refers to how long an impact would last. The following terms are used to describe the duration of the impacts to benthic habitats:

**Short-term** – The impact would be temporary in nature, lasting one year or less, such as the impacts associated with turbidity from in-water construction. Normal conditions would return once the activity is completed or shortly thereafter.

**Long-term** – The impact would last more than one year and could be permanent, such as the loss of seagrass habitat. If short-term impacts occur regularly over a longer period, such as repeated propeller scarring of seagrass, the impact may become long-term.

### Issues

- Coral reefs and seagrass beds are important and sensitive marine habitats that can be damaged by anchoring and boat strikes.
- Many shallow areas, especially Featherbeds, are poorly marked or not marked at all and experience many groundings and propeller scarring, resulting in damage to seagrass beds. (Seagrass beds take many years to recover.)
- Anchoring in the seagrasses, visitor impacts on water quality, and dispersing of wildlife are resulting from high rates of use in areas such as at Sands Cut, Soldier Key, and Stiltsville.

### Impacts of Alternative A, the No Action Alternative

The No Action Alternative would continue current management of the park's buoy and marker system, with no changes to the existing system, or to buoy and marker maintenance. The majority of existing mooring buoys are located on park reefs to provide diving, snorkeling, and fishing opportunities.

Lutz (2002) reviewed studies that expressed concern regarding the extent of damage to corals from small boat groundings and quantified those impacts to corals in the northern portion of the Florida Keys, including areas inside Biscayne National Park. Impacts resulted from two sources, direct boat collisions and propeller scarring. Of the 49 shallow water reef sites surveyed, 57 percent had signs of damage. Damaged areas ranged from four square inches to six square feet, most under 40 square inches. Damage to corals in the area of Boca Chita Key was more severe than most other areas although the frequency of visits was not significantly different.

In addition to direct boat impacts, anchors can break, fragment, and overturn corals. Once set, anchor chain abrasion is another source of impacts (Dinsdale and Harriott 2004). Although no specific studies were located that specifically address the impact of anchors on coral habitat in the park, relevant findings from other studies indicate that greater anchor damage occurred to branching corals than to head (massive) corals. This may have implications for long-term composition of reef communities (Marshall 2000).

No criteria currently exist for determining conditions that would warrant relocation or addition of buoys or markers, nor is there a regular monitoring program to assess the effects of buoys or markers on park resources. Changes to the system are related to safety, research, or resource protection and are most often reactive rather than proactive. Also, due to an insufficient number of markers, many of these functions are not being carried out effectively. Use of mooring buoys in the park is voluntary, and boats using the park are allowed to drop anchor outside of no-anchor zones designated in the Biscayne National Park Superintendent's Compendium (NPS 2010e) and under state law. The sensitivity of resources to improper boating activity is currently not highlighted in the park brochure, although some information is available on displays at the visitor center and on the visitor

locations on Elliott Key. Because the park is accessed by multiple terrestrial and marine routes, it is difficult to distribute this information to all boaters.

Since 2005, Biscayne National Park has averaged more than 560,000 visitors per year, 90 percent of whom are on boats. Long-term trends indicate increasing park visits, although visits in the last few years have decreased. Many adverse impacts to benthic resources in the park arise from boating and recreational activities. Vessel groundings and subsequent injuries caused by propeller dredging are common in the park because of the shallow waters outside marked channels. Most of the shallow seagrass beds in Biscayne Bay show some signs of boat scarring, with some moderately to severely scarred (Robles *et al.* 2005). At a local scale, propeller scars have been shown to decrease the number of crabs and mollusks, although other studies have not shown adverse impacts on fish. At larger scales, however, no relationship between scarring density and abundance of similar organisms has been detected (Bell *et al.* 2002). Seagrass recovery from propeller scarring varies depending on the seagrass species and the severity of the scarring. Estimates range from less than a year to more than seven years, with shoal grass and manatee grass recovering five to seven times faster than turtlegrass. Other studies estimate that scar recovery in some areas may require between 10 and 60 years (U.S. Fish and Wildlife Service 1999c, NPS 2008b). Recovery rates are much slower when scarring is deep, because rooting substrate is removed and deep scars are more susceptible to secondary, continued erosion and expansion of scars from currents, winds, waves, and storms. A negative cycle may begin when increased turbidity reduces available light – lower light levels limit seagrass survival and growth, and the subsequent loss of seagrass reduces sediment stabilization, which increases turbidity (U.S. Fish and Wildlife Service 1999c).

The Florida reef tract is also affected by groundings and propeller strikes. Strikes to hard bottom (rock and corals) have the potential to cause a variety of effects on reef features. Grounding-related injuries to the reef structure and substrate can include superficial scraping of the substrate formations, displacement and fracture of corals and substrate, and deposition of hull paint on the scarred area (NPS 2007).

Based on these conditions, impacts to benthic habitats under the No Action Alternative would be long-term, localized, minor to moderate, and adverse.

### **Cumulative Impacts**

The geographic area considered for cumulative effects on benthic habitats is Biscayne National Park. A variety of impacts to benthic resources in the park arise from sources and activities outside the park that are largely beyond the influence of park policies, activities, and operations. For instance, man-made modifications to surface flows in the South Florida ecosystem have disrupted or eliminated the characteristic overland sheet flows, changed the distribution and timing of those flows, and decreased the quality of the water reaching Biscayne Bay (Alleman *et al.* 2002). Adverse impacts to benthic habitats in the bay from these modifications are most notable in the western portions of the park, especially in the vicinity of the canals that direct runoff into the bay. Impacted areas represent about ten percent of the park. Moving east across the bay, environmental conditions improve with increasing distance from these land-based impacts and as the influence of the ocean and tides increases (Lirman *et al.* 2004). The decline of corals in southeast Florida has been a concern for some time. Although many factors external to the park are likely responsible, recreational impacts to coral reefs include fishing and fish collecting; commercial impacts include anchoring and lost or abandoned fishing gear. Preliminary surveys by the Florida Wildlife Research Institute indicate that the density of fishing-related marine debris is greater in Biscayne Bay than in any other area surveyed throughout the Florida Keys (NPS 2008a). Both shallow and deep coral reefs in southeast Florida have declined in total cover and species diversity due to

bleaching events and storm damage, with “only scant evidence of recovery in species numbers by 2003” (Somerfield *et al.* 2008).

In total, impacts from other projects and plans would be long-term, widespread, minor to moderate, and adverse. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, parkwide, minor to moderate, and adverse.

### **Conclusion**

Impacts from continuing current management in the park would be long-term, parkwide, minor to moderate, and adverse. Impacts from other projects and plans would be long-term, parkwide, minor to moderate, and beneficial. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, parkwide, minor, and beneficial. The No Action Alternative would not result in unacceptable impacts to benthic resources or values.

### **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, the park would adopt a comprehensive system for managing the park’s buoys and markers, including criteria to determine when and where buoys and markers are needed. Standards would be developed for resource conditions and visitor densities, parameters that would be regularly monitored to inform park management concerning needed changes. Best management practices would continue regarding installation and maintenance of buoys and markers.

Alternative B is intended to address the site-specific sources of adverse impacts to benthic resources, i.e., boat-related activities such as groundings, anchor damage, and concentrated visitor use. The purpose of Alternative B is to improve the effectiveness of the park’s buoys and markers, and to monitor resource conditions in support of decision-making for system management. The management framework would provide better condition assessments for submerged habitats, delineate the need for increased or restricted access, improve visitor protection, and increase boater knowledge of sensitive park resources. Early implementation would include installation of additional mooring buoys so fewer boats require anchoring, and provisions for additional navigational markers so that fewer boats stray into inappropriate or non-navigable areas. Habitat condition criteria coupled with monitoring would enhance the effectiveness of the proposed changes. Improved marking and signage does not necessarily decrease impacts to seagrass habitat (Stowers *et al.* 2002; NPS 2008b), although the cost is small and the net habitat gains may be worthwhile (Engeman *et al.* 2008). In addition, more mooring buoys would be expected to spread boats out and, therefore, distribute existing damage over a wider area. Additional mooring points may also increase site visits; and, in that way, may increase resource damage. Both of these impacts would be long-term, localized, negligible to minor, and adverse. Based on these considerations, impacts to benthic resources under Alternative B are judged to be long-term, localized, minor to moderate, and beneficial. The improved system of buoys and markers, increased enforcement, and improved resource monitoring would reduce adverse impacts to coral and seagrass habitats and allow impacted habitats time to recover.

On the other hand, Alternative B proposes the installation of additional buoys and markers, requiring disturbance of substrate at the installation sites. However, the NPS would not install any mooring buoys or markers directly on corals or seagrasses. Anticipated methods of installation include drilling small holes for installation of manta pins for mooring buoys, drilling or pile driving for installation of permanent pilings, or use of concrete anchors, where appropriate. Installation would increase turbidity that would be short-term, localized, negligible to minor, and adverse.



The number of new buoys and the number and types of new markers are not known at this time. Because of siting requirements, no loss of benthic habitat is anticipated with new buoys or markers. However, since both require disturbance of the bay bottom, short-term, localized, adverse impacts would include turbidity during installation. In summary, improvements to benthic resource protection are judged to outweigh projected adverse impacts, such that the overall impact of Alternative B would long-term, parkwide, minor to moderate, and beneficial.

### **Cumulative Impacts**

The geographic area considered for cumulative effects on benthic habitats is Biscayne National Park. Past, present, and reasonably foreseeable future projects and plans that would impact benthic habitats are the same as discussed for the No Action Alternative, and their impacts are the same – long-term, localized (nearshore), minor to moderate, and beneficial. In total, impacts from other project and plans would be long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial.

### **Conclusion**

Under Alternative B, short-term impacts would be localized, negligible to minor, and adverse, and would arise from turbidity created during the buoy and marker installation or construction process. Adverse long-term impacts would be localized and negligible to minor, and would arise from distribution of existing visitor impacts across a wider area or increases in visits because of expanded mooring buoys. Beneficial long-term impacts would be localized (offshore) and minor to moderate. These benefits would arise from an improved system of buoys and markers and improved resource monitoring. Impacts from other projects and plans would be long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial. Alternative B would not result in impairment of or unacceptable impacts to benthic resources or values.

## WATER RESOURCES

### Guiding Regulations and Policies

NPS regulations and policies, including the Organic Act of 1916 and *Management Policies* (NPS 2006b), direct parks to protect park resources. In the case of Biscayne National Park, these policies and regulations require the NPS to manage natural resources in a manner that will maintain, rehabilitate, and perpetuate the integrity of aquatic systems, habitats, and organisms. The NPS achieves this by:

- avoiding whenever possible the pollution of park waters by human activities occurring within and outside the parks; and
- taking all necessary actions to maintain or restore the quality of surface waters and groundwaters within the parks (NPS 2006b, Section 4.6.3).

### Methods and Assumptions for Analyzing Impacts

Available information on surface water resources and water quality was evaluated and determined qualitatively based on the professional judgment of NPS staff and consultants, and consideration of park fundamental resources and values. Primary sources included park management and planning documents, published reports and scientific literature, and unpublished observations and insights from knowledgeable park staff. Information from these sources was gathered, reviewed, and summarized. Impacts on surface water and water quality were evaluated by comparing existing conditions – the No Action Alternative – to projected changes resulting from the proposed project alternative. Since neither alternative would affect the timing, distribution, or quantity of water entering the bay, the remainder of this discussion will focus on water quality.

### Methods

The thresholds to determine impacts to the chemical, physical, or biological aspects of surface water quality are defined below.

**Negligible** – An action would have no measurable or detectable effect on surface water quality.

**Minor** – An action would have small, but measurable, effects on surface water quality. Effects would be localized, but not apparent to visitors. Once the disturbance is removed, the area would recover without assistance.

**Moderate** – An action would have clearly detectable effects on surface water quality over a large area. Resulting changes could potentially affect organisms or natural ecological processes. The effects would be apparent to visitors immediately or over time. If the disturbance is removed, the system would likely return to a normal state with minimal intervention.

**Major** – An action would have substantial, regional effects on surface water quality. Resulting changes would affect organisms or natural ecological processes. The effects would be apparent to visitors immediately or over time. Key ecological processes and community structure would be altered. The system would not return to a normal state without substantial intervention, and the success of that intervention is not guaranteed.

## Duration

Impact duration refers to how long an impact would last. The following terms are used to describe the duration of the impacts to surface water quality.

**Short term** – The impact would be temporary in nature, lasting one year or less, and often much less. An example would be increased turbidity associated with in-water construction. Normal conditions would return once the disturbance is removed.

**Long term** – The impact would last more than one year.

## Issue

Biscayne National Park is prized for its clear waters. Vessel groundings in the park occur most often in seagrass habitat. When grounded vessels attempt to power away from these situations, they can create lengthy propeller scars and large excavations (blow holes) in the bottom of the bay. The resulting volumes of displaced sediments create turbidity plumes that negatively affect water quality.

## Impacts of Alternative A, the No Action Alternative

The No Action Alternative would continue current management of the park's buoy and marker system, with no changes to the existing network of buoys and markers, nor to buoy and marker maintenance. The majority of existing mooring buoys are located on park reefs to provide diving, snorkeling, and fishing opportunities. There are currently 23 mooring buoys in the park; another 12 sites have been used in the past. There are currently 93 NPS-managed markers that serve one of three purposes – navigation, information, or regulation. The park replaces about 25 percent of its mooring buoys - (6) each year, and about 20 percent of its navigational buoys - (19) each year. Based on average losses, about 25 buoys and markers would be replaced each year.

Water quality issues noted for the park include turbidity from propeller scarring and boat groundings, along with turbidity associated with high-use visitation areas. Because current management would continue under the No Action Alternative, the extent and frequency of propeller scarring and boat grounding, along with the resulting turbidity, would also continue. Areas of concentrated visitor use would continue to be freely accessible, and crowded at peak use times. The extent and duration of these water quality impacts would depend on the nature of the substrate disturbed, sea conditions at the time, and severity of the disturbance (e.g., boat grounding, propeller scar, or disturbance from human foot traffic). For most scarring or groundings, water quality would be noticeably affected for a matter of minutes or hours in proximity to the disturbed area. In areas of deep scarring, vegetative cover of sediment may be removed, providing a persistent source of local turbidity. In areas where visitors concentrate (e.g., Stiltsville, Sands Cut Shoal), beaching of boats and foot traffic have trampled and uprooted many of the seagrasses. Because seagrasses may not recover in areas of deep disturbance (see *Benthic Resources*), water quality may be affected at these sites, periodically, over the long-term. Localized adverse impacts to water quality under continued current management would be short to long-term, and negligible to minor.



**Figure 19. Vessel grounding in Biscayne National Park.**

### **Cumulative Impacts**

The geographic area considered for cumulative effects on water quality is Biscayne National Park. A variety of impacts to the park's water quality arise from sources and activities outside the park that are largely beyond the influence of park policies, activities, and operations. For instance, man-made modifications to surface flows in the South Florida ecosystem have disrupted or eliminated the characteristic overland sheet flows, changed the distribution and timing of those flows, and decreased the quality of the water reaching Biscayne Bay (Alleman *et al.* 2002). Adverse impacts to water quality in the bay from these modifications are most notable in the western portions of the park, especially in the vicinity of the canals that direct runoff into the bay. Impacted areas represent about ten percent of the park. Moving east across the bay, environmental conditions improve with increasing distance from these land-based impacts and as the influence of the ocean and tides increases (Lirman *et al.* 2004). Past, present and reasonably foreseeable future projects and plans that would impact water quality include: local and regional efforts to improve stormwater quality, portions of the Comprehensive Everglades Restoration Plan (CERP), and the park's upcoming general management plan (GMP).

Local and regional stormwater projects, as well as portions of the Everglades restoration plan, would mainly benefit nearshore water quality in the western portion of the park. They would do so by increasing freshwater flows, improving water quality, diminishing the point-source nature of current water deliveries, and decreasing drastic fluctuations in salinity. Although the specific ecological effects of these changes are largely unknown (Lirman *et al.* 2004), impacts on water quality in the park are judged to be long-term, localized (i.e., nearshore), minor to moderate, and beneficial. Impacts from the park's general management plan long-term, parkwide, minor, and beneficial through development of a marine sanctuary.

Impacts under the No Action Alternative would be short to long-term, localized (i.e., offshore), negligible to minor, and adverse. Impacts from other project and plans would be long-term, localized (i.e., nearshore), minor to moderate, and beneficial. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, localized, minor to moderate, and beneficial. The long-term benefits arising from other

plans and projects would outweigh the localized adverse impacts of continuing current management, resulting in long-term, localized, minor to moderate, beneficial cumulative effects.

## **Conclusion**

Impacts to water quality under the No Action Alternative would be short to long-term, localized, negligible to minor, and adverse. Impacts from other project and plans would be long-term, localized (i.e., nearshore), minor to moderate, and beneficial. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, localized, minor to moderate, and beneficial. The No Action Alternative would not result in unacceptable impacts to water resources or values.

## **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, the park would adopt a comprehensive system for managing the park's buoys and markers, including criteria to determine when and where buoys and markers are needed. Standards would be developed for resource conditions and visitor densities, parameters that would be regularly monitored to inform park management concerning needed changes. Best management practices would continue regarding installation and maintenance of buoys and markers.

Alternative B would address one source of adverse impacts to water quality – turbidity related to propeller scarring, boat groundings, and concentrated visitor use – through reduction of vessel groundings via one or more of the following: 1) improved markings regarding submerged habitat and restricted areas, 2) improved visitor protection, 3) increased boater educations regarding sensitive park resources, 4) additional navigational markers that would decrease the number of boats that stray into inappropriate or non-navigable areas, and 5) changes in access to and use of popular visitor sites. Based on these elements, turbidity arising from propeller scarring, groundings, and trampling would decrease, resulting in long-term, localized, negligible to minor, and beneficial impacts to water quality.

Placement of additional buoys and markers would require localized disturbance of the bottom substrates at the sites' pin installation. Methods anticipated to achieve this would include drilling small holes for installation of manta pins for mooring buoys, drilling or pile driving for installation of permanent pilings, or use of concrete anchors, where appropriate. Sediments would be disturbed during installation, resulting in short-term, localized, negligible to minor, adverse impacts as a result of turbidity. Given the number of boats (i.e., thousands) relative to the number of existing and proposed buoys and markers (perhaps several dozen), the benefits of Alternative B from diminished boat-related impacts would outweigh projected adverse impacts of buoy and marker installation and maintenance. The overall impact of Alternative B would be long-term, localized, negligible to minor, and beneficial.

## **Cumulative Impacts**

The geographic area considered for cumulative effects on water quality is Biscayne National Park. Past, present, and reasonably foreseeable future projects and plans that would impact water quality are the same as discussed for the No Action Alternative, and their impacts would be the same, i.e. - long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial.

## **Conclusion**

Under Alternative B, impacts to water quality would be long-term, localized (offshore), negligible to minor, and beneficial. Benefits would arise from reduced turbidity resulting from fewer incidents of propeller scarring, boat groundings, and reduced concentrations of visitors at popular locations. Impacts from other projects and plans would be long-term, localized (nearshore), minor to moderate, and beneficial. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, minor to moderate, and beneficial. Alternative B would not result in impairment of or unacceptable impacts to water resources or values.

## WILDLIFE, FISH, AND ESSENTIAL FISH HABITAT

### Guiding Regulations and Policies

NPS regulations and policies, including the *Organic Act of 1916* and *Management Policies* (NPS 2006b), direct parks to protect park resources. In the case of Biscayne National Park, these policies and regulations require the NPS to manage natural resources in a manner that will maintain, rehabilitate, and perpetuate the inherent integrity of aquatic systems and the plants and animals within. The NPS achieves this through:

- Preserving and restoring the natural abundance, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and communities and ecosystems in which they occur; and
- Minimizing human impacts on native plants, animal populations, communities, and ecosystems, and the processes that sustain them (NPS 2006b, Section 4.4.1).

### Methods and Assumptions for Analyzing Impacts

The effects of management activities under this topic focus on wildlife including native fish and essential fish habitat, marine invertebrates, birds, reptiles and mammals.

The primary sources of information used in this analysis included existing park and NPS management documents, NPS policy documents, published reports, and unpublished observations and insights from knowledgeable park staff and wildlife experts. Proposed actions were evaluated based on their potential for direct impacts to wildlife and indirect impacts to wildlife habitat and food sources. Direct impacts include collisions and disturbance that interrupts normal behavior such as foraging and nesting. Adverse impacts from disturbance can range from death and injury to physiological costs such as increased energy expenditures arising from startle response and flushing. For example, foraging wading birds may be startled and take flight. If this happens enough, it may decrease the ability of the animal to survive, reproduce, or care for its young. Indirect impacts include habitat modification and degradation, and human activities that may alter prey distribution, abundance, and availability (e.g., boating and anchoring).

The area analyzed for possible effects on wildlife includes the marine and benthic environments of Biscayne National Park in which mooring buoys and markers may have an impact. Shallow sandbars and beaches where visitors congregate and anchor or beach are also analyzed. Under both alternatives, best management practices would be implemented for any proposed park project, and potential adverse effects on wildlife would be minimized by implementation of mitigation measures proposed under site-specific environmental assessments, if needed.

### Impact Threshold Criteria and Definitions

Impact threshold definitions for fish and wildlife are as follows:

**Negligible:** Effects on native fish and wildlife species, their habitats, and the natural processes sustaining them (e.g., habitat quality, competition, dispersal) would be at or below the level of detection. There would be no measurable or perceptible effects on fish or wildlife populations.

**Minor:** Detectable impacts on native fish and wildlife or their habitats would occur within a small area, but would not result in changes in populations or the habitats and natural processes that sustain them. While the mortality of individual animals could occur, population effects would be within the range of natural variation, and the viability of fish and wildlife populations would not be affected.

**Moderate:** Readily detectable impacts outside the range of natural variability would occur on native fish and wildlife populations, their habitats, or the natural processes sustaining them. Changes would be measurable in terms of species abundance or distribution, or in changes to habitat quality and quantity that would result in such effects on species.

**Major:** Readily apparent impacts outside the range of natural variability would occur on native fish and wildlife populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population viability and could involve the displacement or loss of a fish or wildlife population or communities.

### **Duration**

**Short-term:** The effect would occur only during or shortly after a specified action or treatment. Within a year, conditions would be similar to those prior to the activity.

**Long-term:** Species would continue to be affected beyond one year's time, and conditions would not be similar to those prior to the activity.

### **Impact Criteria and Thresholds – Essential Fish Habitat**

As defined by the *Magnuson-Stevens Fishery Conservation and Management Act*, adverse effects to essential fish habitat (EFH) are those that reduce the quality or quantity of EFH by: (1) altering the physical, chemical, or biological condition of the waters or substrates; or (2) resulting in the injury or loss of benthic organisms or prey species and their habitat.

Essential fish habitat (EFH) includes water and substrates necessary to fish for spawning, breeding, feeding, or growing to maturity. EFH components include aquatic areas (physical, chemical, and biological aspects), sediments and hard substrates, and related biological communities (NMFS 2004). Such areas are designated by regional fisheries councils under the authority of the federal Magnuson-Stevens Fishery Conservation and Management Act. Regulations implementing the act further define “habitat areas of particular concern” (HAPC) as discrete areas within EFH that either play especially important ecological roles in the life cycles of federally managed fish species or are especially vulnerable to degradation from fishing or other activities (50 CFR 600.815[a][8]). More details regarding the regulatory aspects of the Magnuson-Stevens Act, EFH, and related topics are provided in the Environmental Consequences section that follows.

Adverse effects may be any impact which reduces quality and/or quantity of EFH. Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810[a]). Determination of substantial adverse effects “should be based on project-specific considerations, such as the ecological importance or sensitivity of an area, the type and extent of EFH affected, and the type of activity. Substantial adverse effects are “effects that may pose a relatively serious threat to EFH and typically could not be alleviated through minor modifications to a proposed action” (67 FR 2367). Based on the above, impact criteria and thresholds for EFH are described below.



**No effect:** The waters and substrates that define EFH would not be affected, nor would the organisms that depend on those waters and substrates be affected.

**No adverse effect:** Effects to waters and substrates that define EFH would be minimal and temporary. Impacts would affect a relatively small portion of the affected environment and the area would eventually recover. Consideration should be given to the importance of the habitat and its functions.

**Adverse effect:** Effects to waters and substrates that define EFH would be more than minimal, and impacts would permanently affect a relatively large portion of the affected environment. The habitat impacted performs relatively important functions.

## Issues

- During high-use seasons or when popular events occur in the park, there is a shortage of mooring buoys resulting in visitors anchoring in ways that damage seagrass beds and corals.
- The high concentration of boats and visitor use at Sands Cut, Soldier Key, and Stiltsville is causing resource damage through inappropriate anchoring and decreased water quality.
- Many shallow areas, especially Featherbed Bank and Safety Valve, are poorly marked or not marked at all and experience repeated boat groundings and propeller scarring that damage seagrass beds.

## Impacts of Alternative A, the No Action Alternative

### Fishes

Submerged habitats provide important nursery and forage habitats for both tropical and temperate fish species (Florida Department of Environmental Protection 2010a). The No Action Alternative would continue the current management of the park's mooring buoy and marker system, with no changes to the existing network of mooring buoys and markers, nor the system's maintenance. As a result, the current level of damage to fish habitat from boat groundings, anchoring, and propeller scarring would continue. Many shallow areas, such as Featherbed Bank, are poorly marked and experience many incidents of grounding and propeller scarring. Other areas, such as Sands Cut, Soldier Key, and Stiltsville, receive high concentrations of boats and visitors that also lead to resource damage. Heavy use of popular sites in the park would temporarily disturb fish and invertebrates causing them to leave the area. Impacts would be short-term, localized, negligible to minor, and adverse.

Seagrass recovery from propeller scarring varies depending on the seagrass species and the severity of the scarring. Estimates range from less than a year to a decade and beyond (U.S. Fish and Wildlife Service 1999c, NPS 2008b). Recovery rates are much slower when scarring is deep because rooting substrate is removed and deep scars are more susceptible to secondary, continued erosion and expansion of scars from currents, winds, waves, and storms. (More detail regarding benthic habitat conditions is included in *Benthic Resources*.) At a local scale, propeller scars have been shown to decrease the number of crabs and mollusks, but other studies have not shown adverse impacts on fish. At larger scales, no relationship between scarring density and abundance of similar organisms has been detected (Bell *et al.* 2002). Based on these considerations, impacts to fishes under the No Action Alternative would be long-term, localized, negligible to minor, and adverse.

## **Essential Fish Habitat**

Impacts to essential fish habitat (EFH) under the No Action Alternative are largely synonymous with impacts to benthic habitats and water quality. EFH includes water and substrates necessary to fish and invertebrates for spawning, breeding, feeding, or growing to maturity. Specific components include aquatic areas (physical, chemical, and biological aspects), sediments and hard substrates, and related biological communities. For all the species of concern to this document – penaeid shrimp, snapper-grouper, spiny lobster, and corals – all of Biscayne National Park is designated essential fish habitat. Specific bay habitats include intertidal marshes, mangroves, seagrasses, unvegetated flats and soft sediments, ocean inlets, nearshore hard-bottom habitat, and algal communities.

Impacts to benthic habitats under the No Action Alternative are judged to be long-term, localized, minor to moderate, and adverse. Impacts to water quality are judged to be short to long-term, localized, negligible to minor, and adverse. (Please consult those sections for more details.) However, as noted above, EFH has specific criteria and categories of impacts. Based on those criteria and categories, there would be no adverse effects to EFH under the No Action Alternative, i.e. - although there would be adverse impacts to EFH, those impacts would not rise to the category of “adverse effects.”

## **Invertebrates**

Like fish, benthic habitats such as seagrass and corals provide critical feeding and breeding areas, while the mud and sand of the bay bottom also provide important refuge habitat (Dawes *et al.* 2004). Shelter within rocky outcrops and coral reef crevices are important for large juveniles and adults (Marx and Herrnkind 1986).

Seagrass and hardbottom habitats in the park show signs of adverse impacts from human activities, especially in high-use areas such as those mentioned above. As noted above, at a local scale, propeller scars have been shown to decrease the number of crabs and mollusks in seagrass beds. Because the No Action Alternative would continue current management, those adverse impacts to invertebrate habitat would continue. Therefore, impacts to invertebrates under the No Action Alternative would be long-term, localized, negligible to minor, and adverse.

## **Birds**

The No Action Alternative would do little to disperse crowds from high use areas in the park by retaining the current management system for mooring buoys and markers in the park. Areas with heavy use by boats and visitors generate sufficient noise from generators, loud music, and other human activity to disturb seabirds and wading birds in the vicinity. Human disturbances to the birds in the park primarily affect foraging, social behaviors, and pair bonding. Consistent human use of natural areas also can decrease wildlife densities and length of foraging sessions (Klein 1993). These disturbances temporarily disrupt bird behavior and would not be expected to alter behavioral patterns or affect population levels. Therefore, impacts to birds under the No Action Alternative would be short-term, localized, negligible to minor, and adverse.

## **Reptiles**

The reptiles affected by this plan would largely be limited to sea turtles that occur in Biscayne National Park. The effects on the four species of sea turtles that occur in the park – green, hawksbill, leatherback, and loggerhead – are discussed further in the *Special Status Species* section.

## Mammals

The bottlenose dolphin (*Tursiops truncatus*) is the most common marine mammal in South Florida, feeding in seagrass beds for large fish, squid, and invertebrates, even in waters less than 3 feet deep (Florida Museum of Natural History no date). The damage to seagrass beds and other benthic communities in the park from boat groundings, anchor damage, and propeller scarring adversely affects the forage habitat of the dolphin. Heavy concentrations of visitors and boats in certain areas of the park would also continue. Because the No Action Alternative would continue current management, these adverse impacts to mammals would continue. Heavy visitor use would tend to disperse dolphins from a small portion of a rather large range that they normally occupy (Browder *et al.* 2005). Impacts from disturbance are judged to be short-term, localized, negligible to minor, and adverse. Impacts to habitat are judged to be short- to long-term, localized, negligible to minor, and adverse.

The Florida manatee is the other prominent marine mammal found in the park; it is discussed further in the *Special Status Species* section.

## Cumulative Impacts

The geographic area considered for cumulative effects on wildlife, fish, and essential fish habitat is Biscayne National Park. Past, present and reasonably foreseeable future projects and plans that would impact wildlife, fish, and essential fish habitat include: (1) local and regional efforts to improve stormwater quality, (2) portions of the Comprehensive Everglades Restoration Plan, (3) the park's upcoming general management plan, (4) continued growth of the Miami metropolitan area; and (5) ocean warming and coral bleaching.

Local and regional stormwater projects, as well as portions of the Everglades restoration plan would mainly benefit nearshore water quality in the western portion of the park. They would do so by increasing freshwater flows, improving water quality, diminishing the point-source nature of current water deliveries, and decreasing drastic fluctuations in salinity. Although the specific ecological effects of these changes are largely unknown (Lirman *et al.* 2004), impacts on water quality in Biscayne Bay are judged to be long-term, localized (i.e., nearshore), minor to moderate, and beneficial. Impacts from the park's general management plan are expected to be long-term, parkwide, minor, and beneficial through development of a marine sanctuary.

The population of the Miami metro area is projected to continue growing over the next decade. Due to the popularity of boating in South Florida and the proximity of the park to Miami, visitation to the park is expected to increase, as would boat-related habitat damage and wildlife disturbance. Cumulative impacts would be long-term, parkwide, minor to moderate, and adverse.

Numerous fish and invertebrate species in the park are subject to overfishing from both commercial and recreational sources. The increasing numbers of recreational and commercial fishers and improvements to fishing technology has had adverse impacts on the park's fishery resources (NPS 2008a). Fishing also contributes to habitat destruction through groundings, anchoring, and abandoned or lost fishing gear. Declining fish and invertebrate numbers also impact marine mammals and birds by decreasing the amount of available prey. Cumulative impacts would be long-term, parkwide, moderate, and adverse.

Coral reefs, including those in the park, are affected by a number of threats that have eroded their health and survival. Some of these threats include ocean warming and coral bleaching; water pollution; sedimentation; destructive fishing practices; boat strikes; and tropical storms

(Coral Reef Alliance 2010). Cumulative impacts would be long-term, parkwide, moderate, and adverse.

In total, the impacts of other plans and projects would be long-term, parkwide, moderate, and adverse. Other plans and projects would have adverse effects on essential fish habitat. The benefits provided by improved water quality are outweighed by the large-scale impacts of increasing park use and habitat degradation. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, parkwide, moderate, and adverse.

### **Conclusions**

The No Action Alternative would have short-term, localized, negligible to minor, and adverse impacts on wildlife from temporary disturbances. Impact to habitat would be long-term, localized, negligible to minor, and adverse. The No Action Alternative would have no adverse effect on essential fish habitat. The impacts of the other plans and projects would be long-term, parkwide, moderate, and adverse. Other plans and projects would have adverse effects on essential fish habitat. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, moderate, and adverse.

The No Action Alternative would not result in unacceptable impacts to wildlife, fish, or essential fish habitat.

### **Impacts of Alternative B, the Preferred Alternative**

#### **Fishes**

Under Alternative B, the park would adopt a comprehensive system for managing the park's buoys and markers, including criteria to determine when and where buoys and markers are needed. Standards would be developed for resource conditions and visitor densities, parameters that would be regularly monitored to inform park management concerning needed changes. Best management practices would continue regarding installation and maintenance of buoys and markers.

As under the No Action Alternative, impacts to fishes under Alternative B would involve impacts to fish habitat, particularly seagrass beds and corals. Alternative B is intended to address the primary sources of those direct impacts, such as boat groundings, propeller scarring, anchor damage, and fishing gear. The purpose of Alternative B is to improve the effectiveness of the park's buoys and markers so that the system provides better warnings of submerged habitat, delineates restricted areas more clearly, improves visitor protection, increases boater knowledge of sensitive park resources, provides additional mooring buoys so fewer boats require anchoring, and provides additional navigational markers so that fewer boats stray into inappropriate or non-navigable areas. Improved marking and signage does not necessarily decrease impacts to seagrass habitat (Stowers *et al.* 2002; NPS 2008b), although the cost is small and the net habitat gains may be worthwhile (Engeman *et al.* 2008). Based on these considerations, the proposed action would improve benthic habitat protection, such that impacts for fishes would be long-term, localized, negligible to minor, and beneficial.

Alternative B would install new mooring buoys in high use areas like Sands Cut and Stiltsville, and additional mooring buoys in other areas. Because of siting guidelines, no loss of benthic habitat is anticipated with new buoys or markers. However, since both require disturbance of the bay bottom, adverse impacts would include turbidity and sound intrusion during installation. This would have short-term, localized, negligible to minor, and adverse impacts involving temporary disturbance of fish in the vicinity. Furthermore, more mooring buoys

would be expected to spread boats out and, therefore, distribute existing damage to marine resources over a wider area. Additional mooring points may also increase site visits, and in that way increase resource damage. This would have a long-term, localized, negligible to minor, adverse impacts on fish habitat.

In summary, improvements to benthic resource protection would outweigh potential temporary adverse impacts such that the overall impact of Alternative B would be long-term, localized, negligible to minor, and beneficial.

### **Essential Fish Habitat**

As noted previously, impacts to EFH are largely synonymous with impacts to benthic habitats and water quality. Impacts to benthic habitats under Alternative B would be long-term, parkwide, negligible to minor, and beneficial. Impacts to water quality would be long-term, localized, negligible to minor, and beneficial. (Please consult those sections for more details.) However, based on the specific criteria and categories of impacts for EFH, there would be no adverse effects to EFH under Alternative B. Although this is the same category of impact as the No Action Alternative, the actions under Alternative B are expected to improve EFH, but those improvements would not rise to the category of “no effect.”

### **Invertebrates**

Like fishes above, impacts to invertebrates under Alternative B involve impacts to their habitat, particularly seagrass beds and corals. Alternative B is intended to address the primary sources of those impacts (e.g., boat groundings, propeller scarring, anchor damage, and fishing gear). Therefore, impacts to invertebrates from the proposed actions under Alternative B would be long-term, localized, negligible to minor, and beneficial.

Also similar to the effects on fishes, Alternative B would install new mooring buoys in high use areas and additional mooring buoys in other areas. Although no habitat would be lost, these installations would require disturbance of the bay bottom with short-term, localized, adverse impacts resulting from turbidity and noise during installation. Furthermore, more mooring buoys would be expected to spread boats out and, therefore, distribute existing damage over a wider area. Additional mooring points may also increase site visits, and in that way increase resource damage. These actions would have a long-term, localized, and negligible to minor, adverse impact on invertebrate habitats.

Overall, the improvements to benthic resource protection would outweigh projected adverse impacts such that the overall impact of Alternative B would have long-term, localized, negligible to minor, beneficial impacts to invertebrates.

### **Birds**

Alternative B is designed to improve the effectiveness of the park’s buoys and markers so that the system provides better warnings of submerged habitat, delineates restricted areas more clearly, improves visitor protection, increases boater knowledge of sensitive park resources, provides additional mooring buoys so fewer boats require anchoring, and provides additional navigational markers so that fewer boats stray into inappropriate or non-navigable areas. This alternative would help inform visitors of sensitive habitats and restricted areas that may be used by birds. Along with the proposed installation of mooring buoy fields in high use areas, this alternative would help to contain boaters in designated areas and limit the high densities of boats in places such as Sands Cut that disturb birds with loud noise from visitors. Overall, the impacts to birds under Alternative B would be short-term, localized, negligible to minor, and beneficial by reducing disturbance during foraging, nesting, and other activities.

## Reptiles

The reptiles affected by this plan would largely be limited to sea turtles that occur in Biscayne National Park. The effects on the four species of turtle that occur in the park – green sea turtle, hawksbill, leatherback, and loggerhead – are discussed further in the *Special-Status Species* section.

## Mammals

The park's seagrass beds and other benthic communities provide forage habitat for the bottlenose dolphin. The adverse impacts to these habitats from boat groundings, anchor damage, and propeller scarring are the primary concerns related to the dolphin. Alternative B would help limit this damage by improving the effectiveness of the park's buoys and markers so that the system provides better warnings of submerged habitat, delineating restricted areas more clearly, improving visitor protection, increasing boater knowledge of sensitive park resources, providing additional mooring buoys so fewer boats require anchoring, and providing additional navigational markers so that fewer boats stray into inappropriate or non-navigable areas. Short-term, localized, negligible, and adverse impacts to the dolphin would arise from turbidity and noise during installation of buoys and markers. Otherwise, the impact of the changes proposed under Alternative B would be long-term, localized, negligible to minor, and beneficial.

The Florida manatee is the other prominent marine mammal found in the park. It is discussed further in the *Species of Special Concern* section.

## Cumulative Impacts

The geographic area considered for cumulative effects on wildlife, fish, and essential fish habitat is Biscayne National Park. The impact on wildlife of other plans and projects would be as described for the No Action Alternative - long-term, parkwide, moderate, and adverse. Other plans and projects would also have adverse effects on essential fish habitat. The cumulative effect of Alternative B combined with other projects and plans would be long-term, parkwide, moderate, and adverse.

## Conclusions

Alternative B would have short-term, localized, negligible to minor, and adverse impacts on wildlife from temporary disturbances. Impact to habitat would be long-term, localized, negligible to minor, and beneficial. Alternative B would have no adverse effect on essential fish habitat. The impacts of the other plans and projects would be long-term, parkwide, moderate, and adverse. Other plans and projects would have adverse effects on essential fish habitat. The cumulative effect of the No Action Alternative combined with other projects and plans would be long-term, moderate, and adverse.

Alternative B would not result in impairment of or unacceptable impacts to wildlife or essential fish habitat.

## SPECIAL STATUS SPECIES

### Guiding Regulations and Policies

Under the Organic Act of 1916 and *Management Policies* (NPS 2006b) NPS will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The NPS will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. To meet these obligations, the NPS will:

- cooperate with both the U.S. Fish and Wildlife Service and the NOAA Fisheries to ensure that NPS actions comply with both the written requirements and the spirit of the Endangered Species Act. This cooperation should include the full range of activities associated with the Endangered Species Act, including consultation, conferencing, informal discussions, and securing all necessary scientific and/or recovery permits
- undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species
- manage detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend
- manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species
- cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits to the total recovery efforts being conducted by all the participating agencies
- participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate
- cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

The *Endangered Species Act of 1973* established protection over and conservation of threatened and endangered species and the ecosystems upon which they depend. An “endangered” species is a species that is in danger of extinction throughout all or a significant portion of its range, while a “threatened” species is one that is likely to become endangered within the foreseeable future throughout all or in a significant portion of its range. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service jointly administer the act and are also responsible for the listing of species (i.e., designating a species as either threatened or endangered). The U.S. Fish and Wildlife Service has primary management responsibility for terrestrial and freshwater species, while the National Marine Fisheries Service has primary responsibility for marine species. The Endangered Species Act allows the designation of geographic areas as critical habitat for threatened or endangered species.

The Endangered Species Act requires federal agencies to conserve listed species and consult with U.S. Fish and Wildlife or National Marine Fisheries Service to ensure that proposed

actions that may affect listed species or critical habitat are consistent with the requirements of the act.

### Methods and Assumptions for Analyzing Impacts

The geographic area considered when evaluating the effects of the proposed action on special status species is predominantly the marine environment of Biscayne National Park but also includes shoreline areas immediately adjacent to the water.

Impacts on special status species were evaluated and determined qualitatively based on the professional judgment of NPS staff and consultants. The primary sources of information used in this analysis include existing park management documents, NPS policy documents, published reports and scientific literature, and unpublished observations and insights from knowledgeable park staff and experts.

### Impact Threshold Definitions

Special-status species were evaluated based on guiding laws, regulations, and policies, and incorporate both NEPA and Endangered Species Act requirements. In evaluating the impacts to special-status species the type of effect was defined as follows:

**Adverse impacts:** Impacts could be direct or indirect and may involve the loss of individuals and degradation or loss of habitat. Impacts may affect individuals or populations at a local or regional scale.

**Beneficial impacts:** Impacts would include increased conservation of individual animals and populations and their habitats on a local and regional scale.

Described below are Endangered Species Act terms used to assess impacts on listed species, species proposed for listing, or candidate species at the federal level.

*No effect, no adverse modification:* The alternative and its interrelated and interdependent actions would not directly or indirectly affect listed species or adversely modify designated critical habitat.

*May affect, not likely to adversely affect or adversely modify critical habitat:* Effects on special status species or designated critical habitat would be discountable (that is, would be extremely unlikely to occur and could not be meaningfully measured, detected, or evaluated) or the effect would be completely beneficial.

*May affect, likely to adversely affect species or adversely modify critical habitat:* An adverse effect on a listed species or designated critical habitat may occur as a direct or indirect result of the alternative, and the effect is either not discountable or not completely beneficial.

*Is likely to jeopardize a listed species or adversely modify designated critical habitat:* The alternative directly or indirectly could jeopardize the continued existence of a species or adversely modify designated critical habitat.

For this assessment, impact thresholds specific to special-status species have been incorporated into the NEPA thresholds, as defined below.

**Negligible:** No listed species of concern are present; or if special status species are present, there would be no measurable or perceptible consequences to protected individuals, populations, or critical habitat. A negligible effect equates with a USFWS “no effect” determination.



**Minor:** The alternative would affect one or more individuals of a listed species or its critical habitat, but the change would not affect the distribution or viability of any populations or the ability of the habitat to continue to support the species of concern. A taking under Endangered Species Act Section 7 could occur. A minor effect equates to a USFWS “may affect, not likely to adversely affect” determination.

**Moderate:** An action would result in noticeable impacts on multiple individuals or a population of a listed species or its critical habitat. However, the change would not affect the continued existence of the listed species within or outside the park. A taking under Endangered Species Act Section 7 could occur. A moderate, adverse effect equates to a USFWS “may affect, likely to adversely affect” determination. A moderate, beneficial effect equates to a “may affect, not likely to adversely affect” determination.

**Major:** A population of a listed species or its critical habitat would be noticeably affected. The alternative could change the vitality of the population such that it could affect the continued existence of the listed species within or outside the park. A major, adverse effect equates to a “may affect, likely to adversely affect” determination in USFWS terms and in some cases could “jeopardize the continued existence of the species or the integrity of critical habitat.” A major, beneficial effect equates to a “may affect, not likely to adversely affect” determination.

#### Duration

**Short-term:** Effects on listed species or critical habitats would occur for less than one year.

**Long-term:** Effects on listed species or critical habitats would occur for more than one year.

**Table 5. Special Status Species Known to Occur in Biscayne National Park**

Species	Federal Status	Impacts of Alternative A, the No Action Alternative	Impacts of Alternative B, the Preferred Alternative
Florida manatee ( <i>Trichechus manatus latirostris</i> )	E	Long-term, minor to moderate, adverse; <i>may affect, likely to adversely affect</i>	Long-term, localized, and minor to moderate beneficial; <i>may affect, not likely to adversely affect</i>
Green turtle ( <i>Chelonia mydas</i> )	E	Long-term, minor to moderate, adverse; <i>may affect, not likely to adversely affect</i>	Long-term, localized, minor beneficial as well as long-term, localized and negligible to minor adverse; <i>may affect, not likely to adversely affect</i>
Hawksbill turtle ( <i>Eretmochelys imbricate</i> )	E	Long-term, minor to moderate, adverse; <i>may affect, not likely to adversely affect</i>	Long-term, localized, minor beneficial as well as long-term, localized and negligible to minor adverse; <i>may affect, not likely to adversely affect</i>

**Table 5. Special Status Species Known to Occur in Biscayne National Park**

Species	Federal Status	Impacts of Alternative A, the No Action Alternative	Impacts of Alternative B, the Preferred Alternative
Leatherback turtle ( <i>Dermochelys coriacea</i> )	E	Long-term, minor to moderate, adverse; <i>may affect, not likely to adversely affect</i>	Long-term, localized, minor beneficial as well as long-term, localized and negligible to minor adverse; <i>may affect, not likely to adversely affect</i>
Loggerhead turtle ( <i>Caretta caretta</i> )	T	Long-term, minor to moderate, adverse; <i>may affect, not likely to adversely affect</i>	Long-term, localized, minor beneficial as well as long-term, localized and negligible to minor adverse; <i>may affect, not likely to adversely affect</i>
Staghorn coral ( <i>Acropora cervicornis</i> )	T	Long-term, localized, and moderate adverse; <i>may affect, likely to adversely affect</i>	Long-term minor beneficial; <i>may affect, not likely to adversely affect</i>
Elkhorn coral ( <i>Acropora palmata</i> )	T	Long-term, localized, and moderate adverse; <i>may affect, likely to adversely affect</i>	Long-term minor beneficial; <i>may affect, not likely to adversely affect</i>

Acronyms: T – Threatened, E – Endangered, *italics indicate finding under Section 7 of the Endangered Species Act*

### Impacts of Alternative A, the No Action Alternative

Detail regarding the impacts to marine and benthic resources is covered in the Benthic Resources section. These effects are referenced in relation to the impact on species of special concern throughout this section.

#### Florida Manatee

Manatees tend to congregate in and near channels and are especially susceptible to vessel and propeller strike, the main threat to the species. Within the park in these areas speed zone violations are occurring as a result of unclear informational or regulatory markers or inappropriate visitor activity. According to data from the Fish and Wildlife Research Institute, of the Florida Fish and Wildlife Conservation Commission, there have been 20 manatee mortalities in the park from 1977 through October 2009 (Florida Fish and Wildlife Conservation Commission 2009). However, it should be noted that it is unclear exactly where the individual manatees may have incurred the fatal injuries and whether they occurred in restricted areas of the park. The No Action Alternative would continue the current management of the park's information and marker system, which may be insufficient in clearly identifying to visitors the manatee speed restricted areas and the damage that boats can have on this species. As a result, there could be a continued long-term, localized, minor to moderate adverse impact to the manatee. Manatees graze on the productive seagrass beds in Biscayne Bay and the degradation of these seagrass beds is another primary threat to the species (Florida Department of Environmental Protection 2010a). Groundings, propellers,

anchoring in, and beaching of boats damage the sensitive habitats of the park, including seagrass beds, and the No Action Alternative would do little to reduce or prevent the damage. As a result, the continued damage to the seagrass in the park would have a long-term, localized, and minor adverse impact on the manatees. The No Action Alternative would result in a *may affect, likely to adversely affect* finding, as a moderate impact, for the Florida manatee under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

The Florida manatee continues to be threatened by past hunting and poaching and by the present-day effects of boat impacts and propeller injuries (U.S. Fish and Wildlife Service 2001). Manatee are also killed and injured in water control structures across South Florida. Manatees are susceptible to mortality if water temperatures drop below seasonal norms within their range. These threats have resulted in regional, long-term, moderate, adverse effects on manatee populations.

Manatee conservation and recovery programs in Florida involve many entities from federal and local governments, to industry, and citizen groups. The state has implemented numerous manatee speed zones in bays, rivers, and other waterways. Many counties have implemented manatee protection plans. Actions have been taken to reduce or prevent manatee deaths related to water-control structures and navigation locks. In addition, efforts by many agencies and groups have resulted in many sick and injured manatees rescued every year and returned to the wild. As a result of these efforts, manatee populations in Florida are responding with many sub-populations increasing and the Atlantic Coast sub-population which would include Biscayne National Park is found to be stable (U.S. Fish and Wildlife Service 2007c). These recovery efforts would continue to have long-term, major, benefits.

The long-term, minor to moderate adverse effects to manatee under the No Action Alternative would continue to minimally affect the overall, long-term, moderate, beneficial effects to manatee. This would result in a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act.

#### *Conclusions*

Continued motorboat activity and visitor access in the park's marine waters would result in long-term, minor to moderate, adverse effects on the Florida manatee from boat and propeller strike and habitat degradation. These activities would constitute a *may affect, likely to adversely affect* finding under Section 7 of the Endangered Species Act. Cumulative effects would be regional, long-term, moderate, and beneficial as population in Florida are growing or are stable; with actions under the No Action Alternative continuing to detract minimally from these beneficial effects. The No Action Alternative would not result in unacceptable impacts to special status species, including the manatee.

#### **Sea Turtles**

There are four special-status sea turtles that occur in Biscayne National Park: the green turtle (*Chelonia mydas*), the hawksbill sea turtle (*Eretmochelys imbricate*), the leatherback sea turtle (*Dermochelys coriacea*), and the loggerhead sea turtle (*Caretta caretta*). The seagrass beds and coral reefs of the park provide these sea turtles with forage and feeding habitat, though the hawksbill sea turtle is known to have nested on Soldier Key (USFWS 1999a). Damage to the seagrass beds from the high number of boats and visitor uses at Sand Cut, Soldier Key, and Stiltsville, in particular, results in degraded and reduced foraging habitat for the sea turtles. These marine and benthic communities can take years to recover from boat damage (effects to marine and benthic resources are detailed further in the Benthic Resources section). The high density use at Soldier Key could also displace the hawksbill turtle from

known nesting habitat. Overall, the effects of resource damage in the park would be long-term, localized, and minor to moderate adverse impacts on the sea turtles that occur in the park. This would result in a *may affect, likely to adversely affect* finding under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

All sea turtle species are threatened by commercial fishing and habitat destruction. These threats are global in nature, and represent both direct injury to and mortality of turtles and loss of nesting habitat due to shoreline development. Some sea turtle species are also being affected by communicable disease. These combine to produce long-term, moderate to major, adverse effects on sea turtle populations. Within Biscayne National Park, damage to sea turtle foraging habitat, seagrass beds and coral reefs, as a result of groundings, propeller scarring, and anchoring would continue to contribute to the widespread, long-term, moderate to major, adverse effects on sea turtles.

#### *Conclusions*

The current mooring buoy and marker system within the park would not curtail the damage to sea turtle habitat from grounding, propeller scarring, and anchoring. The No Action Alternative would continue to result in long-term, minor to moderate, adverse effects: a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act. Overall cumulative effects would be widespread, long-term, adverse, and moderate to major. Actions under the No Action Alternative would contribute incrementally to these effects. The No Action Alternative would not result in unacceptable impacts to special status species, including the green turtle, the hawksbill sea turtle, the leatherback sea turtle, and the loggerhead sea turtle.

#### **Corals**

Staghorn Coral (*Acropora cervicornis*) and Elkhorn Coral (*Acropora palmata*), collectively known as Acroporid corals, were listed as federally threatened species in 2006 and occur in the park. The eastern portion of Biscayne National Park, east of the barrier islands, including Elliot, Boca Chita, and Old Rhodes Keys, is designated as critical habitat for these corals (Federal Register 2008). The primary threats to corals in the park are boat groundings, propeller damage, and anchoring. This is especially common in areas of high visitor use. Depending on the nature of the disturbance (propeller damage vs. grounding, for example), the effects to corals from boat damage can vary. Some of the principal forms of damage include impacts to living resources, framework fracturing, reef rock displacement, and sediment production. Impacts to living resources may include obliteration, fracture, or abrasion of coral colonies (and associated reef invertebrates), displacement of colonies, and bleaching (Gittings *et al.* 1994). Acroporid corals are generally expected to colonize grounding sites at a slower rate and reach maximum abundance in later recovery phases (Gittings *et al.* 1994). The continued threat to corals in the park from inappropriate visitor behavior and boating damage results in a long-term, localized, and moderate adverse impacts to staghorn and elkhorn corals. This would result in a *may affect, likely to adversely affect* finding under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

The greatest source of region-wide mortality for the Acroporid corals has been disease outbreaks, mainly of white band disease. Other, more localized losses have been caused by hurricanes, increased predation, bleaching, algae overgrowth, human impacts, and other factors. This species is also particularly susceptible to damage from sedimentation and is sensitive to temperature and salinity variation (National Marine Fisheries Service 2003a,

2003e). Since 1980, populations of staghorn corals have collapsed throughout their range and declined by up to 98 percent throughout the range, and localized extirpations have occurred (National Marine Fisheries Service 2003e). Declines have been nearly as bad for the elkhorn coral; in areas where loss has been quantified, estimates are in the range of 90-95 percent reduction in abundance since 1980 (National Marine Fisheries Service 2003a).

In 1998, the United States Coral Reef Task Force was established by Presidential Executive Order 13089 to coordinate and strengthen efforts for protecting coral reef ecosystems. Over 60 regional agencies collaborate in Florida in an effort to prevent the loss of elkhorn and staghorn corals. In addition, conservation programs such as the Coral Reef Conservation Program and the Florida Keys National Marine Sanctuary protect elkhorn and staghorn corals through zoning, channel marking, education efforts and restoration work (Florida Department of Environmental Protection 2009). Past, present, and reasonably foreseeable future projects and plans in the park that would benefit special status coral include the park's general management plan; the park's fishery management plan; and other park-specific resource management plans and activities. These efforts within the park and regionally would continue to have minor, localized benefits for Acroporid species.

However, given the widespread and drastic threats to elkhorn and staghorn coral populations throughout the range, the benefits of park and regional actions at this time are not outweighing the adverse effects. Combined with the long-term, localized, and moderate adverse impacts to these special status corals under the No Action Alternative, the cumulative effects to Acroporid corals would be long-term, major, and adverse.

### *Conclusions*

The current mooring buoy and marker system within the park would not curtail the damage to elkhorn and staghorn corals that results from boat grounding, propellers, and anchoring. The result of continuing management under the No Action Alternative would be long-term, localized, and moderate adverse. This equates to a *may affect, likely to adversely affect* finding under Section 7 of the Endangered Species Act. Overall cumulative effects would be widespread, long-term, adverse, and major. Actions under the No Action Alternative would contribute incrementally to these effects. The No Action Alternative would not result in unacceptable impacts to special status species, including elkhorn and staghorn coral.

## **Impacts of Alternative B, the Preferred Alternative**

### **Florida Manatee**

Under Alternative B, Biscayne National Park would adopt a comprehensive framework for managing the park's system of mooring buoys and markers. This alternative would increase the number of markers in site-specific locations in the park to enhance protection of manatees by clearly identifying restricted speed zones. This would help to reduce potential manatee collisions particularly in the bay. Improved signage, along with increased education and enforcement efforts proposed under this alternative, would help to slow down boaters and alert them to the presence of manatees in the park. This would have a long-term, localized, and minor beneficial impact on the manatee in the park. This would result in a *may affect, not likely to adversely affect* finding for the Florida manatee under Section 7 of the Endangered Species Act.

Alternative B is intended to address the major sources of adverse impacts (e.g., boat-related activities groundings, anchor damage, and fishing gear) to lagoon and marine benthic resources, including seagrass beds in the park that provide forage habitat for the manatee. The purpose of Alternative B is to improve the effectiveness of the park's mooring buoys and

markers so that the system provides better warnings of submerged habitat, delineates restricted areas more clearly, improves law enforcement, increases boater knowledge of sensitive park resources, provides additional mooring buoys so fewer boats require anchoring, and provides additional navigational markers so that fewer boats stray into inappropriate or non-navigable areas. Based on these elements, impacts to marine benthic resources, including seagrasses, under Alternative B are judged to be long-term, parkwide, minor to moderate, and beneficial. The increased protection of seagrass beds under this alternative, and therefore, the increased protection of manatee habitat, would have long term, localized, minor to moderate and beneficial impacts on the manatee in the park. This would result in a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

Widespread cumulative effects on the Florida manatee would be as described for the No Action Alternative – long-term, moderate, and beneficial. The long-term, localized, and minor to moderate benefits of Alternative B would contribute to the recovery and protection of manatees, resulting in overall long-term, moderate benefits.

#### *Conclusions*

The new management framework proposed under Alternative B would help protect the manatee from boat collisions and would also improve resource protection of manatee foraging habitat. This would have a long-term, localized, and minor to moderate beneficial impacts. The actions under this alternative would constitute a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act. Cumulative effects would be regional, long-term, moderate, and beneficial, with actions under Alternative B contributing to the overall benefits to the Florida manatee. Alternative B would not result in impairment of special status species, including the manatee.

#### **Sea Turtles**

The seagrass beds and coral reefs of the park provide sea turtles with forage and feeding habitat. Loggerheads nest regularly on the park's islands, and the hawksbill turtle is known to have nested on Soldier Key (U.S. Fish and Wildlife Service 1999a). Alternative B would generally improve and protect the sea turtle forage habitat, as discussed in the manatee section above. This would have long-term, localized, and minor beneficial impacts on sea turtles in the park, resulting in a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act.

Alternative B would also establish mooring buoy fields to better disperse boaters and identify specific mooring locations throughout the park. These locations would be in areas of high use (Sands Cut, Stiltsville, Soldier Key, to name a few) where resources experience a higher rate of damage from boats and inappropriate visitor use. Dispersing boaters in heavily concentrated areas would result in long-term, localized, and minor beneficial impacts to the sea turtles because it would better protect the resources that provide habitat for them, including nesting habitats, as well as reduce frequency of anchor damage to benthic habitats important to sea turtles. However, this may also have long-term, localized, negligible to minor adverse impacts on the turtles as the newly installed mooring buoy fields would expand the areas affected by visitors. Overall, Alternative B would result in a *may affect, not likely to adversely affect* finding for sea turtles under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

Cumulative impacts to sea turtles under Alternative B would be expected to be similar to the No Action Alternative. Alternative B would have minor beneficial and adverse impacts but

would not likely alter the widespread, long-term, moderate to major, and adverse affliction currently impacting sea turtles throughout their ranges.

#### *Conclusions*

Alternative B would result in long-term, localized, minor beneficial impacts as well as long-term, localized and negligible to minor adverse impacts. The actions under this alternative would constitute a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act. Overall cumulative effects would be widespread, long-term, adverse, and moderate to major. Actions under Alternative B would not notably reduce the overall adverse effects. Alternative B would not result in impairment of special status species, including the green turtle, the hawksbill sea turtle, the leatherback sea turtle, and the loggerhead sea turtle.

#### **Corals**

Alternative B is intended to address the sources of adverse impacts (e.g., boat-related activities groundings, anchor damage, and fishing gear) to marine benthic resources, including the federally threatened staghorn and elkhorn corals. The purpose of Alternative B is to improve the effectiveness of the park's buoys and markers so that the system provides better warnings of submerged habitat, delineates restricted areas more clearly, improves law enforcement, increases boater knowledge of sensitive park resources, provides additional mooring buoys so fewer boats require anchoring, and provides additional navigational markers so that fewer boat stray into inappropriate or non-navigable areas. Based on these elements, impacts to the staghorn and elkhorn corals under Alternative B are judged to be long-term, localized, minor, and beneficial. This would result in a *may affect, not likely to adversely affect* finding for staghorn and elkhorn corals under Section 7 of the Endangered Species Act.

#### *Cumulative Impacts*

Cumulative effects on corals would be as described for the No Action Alternative—long-term, major, and adverse. The long-term, localized, and minor benefits of Alternative B would make no detectable contribution to widespread effects, resulting in continued long-term, major, adverse effects on both staghorn and elkhorn coral.

#### *Conclusions*

Overall, Alternative B would provide long-term minor benefits to elkhorn and staghorn coral. This would result in a *may affect, not likely to adversely affect* finding under Section 7 of the Endangered Species Act. Cumulative effects would continue to be widespread, long-term, major and adverse. Actions under Alternative B would not notably reduce the overall adverse effects. Alternative B would not result in impairment of special status species, including elkhorn and staghorn coral.

## CULTURAL RESOURCES

### Guiding Regulations and Policies

Section 106 of the *National Historic Preservation Act of 1966* requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing on the National Register of Historic Places. All actions affecting the parks' cultural resources must comply with this legislation.

The *National Environmental Policy Act* requires analysis of the impacts of federal actions on the human environment (the natural and physical environment and its relationship with human culture); and directs that these important historical, cultural and natural aspects of our national heritage be preserved.

The physical attributes of cultural resources are, with few exceptions, nonrenewable. Once the historic fabric of a resource is gone, nothing can restore its authenticity or gain information that might have been found through analysis. *NPS-28* (NPS 1998b) and *NPS Director's Order #28* (NPS 1998a) provide guidance for management and protection of the cultural resources in NPS custody.

### Methods and Assumptions

Regulations for implementing the National Environmental Policy Act (NEPA) (42 USC 4321, et seq.) and the National Historic Preservation Act (NHPA) (16 USC 470 et seq.) require the analysis of the effects of proposed actions on important cultural resources. Unfortunately, both acts have different sets of definitions for assessing effects on cultural resources so the following impact analyses are designed to comply with the requirements of both NEPA and NHPA Section 106.

The method for evaluating impact topics under NEPA is described in the "General Methodology" section of this chapter.

In accordance with the Advisory Council on Historic Preservation's regulations implementing NHPA Section 106 (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources also were 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 be made for affected National Register listed or eligible cultural resources. An adverse effect occurs whenever an impact directly or indirectly alters any characteristic of a cultural resource that qualifies it for inclusion in the National Register. For example, the impact diminishes the integrity of its location, design, setting, materials, workmanship, feeling, or association, or it diminishes the extent to which a resource retains its historic appearance. 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). 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.



To clearly articulate effects on affected National Register listed or eligible properties, 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) on National Register eligible or listed cultural resources only, based upon the criterion of effect and criteria of adverse effect found in the advisory council's regulations.

The Council on Environmental Quality regulations and NPS policies (NPS 2001) 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 NEPA only.

It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are non-renewable 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.

The following discussion correlates the different requirements of NHPA and NEPA to disclose potential effects on cultural resources and to achieve compliance with both laws.

### **Impact Criteria and Thresholds for Archeological Resources**

**Negligible:** Impact(s) would be barely perceptible and would not alter resource conditions, i.e. - shipwreck preservation. For purposes of Section 106, the determination of effect on submerged archeological resources would be *no adverse effect*.

**Minor:** Adverse or Beneficial - Impact(s) would be slight, but noticeable, and would not appreciably alter resource conditions, i.e. - shipwreck preservation. For purposes of Section 106, the determination of effect on submerged archeological resources would be *no adverse effect*.

**Moderate:** Adverse - Impact(s) would be apparent and would alter resource conditions. Something would affect shipwreck preservation to the extent that the resource's integrity would be diminished. For purposes of Section 106, the determination of effect on submerged cultural resources would be *adverse effect*. Beneficial - Impact(s) would facilitate shipwreck preservation, resulting in resource protection. For purposes of Section 106, the determination of effect on submerged archeological resources would be *no adverse effect*.

**Major:** Adverse - Impact(s) would significantly alter resource conditions. Something would greatly affect shipwreck preservation to the extent that the resource's integrity would be degraded or lost. For purposes of Section 106, the determination of effect on submerged archeological resources would be *adverse effect*. Beneficial - Impact(s) would ensure site preservation, resulting in certain resource protection. For purposes of Section 106, the determination of effect on submerged archeological resources would be *no adverse effect*.

### **Duration:**

Long-term: Archeological resources are nonrenewable; therefore, adverse effects on shipwrecks would be long-term and extend well beyond implementation of the project.

### **Issues**

The following issues related to cultural resources were identified by the NPS, other agencies, and the public during internal and public scoping.

- Cultural resources may be damaged by anchor and boat strike.
- There is a lack of mooring buoys at sites within the park near interesting and unique resources. This inhibits visitor use and understanding of park resources. There is a desire by the park to have visitors experience healthy and interesting coral reefs, along with submerged cultural sites such as the Marine Heritage trail, without damaging sensitive resources.
- Increased visitation to submerged archeological sites may potentially damage these sites.

### **Impacts of Alternative A, the No Action Alternative**

Under current management, the Maritime Heritage Trail would continue to function as a loosely defined and marked visitor experience. (See Visitor Use and Experience section for a more detailed description of the impacts related to this topic and each alternative.) No formal visitor information or maps would be developed for the Maritime Heritage Trail, and no additional mooring buoys would be installed on sites appropriate or eligible for inclusion on the trail. Three of the shipwrecks, the *Arratoon Apcar*, the *Alicia*, and the *Erl King*, would remain unmarked for visitor experience and appreciation. There would continue to be no limits on anchoring near the shipwrecks; nor would there be documented criteria used to determine eligibility for inclusion of additional shipwrecks on the Maritime Heritage Trail. Information regarding the Maritime Heritage Trail would continue to be limited to what is found on the park's website. Monitoring of submerged cultural resources would be conducted without a formal framework in place; and, no management actions would be in place to react to observed effects.

Implementation of Alternative A would continue to result in damage to the park's submerged cultural resources. Examples of recent damage to shipwrecks from human actions appear to be most extreme at the *Mandalay*. In 2003, anchor damage was observed that resulted in dislocation of a portion of the wreck's foremast wire rope rigging, breaking it in half. Remarks also noted an accelerated rate of deterioration at this wreck. The following year, anchor damage had displaced the foremast rigging from the starboard to port side of the vessel (NPS 2010d).

Without increased awareness through better education and markings, prohibition of anchoring / increase in mooring capabilities, and systematic monitoring of and reaction to inappropriate human actions, existing levels of damage to submerged archeological resources would continue unabated. Additionally, Alternative A would not expand the Maritime Heritage Trail; thus, it would not increase protection of submerged resources which are currently not included on the trail and therefore more vulnerable to damage. As a result, Alternative A would have direct, localized moderate long-term adverse effects on those shipwrecks within the park that are not currently included in the Maritime Heritage Trail.

### **Cumulative Impacts**

The area of potential effect for cumulative impacts includes the six shipwrecks of the Maritime Heritage Trail, and to a greater extent, the listed shipwrecks that contribute to the Offshore Reefs Archeological District, as well as the immediate park waters surrounding each submerged archeological resource which may be used for mooring buoys and informational

markers. The resources are subject to the natural and inevitable effects of time, water currents, and storm events.

The shipwrecks are also subjected to the inappropriate human actions of park visitors, such as dropping anchor or fishing in areas in which such actions are prohibited. According to the park's Fisheries Management Plan, surveys conducted during the early 2000s of 42 of the park's submerged archeological sites indicated that the structural integrity of submerged archeological sites was damaged or affected by numerous fishing-related threats, including anchor damage, lobster trap debris, hook-and-line gear, fishing nets, and spears from spearfishers (NPS 2008a). These past and on-going actions have resulted in long-term, minor to moderate, adverse effects.

The park's submerged archeological resources have been documented, monitored, and protected by the NPS on a relatively *ad hoc* basis. Unfortunately, a multitude of factors such as the availability of staff assigned to these purposes, the number and the geographic extent of the submerged archeological resources within the Offshore Reefs Archeological District, the lack of anchoring restrictions, the difficulty in enforcing park regulations during high-use periods, and the subsequent threats to resource integrity combine to make it difficult for the NPS and others to keep up with preservation needs. Despite the ongoing, beneficial effects of efforts by NPS staff to preserve the park's submerged cultural sites via planning avenues, deterioration of the submerged archeological resources found along the Maritime Heritage Trail and, to a greater extent, the Offshore Reefs Archeological District, would nevertheless continue as a result of inevitable and uncontrollable elements of time, the marine environment, and weather. These long-term, minor, adverse effects are expected to last into the future, gradually eroding the physical integrity of the resources.

Development of a general management plan (GMP) is underway for the park, but its completion and implementation is a few years in the future. The GMP would benefit the park's cultural resources by establishing a framework and direction for effective management and preservation of the park's cultural resources, the impact of which would be long-term, minor, and beneficial. The park's Fisheries Management Plan (FMP) aims to restrict or better control fishing activities in the park, which would also result in long-term, minor, beneficial impacts to submerged archeological resources (NPS 2008a).

When the minor to moderate, adverse effects of these past, current and future actions and events are added to the moderate ongoing and expected future adverse effects as a result of the no action alternative, this alternative would have a long-term, moderate, adverse cumulative effect on the submerged archeological resources along the Maritime Heritage Trail and within the greater Offshore Reefs Archeological District.

## Conclusions

The present level of mooring buoy and marker management would not be adequate to prevent long-term effects of diminished or degraded integrity to the submerged archeological resources of the park. For example, anchor impacts would potentially continue at Maritime Heritage Trail sites. Continuation of Alternative A would have direct, localized moderate long-term adverse effects on these resources.

Despite the best efforts of park management to preserve its submerged archeological resources, the combined effects of past actions and events, ongoing natural threats (time, weather and wave action), and future projects would have a long-term, moderate, adverse cumulative effect on the submerged archeological resources on the Maritime Heritage Trail and on the Offshore Reefs Archeological District.

There would be no unacceptable impacts to archeological resources as a result of park actions under Alternative A.

### **Section 106 Summary**

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of Alternative A would have *an adverse effect* on the historic properties of Biscayne National Park.

### **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, the Maritime Heritage Trail would become a clearly defined and marked visitor experience. (See Visitor Use and Experience section for a more detailed description of the impacts related to this topic and each alternative.) Formal visitor information and maps would be developed for the Maritime Heritage Trail, and additional mooring buoys would be installed on sites appropriate or eligible for inclusion on the trail. Three of the shipwrecks which are now unmarked, the *Arratoon Apcar*, the *Alicia*, and the *Erl King*, would be marked for visitor experience and appreciation, and additional mooring buoys would reduce the likelihood of anchor damage. Anchoring near the shipwrecks would be prohibited; and, there would be documented criteria used to determine eligibility for future inclusion of additional shipwrecks on the Maritime Heritage Trail. Information regarding the Maritime Heritage Trail would expand beyond what is found on the park's website. Monitoring of submerged cultural resources would be conducted under the guidance of a formal framework; and, an adaptive management plan would be in place to proactively adjust to observed effects.

Implementation of Alternative B would likely decrease damage to the park's submerged cultural resources. Although increased visitation could potentially lead to increased damage to resources, Alternative B is more likely to reduce anchor strikes by prohibiting anchoring and by installing additional markers and mooring buoys near the shipwrecks, while simultaneously requiring periodic observations to methodically react to resource damage. It could potentially expand the Maritime Heritage Trail; thus, it could increase awareness and protection of submerged resources which are currently vulnerable to damage. As a result, Alternative B would have direct, localized, moderate, long-term, beneficial effects on the six shipwrecks included in the Maritime Heritage Trail, along with any others that could be part of an expanded trail.

### **Cumulative Impacts**

The area of potential effect for cumulative impacts includes the six shipwrecks of the Maritime Heritage Trail, and to a greater extent, the listed shipwrecks that contribute to the Offshore Reefs Archeological District, as well as the immediate park waters surrounding each submerged archeological resource which may be used for mooring buoys and informational markers. The impacts of other past, present and reasonably foreseeable actions affecting archeological resources under Alternative B would be the same as described for Alternative A. Overall impacts to submerged archeological resources from other past, present and reasonably foreseeable actions would be long-term, minor to moderate adverse.

As explained above, implementation of Alternative B would result in direct, localized, moderate, long-term, beneficial effects to submerged archeological resources.

The beneficial effects of Alternative B, in promoting resource protection and reducing the direct and often severe damage to shipwrecks resulting from human actions, cannot compensate for or overcome the gradual and widespread impacts to individual shipwrecks

and the district as a whole posed by the marine environment and storms. In addition, impacts to these resources as a result of fishing and boating activities would continue with the exception of reduced anchoring impacts. The localized moderate long-term benefits of Alternative B, in combination with the long-term, minor to moderate, adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a long-term, minor adverse cumulative impact.

### **Conclusions**

The proposed adaptive management of mooring buoy and markers could likely reduce long-term effects of diminished or degraded integrity to the submerged archeological resources of the park by reducing damage to the resources caused by human actions. Alternative B would have direct, localized moderate long-term beneficial effects on these resources.

Despite the best efforts of park management to preserve its submerged archeological resources, the combined effects of past actions and events, ongoing natural threats (time, weather and wave action), and future projects would have a long-term, minor, adverse cumulative effect on the submerged archeological resources on the Maritime Heritage Trail, and to a greater extent, on the Offshore Reefs Archeological District.

There would be no impairment of or unacceptable impacts to archeological resources as a result of park actions under Alternative A.

### **Section 106 Summary**

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of Alternative B would have *no adverse effects* on the historic properties of Biscayne National Park.

## VISITOR USE AND EXPERIENCE

### Guiding Regulations and Policies

*Management Policies* (NPS 2006b section 8.2) states that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all park units and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy at the park units. Because many forms of recreation can take place outside of a national park setting, the NPS therefore seeks to:

Provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in a particular park unit.

Management controls are sometimes necessary in order to maintain the quality of visitor experience and protection of resources. This might include changes in access to or uses of park resources or facilities. Under section 8.2 (Visitor Use) of *Management Policies* (NPS 2006b), such changes may be made in order to:

- Protect public health and safety;
- Prevent unacceptable impacts to park resources and values;
- Minimize visitor use conflicts; or
- Otherwise implement management responsibilities.

*Management Policies* (NPS 2006b) also states that park managers may need to make controversial decisions regarding resources, and that in making these decisions, parks should integrate the resource issues and park initiatives into their interpretive and educational programs. This serves to build public understanding of, and support for, such decisions.

### Method and Assumptions

#### Geographic Area Evaluated for Impacts

Evaluation of impacts to visitor use and experience was based upon the resources available within the park boundary.

#### Issues

The following issues related to visitor use and experience were identified by the NPS, other agencies, and the public during internal and public scoping.

- High concentrations of visitors during peak use times can reduce overall visitor experience and appreciation of park resources and values.
- Concentrated visitor use and use of anchors can have negative effects on the park's natural and cultural resources.
- During certain peak-use times, some visitors avoid certain locations within the park because of crowding and conflict.
- There is a lack of mooring buoys at sites with interesting and unique resource. This inhibits visitor understanding and appreciation of park resources. The park's goal is to provide access to healthy and interesting coral reefs and submerged cultural sites such as the Maritime Heritage Trail without damaging sensitive resources.

- There is a conflict between public visitor and concession use of mooring buoys. Occasionally the concessioner arrives at specific high-weight capacity buoys to find them occupied by visitor boats. The concession must then relocate to another area or drop anchor to provide access to their visitors.
- Information and regulatory markers are not adequate to support appropriate visitor uses and behaviors.

To determine the overall impact of the action alternatives on visitor use and experience, the issues were evaluated using the procedures described in the general methods section of this document. The impact analysis evaluates several aspects of the visitor experience in Biscayne National Park.

For this impact topic, impacts on the visitor were evaluated and determined qualitatively, based on the best professional judgment of NPS staff and consultants. The primary sources of information used in this analysis include existing park management documents, NPS policy documents, peer-reviewed research publications, and unpublished observations and insights from knowledgeable park staff.

### **Definition of Adverse and Beneficial Effects**

Adverse effects would create disruptions to visitor appreciation of park resources, impede visitor circulation and diminish comfort, or negatively affect condition of natural and/or cultural resources on which the visitor experience is based.

Beneficial effects would reduce disruptions to visitor appreciation of park resources, support visitor circulation and increase comfort, or positively affect condition of natural and/or cultural resources on which the visitor experience is based.

### **Impact Threshold Definitions**

The following threshold definitions were developed and applied to determine the intensity of rehabilitation efforts on visitor use and experience.

**Negligible:** Visitors would not be affected, or changes in visitor experience and/or understanding would be at or below the level of detection. The visitor would not likely be aware of the effects associated with the alternative.

**Minor:** Changes in visitor experience and/or understanding would be detectable, although the changes would be slight. Visitors could be aware of effects associated with the alternative, but slightly.

**Moderate:** Changes in visitor experience and/or understanding would be readily apparent. Visitors would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

**Major:** Changes in visitor experience and/or understanding would be readily apparent and would have important consequences, such as changes to visitor access to resources. Visitors would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

### **Duration**

Short-term – Effects would be intermittent or occur during project implementation activities.

Long-term – Effects would persist beyond project implementation activities.

## **Impacts of Alternative A, the No Action Alternative**

### **Recreating in the Park**

Under the No Action Alternative, access to and use of recreation sites in the park would remain unchanged. Popular visitor sites would be fully accessible, existing mooring buoys would remain in place (unless damaged or removed by weather events), and the Maritime Heritage Trail would remain an informal experience without support of mapping or visitor information.

### **Popular Visitor Use Areas**

Throughout most of the year, the park would continue to be uncrowded. However, at peak visitation times, popular visitor use areas would continue to be crowded. During these high-demand weekends and holidays, boats would be crowded together at particular sites (Sands Cut, Biscayne Channel, Stiltsville, Soldier Key, etc.) with as many as five boats rafted from a single anchored vessel. In very shallow areas, some visitors would continue to “beach” their boats – parking them in sandy shoals with the bow resting on the bottom. Visitor conflicts would continue to arise in these situations and a variety of recreational activities would be pursued in crowded conditions. For example, families with children who are swimming or using personal flotation devices would be in proximity to adults playing volleyball on shallow shoals; those seeking a relaxed experience would be in proximity to those seeking a party atmosphere with loud music; and occasional verbal and physical confrontations would erupt.

Although recreational visitors may have different preferences and expectations for their visits to these popular sites in Biscayne National Park, research has shown that crowding can result in decreased quality of the visitor experience and changes in visitor behaviors and uses (University of Wisconsin 2003). Crowded conditions in recreational settings can produce feelings of stimulus overload (e.g., in a setting where relaxation is sought) or in altered social interactions (e.g., because of high numbers or proximity of other visitors) (Gramann 1982). Some visitors may feel the need to seek uncrowded sites or to eliminate exposure to conflict. This is most commonly accomplished by changing the day, season, or time of visitation to a particular area. The second most common strategy is to relocate to another suitable location within the park. Finally, if alternative suitable use sites are not available, sensitive visitors may relocate to another recreational location altogether during peak use times (Hall and Shelby 2000). Local residents, and visitors with higher rates of on-site experience, perceive crowded conditions more readily than do tourists or occasional users (Arnberger and Brandenburg 2004).

Thus, visitors with expectations of relatively uncrowded conditions, those sensitive to noise or conflicting uses, and local-resident users may not have the opportunity to recreate at preferred sandy shallows sites during peak visitation days. Decreased visitor satisfaction or the need to change locations or recreation pursuits during these times would result in short-term, minor to moderate, adverse impacts on visitor experience and appreciation. These effects would result from the temporary loss of a range of high-quality opportunities, and potential exposure to conflicting uses and confrontational situations.

High concentrations of visitors can diminish resource conditions, on which the quality of the experience is ultimately based. Trash, bottles, and cans are common at several sites in the park, such as at Sands Cut Shoals and Elliot Key Anchorage. Environmental degradation may play a larger role in relocation of visitor uses to alternate sites than does crowding and conflict (Hall and Shelby 2000). For example, at the Sands Cut sandbar, along Biscayne Channel, and at Stiltsville, seagrass beds have been disturbed, denuded, and reduced to patches by beaching of boats, high volumes of foot traffic, and propeller scarring. Overall, seagrass damage in the park covers approximately 11,000 acres (see *Benthic Habitats*) and



comprises dispersed areas of propeller scarring and concentrated areas of visitor use and beaching activities. Loss of seagrass in heavily used areas reduces quality for a variety of wildlife species (Bell *et al.* 2002) and increases turbidity by exposing sediment to direct disturbance (NPS 2008b). Resource condition changes resulting from the degradation of seagrass and shallow habitats would potentially reduce visitor appreciation of park resources, resulting in long-term, localized, minor, adverse impacts on the visitor experience.

### **Mooring Buoy Sites**

Mooring buoy sites currently provide visitors the opportunity to experience the Florida reef tract and marine ecosystem at a variety of locations. The high-quality dive and snorkel sites are known to local users and commercial service providers, and receive regular, repeated visits by a variety of groups. The experience at these sites is uncrowded, with a single vessel using each buoy. Visitors using buoys are free to pursue a range of activities including swimming, snorkeling, diving, and fishing. Boats may also be anchored to provide access these locations, and it is not uncommon for visitors to encounter small numbers of other users. Although these sites provide high-quality opportunities to experience and appreciate park resources, the number of mooring buoys is not adequate to meet visitor demand. This unmet demand results in long-term, localized, minor, adverse effects on visitor experience and appreciation.

Under continued current management, resources at high-quality snorkel and dive sites would continue to be affected by anchor damage and visitor activities. Anchors and anchor chains cause damage to coral reefs during setting, retrieval and while at anchor. Reefs with high levels of boating activities also have high levels of damaged corals, fishing lines, and debris (Dinsdale and Harriott 2004). In many popular coastal destinations, including Biscayne National Park, marine ecosystems show signs of damage as a result of private and commercial snorkeling and diving. The presence of small and large groups of people in shallow coral and rocky reefs and other habitats can lead to marked degradation of an ecosystem over time (Conservation International 2010). Observable effects from both visitor access and anchoring include broken, damaged, and overturned hard and soft corals. Such damage affects the experience and appreciation of the park's coral communities, and provides a less than desirable visitor experience. Because coral damage persists for long periods of time (see *Benthic Habitats*), the localized adverse effects to visitor experience would be long-term, and minor to moderate.



**Figure 20. View of Typical Shallow Reef in Biscayne National Park**

### **Maritime Heritage Trail**

Under continued current management, the Maritime Heritage Trail would remain a generally under-appreciated resource, with access to and interpretation of the resources

being limited. Existing mooring buoys on three of the six wreck sites would remain – two on the *Lugano*, one on the *Mandalay*, and one on the *19<sup>th</sup> Century Sailing Vessel*. These mooring buoys provide access to shallow-water cultural sites that also abound with marine life. To gain specific information on the trail's cultural resources, visitors would need to access the park's website. Although snorkeling and diving on these cultural sites provide opportunities to experience park resources, few are aware of the sites or their history, and little educational information is available to support visitor appreciation. This results in a less than desirable visitor experience at these locations, resulting in long-term, localized, adverse effects of minor intensity.

As described for mooring buoy sites on the reef tract, the Maritime Heritage Trail wrecks would continue to be vulnerable to anchor damage. Over the long-term, adverse effects on the sites could become noticeable to visitors, reducing the quality of the visitor experience and appreciation of these sites and resources, and producing long-term, localized, minor, adverse effects on visitor experience and appreciation.

### **Commercial Visitor Services**

Under continued current management, the park's concession provider would continue to access a limited number of specific high-capacity buoys along the reef tract. Visitors would have opportunities to experience the coral reef and its resources. On occasion, these buoys would be in use by private boaters when the concessions boat arrives. At these times, the concessioner would drop anchor near the desired visitation site, or relocate to another area with suitable conditions or visitor experience opportunities. Either of these options would likely have limited adverse effects on commercial visitor experience, as a reef tract experience would be provided. As described for visitor use of other mooring buoy sites, visitor use at these sites would provide localized, minor to moderate benefits to experience and appreciation. However, the current number of commercial-capacity mooring buoys would continue to be inadequate, and the buoys would not be clearly identified for NPS or concessioner use. Overall, the reef experience opportunity would result in localized, short-term, minor to moderate benefits to visitor experience and appreciation.

Over the long-term, repeated anchoring by the commercial services boats would contribute to visitor use and anchor damage at the high-quality dive and snorkel sites. Damaged corals would be as described for other mooring buoy sites; such damage affects the appreciation of the park's coral communities, and provides a less than desirable visitor experience. Because coral damage persists for long periods of time (see *Benthic Habitats*), the localized adverse effects to visitor experience would be long-term, and minor to moderate. Overall, the sites used by commercial services provide localized, minor to moderate benefits to visitor experience and appreciation. However, under continued current management, the number of mooring buoys would continue to be less than desirable, and resources at high-quality snorkel and dive sites would continue to be affected by visitor activities and anchor damage.

## **Navigating in the Park**

### **Boundaries and Regulations**

The scarcity of boundary markers makes it difficult for visitors to know that they have entered (or left) the park. Expectations for visitor behavior (especially regarding resource protection and/or extraction) within a national park are different than those outside a park. For example, personal watercrafts (PWCs) are not allowed in Biscayne National Park, but riders often enter the park from Key Biscayne. All of Biscayne Bay is included in the Biscayne Bay-Card Sound Lobster Sanctuary, and a slow-speed is required along the western shore of the park for protection of the Florida manatee. Sparse boundary markings may limit visitor

understanding of the need to protect such resources in the park. This would represent a missed opportunity for visitors to appreciate the resources of Biscayne National Park.

In some locations, the park's informational and regulatory markers are inadequate in number or in poor condition. For example, signs indicating slow-speed zones for manatee protection are not sufficient to ensure visitor compliance for the full length of the western shoreline. The distance between markers that delineate the Legare Anchorage exceeds the line of sight, making it difficult for visitors to determine if they are within the area of limited use. In addition, some pilings indicating shoals or hazard areas have lost their signs. These conditions could lead to inappropriate visitor uses or behaviors, damage to natural and cultural resources, and could also interfere with visitor abilities to appreciate and protect park resources. In combination, inadequate boundary markers and other informational and regulatory markers would result in parkwide, long-term, and minor adverse effects on the visitor experience.

### **Marked Channels**

The condition and quantity of markers along the park's main navigable channels varies. For example, Biscayne Channel and Caesar Creek are well-marked, and the navigation route is clearly visible. Along the Intracoastal Waterway and Hawk Channel, the distances between marks can be several miles, and the navigation route can be unclear. The latter situation results in increased risk of leaving the channel and potentially running aground in shallows. Groundings are reported each year along the Intracoastal Waterway on the Featherbed Banks, and just outside Hawk Channel on shallow coral reefs. Avoidance of these areas could be accomplished by use of navigational charts or electronic way-finding, but visitors continue to run aground at these locations, and others.

Additionally, visitors occasionally leave marked channels or enter into known shallows to pursue recreation or in an attempt to reduce transit times (navigate on a straight line). This can also lead to groundings, such as those that occur outside Biscayne Channel, adjacent to Black Point Channel, or through the Featherbed Banks.

Vessel groundings on any benthic substrate (sand, seagrass bed, rock, or coral) can adversely affect the visitor experience and appreciation of park resources. If the visitor cannot extricate the boat from the shallows, a tow would be obtained from a commercial service, which would be costly in both time and money. Such events would result in localized, short-term, minor to moderate, adverse effects on visitor experience and appreciation.

### **Hazard Areas**

Shallows that pose the potential for boat groundings and propeller strikes are common in Biscayne Bay and in the Atlantic portions of the park. Hazard markings on these sites may be abundant (e.g. Pelican Bank), present but inadequate (Featherbed Banks), or absent (shallow reefs just outside Hawk Channel near the intersection with Caesar Creek). Other sites that are accessed with local knowledge (Sands Cut and Lewis Cut) are not marked for navigation, or intended for safe passage. Visitors run aground in these, and a variety of other locations in the park, from well-marked to unmarked. As described above in the preceding section, running aground can adversely affect the visitor experience and appreciation of park resources. Striking a hard bottom (rock or coral) can also increase the potential for damage to personal property and the need for professional towing services. Such events would result in localized, short-term, minor to moderate, adverse effects on visitor experience and appreciation.

## Cumulative Effects

The geographic area considered for cumulative effects on visitor use and experience is Biscayne National Park. Past, present and reasonably foreseeable future projects and plans that would affect visitor experience and appreciation include: the park's general management plan; the park's fishery management plan; and ongoing restoration of seagrass, coral, and other benthic habitats within the park. Restoration efforts and resource management would be anticipated to create parkwide, long-term, minor, benefits to visitor experience and appreciation.

The General Management Plan for Biscayne National Park would guide park activities and management over the next 20 to 25 years. One element being considered for the General Management Plan is the establishment of marine reserve zones. The goal of establishing marine reserve zones is to provide snorkelers and divers an opportunity to experience a healthy, natural reef with a wide diversity of fish species and sizes (NPS 2010a). The addition of marine reserve zones would create a greater range of opportunities, resulting in long-term, parkwide, minor, beneficial impacts.

The Fisheries Management Plan would address the decline of the park's fisheries resources by ensuring that fishing activities in the park are conducted in a sustainable manner, providing greater oversight of fisheries resources, and by complying with the National Park Service mandate to provide inspiration, education and enjoyment to this and future generations. The Fishery Management Plan would guide fishery management decisions in Biscayne National Park for the next five to ten years (NPS 2009d). The Fisheries Management Plan would potentially enhance visitor experience and appreciation by increasing the numbers and diversity of fish in the park – both for fishermen and divers and snorkelers. This would result in long-term, parkwide, minor, beneficial impacts to the visitor experience.

The population of the Miami metro area increased by 11 percent between 2000 and 2009 (U.S. Census Bureau 2010) and is projected to continue growing over the next decade. Between 1964 and 1998, the number of licensed vessels in South Florida grew by 444 percent (NPS 2008a). Due to the popularity of boating in South Florida and the proximity of the park to Miami, visitation to the park is expected to increase. Although the park could accommodate more boaters than it currently does, effects of boating and visitor use may become more evident parkwide. This would result in long-term, parkwide, minor adverse impacts to visitor experience and appreciation.

The overall impacts from population growth in South Florida, combined with impacts from other plans and projects, would be long-term, parkwide, minor, and beneficial. The No Action Alternative would result in long-term, localized, minor to moderate, adverse effects on visitor experience and appreciation. Cumulatively, the impacts of the No Action Alternative in combination with the impacts of other plans and projects would be long-term, parkwide, negligible and adverse.

## Conclusion

Under continued current management, visitors to the park would have less than adequate access to opportunities for high-quality, resource-based experiences; would experience periodic crowding and conflict situations; and would have limited appreciation of the park's shipwreck history and resources. Effects to visitor experience and appreciation would be parkwide, long-term, minor to moderate, and adverse. In combination with the long-term, parkwide, minor, and beneficial effects from other projects, plans, and local and regional

actions, cumulative effects on visitor experience and appreciation would be parkwide, long-term, negligible, and adverse.

### **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, Biscayne National Park would adopt a comprehensive framework for managing the park's system of mooring buoys and markers, and address site-specific needs by implementing a variety of marker and mooring buoy management strategies. Resource monitoring and use of adaptive management would support park decisions on how best to enhance the visitor experience while protecting the park's natural and cultural resources.

### **Recreating in the Park**

Under Alternative B, the park would exercise greater control of visitor access to and use of certain areas of the park, and expand access and visitor opportunities in others. The park would adaptively manage mooring buoys and markers to meet plan objectives which would allow the park to be flexible in the use of tools to address issues such as safety of navigation, visitor crowding and conflict, resource damage, crowding, and the need for increased variety of visitor experiences. The visitor experience at several popular sites would be improved by reducing crowding and inappropriate visitor uses, access to sites along the Florida reef tract would be expanded, and the Maritime Heritage Trail would be formalized with development of visitor information and use maps.

### **Popular Visitor Use Areas**

Peak use and popular sites would be managed through installation of mooring buoy fields at Stiltsville, Sands Cut Shoals, and in the Elliott Key Anchorage. Anchoring in mooring buoy fields would be prohibited. Informational and regulatory markers would be placed as necessary, and visitor protection presence would be increased. These management actions would reduce visitor density at these sites, reduce beaching of boats on shores and shoals, and allow for more appropriate park experiences. More even spacing of visitors would reduce conflicts between use groups and improve safety for swimming. It is anticipated that incidents requiring the attention of visitor protection officers would be reduced and that reports of crowding and conflict would also decrease. Frequent park visitors would be most affected by these changes in visitor experience. Improved management of high-visitation areas at peak use events would result in long-term, localized, minor benefits to visitor experience and appreciation.

Because these sites would continue to be heavily used by visitors, it is not anticipated that resource conditions (i.e., seagrass beds; see *Benthic Habitats*) would change to the degree that the visitor experience related to these resources would notably improve, resulting in no effect to visitor experience and appreciation based on resource condition.

### **Mooring Buoy Sites**

Individual mooring buoys provide visitors the opportunity to experience the park's marine environments in an uncrowded setting, with limited impacts to resources. Under Alternative B, the use of individual mooring buoys would be increased in the park. Within Biscayne Bay, mooring buoys would be added at Elliott Key Harbor and Billy's Point to provide additional opportunities in bayside seagrass habitats. Along the Florida reef tract, individual mooring buoys would be added at Fowey Rocks, Brewster Reef and Star Reef to increase opportunities to experience reef habitats and species. Anchoring would not be allowed in the vicinity of the mooring buoys unless all mooring buoys were occupied. Resource conditions at mooring buoy sites would be monitored and recorded at regular intervals. The increased

opportunities to provide high-quality visitor experience using a low-impact method would improve the visitor experience, resulting in localized, long-term, minor benefits to visitor experience and appreciation.

Resource conditions at the mooring buoy sites would be monitored to assess the effects of visitors. If the condition of resources indicates that use is too great, or that anchoring is occurring at an increased rate in the vicinity of mooring buoys, the management team could pursue a variety of actions to improve visitor appreciation at the existing sites, or at other sites that support similar experiences. Because this approach would support a resource condition-based experience, the impact would be long-term, localized, minor, and beneficial.

### **Maritime Heritage Trail**

Under Alternative B, all six shipwrecks currently eligible for inclusion on the Maritime Heritage Trail would be buoyed and visitor information would be developed to provide opportunities to experience these resources. The Maritime Heritage Trail is a uniquely accessible resource that supports understanding of the maritime history of the park and South Florida. Brochures for the trail would include information on each of the shipwrecks, their origin, use and ultimate fate on the reefs of South Florida. In addition to the cultural and historic resources present, these sites provide viewing of a variety of colorful marine species – from corals to tropical fishes – providing opportunities for visitors with differing interests.

Over the long-term, additional mooring buoys may help protect the shipwrecks and nearby resources from anchor damage. Resource condition monitoring and assessments would support management decisions to protect these non-renewable resources and support a high-quality visitor experience into the future. Expansion and formalization of the Maritime Heritage Trail would provide long-term, localized, minor to moderate, benefits to visitor experience and appreciation.

### **Commercial Visitor Services**

Under Alternative B, the park would install additional mooring buoys of a capacity suitable for use by the concessioner boats. These buoys would bear specific marking to indicate that they are reserved for concessioner use. To help alleviate visitor conflicts at the concessioner mooring buoys, the park would include information on proper use of these buoys in educational materials developed to support this plan. In addition, visitors using these buoys when the concession boat arrives would be subject to citation by park visitor protection officers. As described for other visitor use sites, resource condition monitoring and assessments would be used to support management decisions regarding the quantity and location of concessioner mooring buoys, and protection of park resources. The installation of additional concessioner mooring buoys under Alternative B would reduce visitor conflicts and support opportunities for high-quality visitor experiences, resulting in long-term, localized, minor benefits to visitor appreciation.

### **Navigating in the Park**

#### **Boundaries and Regulations**

By installing additional boundary markers, as well as informational and regulatory markers, visitors would have improved opportunities to appreciate park resources and to understand the expected behaviors within Biscayne National Park. For example, personal watercraft entry from the north would be better controlled, improved adherence to slow-speed zones for manatee protection would allow visitors time to see and identify manatee, and lobster would be better protected by additional postings of lobster sanctuary boundaries. The

Legare Anchorage would also be better defined by installation of additional regulatory markers, and restrictions at Soldier Key and Jones Lagoon would be better marked. Such improvements would benefit visitor understanding by highlighting appropriate use of park resources. Coupled with enhanced interpretive and educational programming, and increased visitor protection presence, a greater number of visitors would have opportunities for high-quality experiences, and resources would receive improved protection. This would result in parkwide, long-term, minor benefits to visitor experience and appreciation.

### **Marked Channels**

Under Alternative B, the park would incorporate grounding information and regular marker condition assessments to update and improve the navigational markers within the park. Locations with inadequate channel indicators that lead to groundings and resource damage would receive priority for improved or additional markers. For example, the park (in cooperation with the U.S. Coast Guard) would increase the number of markers on Hawk Channel where coral groundings are common. The park would also mark an east-west passage in the Featherbed Banks to reduce groundings on these shallow seagrasses. Overall, these actions would result in reduced groundings and propeller strikes, and the likelihood that visitors would be adversely affected, yielding localized, long-term, minor benefits to visitor experience and appreciation.

### **Hazard Areas**

The park's new framework of monitoring and assessment would be used to reduce the potential for visitors to encounter hazards to navigation throughout the park. Groundings and propeller strikes would be expected to continue at a reduced rate. If groundings continue to be an issue at Sands and Lewis Cuts, hazard or shoal markings could be used to notify visitors that these areas are not navigable. Through consistent application of the management framework and adaptive use of navigational, information, and regulatory markers, the potential for visitors to run aground is expected to decrease. This would result in localized, long-term, minor benefits to visitor experience and appreciation.

### **Cumulative Effects**

The geographic area considered for cumulative effects on visitor use and experience is Biscayne National Park. Effects of other projects, plans, and local and regional actions would be as described for the No Action Alternative – parkwide, long-term, minor, and beneficial. In combination with the parkwide, long-term, minor benefits of Alternative B, overall cumulative effects on visitor experience and appreciation would be long-term, parkwide, minor, and beneficial.

### **Conclusion**

Under Alternative B, visitors to the park would have greater access to opportunities for high-quality, resource-based experiences; would experience less crowding and conflict situations; and would have an enhanced appreciation of the park's shipwreck history and resources than under the No Action Alternative. Effects to visitor experience and appreciation would be parkwide, long-term, minor, and beneficial. In combination with the long-term, minor, and beneficial effects from other projects, plans, and local and regional actions, cumulative effects on visitor experience and appreciation would be long-term, parkwide, minor, and beneficial.

## PUBLIC HEALTH AND SAFETY

### Guiding Regulations and Policies

The larger context for analyzing the impact of each alternative on park public health and safety is established by the legislation establishing the park (P.L. 96-565), and *Management Policies* (NPS 2006b). NPS policies provide service-wide guidelines and mandates for the protection of visitor safety and provision of emergency response in NPS units.

The saving of human life will take precedence over all other management actions as the National Park Service strives to protect human life and provide for injury-free visits. The service will do this within the constraints of the 1916 Organic Act. The primary—and very substantial—constraint imposed by the Organic Act is that discretionary management activities may be undertaken only to the extent that they will not impair park resources and values (*Section 8.2.5.1*).

### Methods and Assumptions for Analyzing Impacts

Effects on public health and safety were evaluated and determined qualitatively based on the professional judgment of NPS staff and consultants. The primary sources of information used in this analysis included existing park management documents, NPS policy documents, incident reports, and unpublished observations and insights from knowledgeable park staff.

### Impact Criteria and Thresholds for Public Health and Safety

Impact threshold definitions for public health and safety are as follows.

**Negligible:** Health and safety would not be affected, or the effects on employee or visitor health or safety would not be measurable.

**Minor:** Effects on employee or visitor health and safety would be detectable, but would not produce an appreciable change in employee or visitor health or safety.

**Moderate:** Effects would be readily apparent, and would result in noticeable effects on employee or visitor health and safety. Changes in rates or severity of injury would be measurable.

**Major:** Effects would be swiftly apparent and would result in substantial, noticeable effects on employee or visitor health and safety, and could lead to employee or visitor mortality.

### Duration

**Short-term:** Effects would occur only during and shortly after a specified action or treatment.

**Long-term:** Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with a particular action such as a construction project.

### Issues

- The high concentration of boats and visitor uses at Sands Cut, Soldier Key, and Stiltsville is causing public safety concerns. For example, the Sands Cut area is poorly marked resulting in safety concerns as groundings occur and visitors inappropriate



use of the area as a swimming area results in potential hazards due to the high level of boat use.

- Use of non-navigable areas as channels, including Sand Cut ocean side which should be used with local knowledge only as the cut poses potential hazards because of the shallow nature of the area.
- Insufficient signage in various areas causes safety concerns
- Inappropriate visitor behaviors (tying to mangroves or channel markers, anchoring in and near channels)

### **Impacts of Alternative A, the No Action Alternative**

The No Action Alternative would continue the current management of the park's mooring buoy and marker system. Currently, there is insufficient signage in various areas of the park, which causes safety concerns. Some of the markers in the park are in need of repair and some potential hazards, such as shallow waters, are not clearly marked. For example, in the southern stretches of Hawk Channel, the distance between markers is great, and boaters are unable to locate sequential markers and navigate the area effectively and safely. The insufficient and damaged signage in the park has long-term, localized, and minor to moderate, adverse impacts on public health and safety in the park because of the increased likelihood of grounding or beaching of visitor boats. In addition to poor signage throughout the park, there are multiple unmarked, non-navigable areas in the park (e.g., Sands Cut and Lewis Cut) that are frequently used to move between Biscayne Bay and the Atlantic Ocean. These areas are bounded by shoals, and depth changes based on tidal conditions. In addition, visitor uses such as swimming and snorkeling also take place nearby. The use of these non-navigable areas poses long-term, localized, and negligible to minor adverse impacts to public health and safety.

One of the primary public health and safety concerns in Biscayne National Park is the high concentration of boats and visitors in certain areas of the park. At high-use areas such as Sands Cut, Soldier Key, and Stiltsville, boat density restricts the access to sites for visitor protection, medical, and fire emergency response vessels. Additionally, visitor conflicts and confrontations arise from crowding and conflicting visitor uses, e.g., swimmers and boaters seeking to use the same areas of the park. Lastly, visitor injuries sometimes result from broken glass bottles and other debris that accumulates in the water around heavy use areas. Overall, these high use areas present long-term, localized, and minor to moderate, adverse impacts to public health and safety.

In addition to heavy concentrations of visitors in areas of the park, another public health and safety concern in Biscayne relates to inappropriate visitor behaviors in the park. The current system of mooring buoys does not provide adequate infrastructure for boaters to safely and appropriately moor in the park, nor does the signage sufficiently educate against dangerous behaviors. This behavior includes tying to mangroves or channel markers and anchoring in and near channels used for boat traffic. Tying to mangroves can lead to grounding with the changing tides, and beaching can lead to stranding. Boats anchoring in and near channels create hazards to other boaters traveling in the channel. Inappropriate visitor behavior in the park results in long-term, localized and minor adverse impacts to public health and safety in the park.

## Cumulative Impacts

Given that over 90 percent of visitors to the park are on boats (NPS 2007), the natural hazards associated with boating and water-based recreation are prominent public health and safety concerns. Some of these hazards include grounding, capsizing, and swamping of boats and the risk of drowning or stranding. Severe weather events always pose a risk to visitors and should be monitored closely, particularly during hurricane season in the Atlantic which begins June 1st and ends November 30<sup>th</sup> (National Oceanic and Atmospheric Administration 2010). Common activities associated with boating (e.g. swimming and snorkeling) have associated risks such as increased risk of drowning or injury from marine life; snorkelers are at risk of brushing against fire coral or being stung by jellyfish. Combined, the hazards of boating pose short- and long-term, negligible to minor adverse effects to public health and safety in the park.

Visitor behavior also adds to public health and safety concerns. Alcohol is commonly consumed by boaters in the park and this can affect judgment and the ability to operate a boat safely and effectively. Alcohol can also exacerbate visitor conflicts. In addition, risks associated with subtropical heat and climate include dehydration and sunburn, both of which can be avoided. The degree of severity of these effects is individual, and varies by visitor and circumstance. Overall, inappropriate visitor behavior would result in parkwide, long-term, minor adverse effects on public health and safety.

The population of the Miami metro area increased by 11 percent between 2000 and 2009 (U.S. Census Bureau 2010) and is projected to continue growing over the next decade. Between 1964 and 1998, the number of licensed vessels in South Florida grew by 444 percent (NPS 2008a). Due to the popularity of boating in South Florida and the proximity of the park to Miami, visitation to the park is expected to increase. Should visitation to the park increase, greater crowding in high use areas and more traffic along popular navigational routes would be expected. This would result in long-term, parkwide, minor adverse impacts to visitor health and safety.

Past, present and reasonably foreseeable future projects and plans that would affect public health and safety in the park include the park's general management plan and the park's fishery management plan. These plans would help to regulate visitor behavior in the park and provide greater visitor protection support, in addition to providing greater educational information on public safety. These would have long-term, minor, and beneficial impacts on public health and safety. A program such as EcoMariner (<http://www.ecomariner.org/>), a boater educational tool utilized by Everglades National Park, would also improve safety of visitors in the park and would have long-term, minor and beneficial impacts to visitor health and safety.

The combined cumulative effects of local and regional activities that could affect public health and safety would be parkwide, long-term, minor, and adverse. The impacts of the No Action Alternative to public health and safety are long-term, localized, and range from negligible to moderate adverse. Combined with the effects of visitor behavior, boating hazards, population growth, and other plans and projects, the No Action Alternative would, cumulatively, result in long-term, localized, minor to moderate, adverse impacts to public health and safety in Biscayne National Park.

## Conclusions

The No Action Alternative would have long-term, localized, and negligible to moderate adverse effects on public health and safety in Biscayne National Park. Cumulatively, the effects of other projects and safety hazards in the park, combined with the effects of the No

Action Alternative, would result in short- and long-term, minor to moderate, adverse impacts on public health and safety in the park.

### **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, Biscayne National Park would adopt a comprehensive framework for managing the park's system of mooring buoys and markers. This alternative would increase the number and improve the navigational and informational markers throughout the park. The markers would be improved appropriate to the speed and size of today's boats and would help to reduce potential safety hazards in a number of locations. For example, at Sands Cut, the damaged and worn navigational signs on pilings would be replaced to indicate shoals or danger. The improvement to the markings and the addition of new markers would have long-term, localized, and minor beneficial impacts to visitor health and safety in the park by helping to reduce groundings and by better informing visitors of hazards.

The improved informational and regulatory markings, installed under Alternative B, would help to regulate the use of non-navigable channels. Additionally, increased education and visitor protection would reduce inappropriate uses of these channels, particularly in Sands Cut where crowding and visitor use conflicts are common. Overall, the effects of increased education and enforcement, in combination with improved markings, would result in long-term, localized, and negligible to minor beneficial impacts to public health and safety by reducing the hazards associated with unsuitable uses of non-navigable channels.

Alternative B proposes the installation of mooring fields, increased visitor protection and education, and the elimination of beaching by boaters in the park. These actions would combine to disperse boats in high use areas and allow for easier access by emergency vessels. These actions would also help to reduce visitor conflicts and crowding and reduce inappropriate behaviors that may pose hazards to visitors. While crowding, confrontation, and inappropriate behavior would not be eliminated under this alternative, the dispersal of boaters in high use areas would help to ease congestion in popular areas of the park and would lessen the volatile behavior that sometimes occurs in high density gatherings. Overall, the actions under Alternative B would have long-term, localized, and minor beneficial impacts to public health and safety in the park.

The improved education and increased visitor protection, combined with the installation of mooring buoys in the park, would reduce inappropriate visitor behavior in the park, as well as the hazards associated with such behaviors. In Stiltsville-Coral Shoals, for example, the park would install a shallow-water mooring field where boaters currently congregate. Anchoring would be prohibited within mooring field and the alternative would increase the visitor protection presence, improve navigational markings, place informational markers to reduce groundings, and impose a speed restriction zone on approaches to and in vicinity of mooring field. Overall, the actions under Alternative B would have long-term, localized, and negligible to minor beneficial impacts on public health and safety.

### **Cumulative Impacts**

Under Alternative B, cumulative effects on public health and safety would be as described for the No Action Alternative – parkwide, short- and long-term, minor and adverse. Alternative B would result in long-term, localized, negligible to minor, beneficial impacts to public health and safety in the park. Combined with the other cumulative effects, Alternative B would have long-term, negligible to minor adverse impacts on public health and safety.

## **Conclusions**

Alternative B would have long-term, localized, negligible to minor beneficial impacts to public health and safety in Biscayne National Park. Cumulatively, the effects of other projects and safety hazards in the park, combined with the effects of the No Action Alternative, would result in long-term, negligible to minor beneficial impacts on public health and safety.

## PARK OPERATIONS AND MANAGEMENT

### Guiding Regulations and Policies

The larger context for analyzing the impact of each alternative on park operations and management is established by the legislation establishing the park (P.L. 96-565), and *Management Policies* (NPS 2006b). NPS policies provide service-wide guidelines and mandates for the preservation, management, and use of park resources and facilities. For instance, Chapter 9: Park Facilities provides guidance on the nature of aids to navigation and appropriate boating facilities in NPS units.

Water navigation aids will be planned in collaboration with the U. S. Coast Guard, and will be installed, maintained, and used in conformance with the standards established by these agencies only if there are no appropriate alternatives outside park boundaries. Exceptions to the standards may be authorized when necessary to meet specific park and public safety needs (*Section 9.2.5*).

Boating facilities (including navigational aids) may be provided as appropriate for the safe enjoyment by visitors of water recreation resources, when (1) they are consistent with the purposes for which the park was established, and (2) there is no possibility that adequate private facilities will be developed. Facilities must be carefully sited and designed to avoid unacceptable adverse effects on habitats and minimize conflicts between boaters and other visitors who enjoy use of the park (*Section 9.3.4.2*).

### Methods and Assumptions for Analyzing Impacts

This impact topic addresses the ability of NPS staff to protect and preserve Biscayne National Park resources and to provide opportunities for appropriate and enjoyable visitor experiences. It also addresses the effectiveness and efficiency with which NPS staff performs such tasks. Information about NPS operations was compiled from various sources, especially park managers and other NPS staff. Information gathered includes park staffing, maintenance, administrative activities, and restoration efforts. Examples of operational considerations include needs for maintenance, protection, and patrol activities.

### Impact Criteria and Thresholds for Park Operations

The thresholds for this impact topic are as follows:

**Negligible:** Effects on NPS operations and management would be at or below the level of detection.

**Minor:** Effects on NPS operations and management would be small but detectable. The change would be noticeable to staff but probably not to the public.

**Moderate:** Effects on NPS operations and management would be readily apparent to staff and possibly to the public.

**Major:** Effects on NPS operations and management would be substantial, widespread, and apparent to staff and the public.

## Duration

**Short term:** Effects would occur only during and shortly after a specified action or treatment.

**Long term:** Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with a particular action such as construction.

## Issues

- Lack of proper signage in various areas causes safety concerns. Boaters do not have a clear understanding of area closures and seasonal restrictions that may be in place for resource protection. There is not clear demarcation of the national park boundary that results in visitors not recognizing when they have entered Biscayne National Park and as a result may undertake in appropriate activities that are inconsistent with the mission of the park. Without clear signage and recognition of being in a national park, there is an increased burden on visitor protection staff to enforce park rules and regulations and maintain public safety.
- Markers should be easy to understand and located specifically to direct appropriate boating navigation.
- The park does not have adequate staff to maintain the buoy and navigational marker system and inform the public of proper boating practices. This leads to poor marker condition and lack of understanding of expectations for boater behavior in a national park setting.
- In some locations, signage is missing from markers. Markers, day boards, and warning signs come off the piles and are not replaced often enough. This can lead to boater confusion because intent of marker is not clear. For example, should the area be safe for navigation, or is it to be avoided?
- There may be use of language on informational markers that people do not understand. There is a lack of Spanish information in the informational marking system that results in difficulties navigating within the park. In addition, informational markers are not uniform in how information is presented such as by colors or symbols that are used on signs that results in inappropriate boating activities and navigational difficulties.
- Coastal geomorphology is dynamic and may affect the placement and relocation of markers and should be a consideration during siting.
- Staffing is not adequate to enforce and educate. The park lacks adequate numbers of law enforcement staff to ensure that visitors in the park's vast stretches of open water are aware of, and complying with, regulations and requirements for safety and resources protection.
- The park is dependent on one volunteer to maintain the marker buoy system. This places an undue burden on unpaid staff. Additional NPS staff is needed to assume responsibility for and take part in maintaining vital park infrastructure components.
- The responsibility of maintenance of markers in the park is not clearly defined. There is confusion amongst managers as to what agencies and what divisions within agencies they should cooperate and coordinate. Communications with other

agencies responsible for marker maintenance (e.g., USCG, Monroe County) need to be improved, and roles and responsibilities formalized.

- There is inappropriate use of mooring buoys by boaters – including rafting, overnight use, and mooring by the stern. These uses can damage the mooring pin or line and result in increased maintenance of the buoys.
- At Sands Cut and other high use areas of the park, visitor protection, medical, and fire emergency response vessels cannot get access to sites because the boat density restricts access.
- There is an insufficient number of mooring buoys and a lack of mooring buoys that have enough strength to support concession boat use in the park.

### **Impacts of Alternative A, the No Action Alternative**

Under current management, there would be no formal framework in place to guide the park in placement of mooring buoys and markers. As such, decision-making and maintenance of the park's navigational aids would continue on an as-needed basis with no specific individual or group assigned overall responsibility for direction or decision-making pertaining to mooring buoys or markers. Typically, the division that determines a need for a new mooring buoy or marker is assigned responsibility for maintenance of the marker. No comprehensive or parkwide schedule has been established to ensure that navigational aids are routinely maintained or replaced and this exacerbates the challenge of maintaining and updating the system of buoys and markers in the park.

The No Action Alternative would have no effect on the day-to-day operations of park staff in regards to buoy and marker maintenance, and there would be no additional staff needed for this aspect of park management. However, because the park staff lacks resources to keep the mooring buoy and marker system maintained, the No Action Alternative would have a long-term, minor to moderate adverse effect on park operations as buoys and markers become dilapidated and unsuitable for their intended uses. This may impact other aspects of park management, including both visitor and resource protection, as the buoys and markers in the park become incapable of directing visitor use within the park.

The regulatory and navigational markers in the park are insufficient in supporting visitor understanding of boating laws and regulations within the park. The No Action Alternative would not increase staffing levels for visitor protection in the park, which would result in a continued strain on the park's ability to enforce regulations and educate visitors. Long-term, this would have park-wide, minor to moderate adverse impacts on visitor protection in the park. Furthermore, the challenge of interfacing with visitors results in limited educational opportunities on proper navigation and use of mooring buoys (including rafting and overnight use) which leads to damage to markers, buoys, and the natural resources of the park. While the No Action Alternative would not affect park operations as related to visitor education, it would lead to long-term, park-wide, minor adverse impacts as visitors continue to abuse park resources and damage the facilities provided by the park which, in turn, would require park resources to fix, replace, or restore.

The No Action Alternative would continue the current management strategy in which management and maintenance of the marker and buoy system is undefined; the coordination between divisions and with outside agencies would continue to be unclear. This would have long-term, park-wide, minor and adverse impacts on park management as buoys and markers are not maintained with the necessary frequency. The current maintenance strategy

also places undue strains on certain segments of the park staff and the volunteer that commonly bears the burden of the maintenance responsibilities.

This alternative would not provide additional mooring buoys of sufficient strength for concession boat use in the park. At present, there is an insufficient number of mooring buoys for concessioners and mooring sites along the reef line in the park are limited which creates conflict between concessioners and visitors when mooring sites are in use. Long-term, this would have localized and negligible to minor adverse impacts on park operations as staff is forced to deal with visitor use conflicts and an inadequate system of mooring buoys for concessions in the park.

The Maritime Heritage Trail would continue to function as a loosely defined and marked visitor experience. This would have no effect on current park operations or management.

Under the No Action Alternative, the park would not actively pursue further partnerships with outside agencies and would maintain the agreements currently in place. This would have no effect on park operations or management.

### **Cumulative Impacts**

The geographic area considered for cumulative effects on park operations and management is Biscayne National Park. Past, present and reasonably foreseeable future projects and plans that would park operations and management include: the park's general management plan; the park's fishery management plan; ongoing restoration of seagrass, coral, and other benthic habitats within the park; and other park-specific resource management plans and activities. Restoration efforts and resource management plans create short-term, parkwide, minor to moderate adverse impacts on park operations because they require coordination, planning, and construction efforts from park staff beyond the standard duties. In the long term, these projects will address perpetual problems that consume considerable staff resources effort. These restoration efforts would help the park operate more efficiently as environments are rehabilitated and the impacts from these projects would be expected to be minor to moderate and beneficial.

The General Management Plan (GMP) for Biscayne National Park will guide park activities and management over the next 20 to 25 years. One element being considered for the General Management Plan is the establishment of marine reserve zone(s). The goal of establishing marine reserve zone(s) is to provide snorkelers and divers an opportunity to experience a healthy, natural reef with a wide diversity of fish species and sizes (NPS 2010j). The addition of marine reserve zones would create a greater management burden for park staff through enforcement and visitor services; this would result in long-term, parkwide, minor adverse impacts. The General Management Plan would, however, help improve park operations and provide the guiding framework for management over a 20 to 25 year period. Despite the increased burden on visitor protection and visitor services, the benefits of a long-term management plan would outweigh the adverse aspects and would have a long-term, parkwide, minor to moderate beneficial impact.

The Fisheries Management Plan (FMP) addresses the decline of fisheries resources from previous levels and the concern about the long-term sustainability of the park's fisheries resources. In order to protect and restore Biscayne National Park's diminishing fisheries resources, ensure that fishing activities in the park are conducted in a sustainable manner, and comply with the National Park Service mandate to provide inspiration, education and enjoyment to this and future generations, the National Park Service has developed a Fishery Management Plan to guide fishery management decisions in Biscayne National Park for the next five to ten years (NPS 2009d). The Fisheries Management Plan would increase the management burden on park staff, mainly through increased enforcement, fisheries



restoration, and greater oversight of the park's fisheries resources. This would result in long-term, parkwide, and minor to moderate adverse impacts to park operations and management, particularly for the Divisions of Resource Management and Visitor and Resource Protection.

The population of the Miami metro area increased by 11 percent between 2000 and 2009 (U.S. Census Bureau 2010) and is projected to continue growing over the next decade. Based on modeled participation for recreational fishing, the Fisheries Management Plan indicates an 18.7 percent projected increase from 1993 to 2010 in recreational fishing; between 1964 and 1998, the number of licensed vessels in South Florida grew by 444 percent (NPS 2008a). Due to the popularity of boating in South Florida and the proximity of the park to Miami, visitation to the park is expected to increase. Should visitation to the park increase, Biscayne would accommodate more boaters than it currently does and would experience a greater management burden due to the need for increased visitor protection, resource protection, and visitor services. This would result in long-term, parkwide, minor to moderate adverse impacts to park operations and management.

The overall impacts from population growth in South Florida, combined with impacts from other plans and projects, would be long-term, parkwide, minor, and adverse to park operations and management. The No Action Alternative would result in impacts ranging from long-term, localized and parkwide, negligible to moderate adverse impacts. Cumulatively, the impacts of the No Action Alternative in combination with the impacts of other plans and projects would result in long-term, minor to moderate, adverse cumulative impacts on park operations.

## **Conclusions**

The No Action Alternative would have long-term, negligible to moderate, and adverse impacts as on the operations and management of Biscayne National Park. Cumulatively, the effects of other projects and park operations, combined with the effects of the No Action Alternative, would result in long-term, minor to moderate, adverse impacts on the operations and management of the park.

## **Impacts of Alternative B, the Preferred Alternative**

Under Alternative B, Biscayne National Park would adopt a comprehensive framework for managing the park's system of mooring buoys and markers. This alternative would identify the individual or group responsible for the planning, decision-making, and maintenance of the system components and needs for additional staff would be identified and documented. A schedule for repairs and maintenance would be defined and implemented, which would reduce emergency repairs and help to maintain the bulk of the buoys and markers in good condition. The park would adaptively manage mooring buoys and markers to meet plan objectives to allow the park to be flexible in the use of tools to address issues such as boating safety, resource damage, crowding, and the need for increased variety of visitor experiences. The introduction of this management framework would better distribute the burden of buoy and marker maintenance amongst park staff and would improve navigational and mooring direction for visitors, resulting in greater control of inappropriate use and damage to park resources. The new management framework for buoys and markers would result in long-term, park-wide, minor beneficial impacts to the operations and management of the park.

Alternative B would probably require more law enforcement rangers to ensure compliance with the new park regulations. Along with efforts to improve visitor education and the marker system, Alternative B would reduce the burden on visitor protection overall. The improved markers and education would help to prevent unsafe conditions from navigational

errors and would also help to ease resource damage, all of which would have a beneficial impact on park operations. Alternative B would have a long-term, park-wide, minor to moderate and beneficial impact on visitor protection in the park.

Under Alternative B, the park would develop and implement new interpretive programming, educational materials, and partnerships with outside agencies to improve the visitor experience in the park. All of this would require additional time, effort, and staff to implement and would have a short-term, park-wide, minor adverse impact on park operations. However, these actions would also help to ease visitor use conflict, limit resource damage, and improve visitor safety resulting in long-term, park-wide, and minor to moderate beneficial impacts to park operations and management.

Specific buoys for NPS and concession use would be installed throughout the park to limit use conflicts between concessioners and visitors both vying for mooring sites along the reef line. This would both increase the number of buoys available to concessioners and provide them with mooring buoys more suited to their vessels - stronger buoys, in short. This would have a long-term, localized, and negligible to minor beneficial impact on park operations and concessions in the park.

Under Alternative B, the Maritime Heritage Trail would be formalized to provide more information to visitors, install more mooring buoys to protect the sites, and provide easy access to visitors. These actions would have a short-term, localized, and minor adverse impact on park operations as the new aspects of the trail are implemented and the public educated. Long-term, the increased infrastructure associated with the trail would have a localized, negligible to minor adverse impact on park operations.

The park would explore numerous opportunities to collaborate with other agencies and groups under Alternative B. Enhanced partnerships would serve to distribute responsibility for management and maintenance and would also improve the distribution and availability of educational materials and information. In the short-term, this would have negligible to minor adverse impacts as partnerships are developed and responsibilities determined; however, in the long-term, this would have negligible to minor and beneficial impacts on park operations because it would help ease the management burden of the park and require less additional staff and effort for some tasks.

### **Cumulative Impacts**

The geographic area considered for cumulative effects on park operations and management is Biscayne National Park. The impacts of other plans and projects and population growth in the Miami metro area would be the same as described in the No Action Alternative, long-term, parkwide, minor, and adverse to park operations and management. Alternative B would have long-term, parkwide, negligible to moderate, beneficial impacts as well as long-term, localized, negligible to minor adverse impacts on park operations and management. Cumulatively, the impacts of Alternative B in combination with the impacts of other plans and projects would result in long-term, minor to moderate beneficial cumulative impacts on park operations.

### **Conclusions**

Alternative B would have long-term, parkwide, negligible to moderate, beneficial impacts as well as long-term, localized, negligible to minor adverse impacts on park operations and management of Biscayne National Park. Cumulatively, the impacts of Alternative B in combination with the impacts of other plans and projects would result in long-term, minor to moderate beneficial cumulative impacts on park operations.

## **CHAPTER 5: CONSULTATION AND COORDINATION**

### **SCOPING PROCESS AND PUBLIC INVOLVEMENT**

The National Park Service divides the scoping process into two parts: internal scoping and external (public) scoping. Internal scoping for the Mooring Buoy and Marker Plan and EA involved discussions between the NPS and the U.S. Coast Guard, and other federal and state agencies at internal scoping meetings held in January 2008. Participants discussed the purpose and need for the project, issues, objectives, management alternatives, appropriate level of documentation, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have been given an opportunity to comment and contribute early in the decision-making process.

A newsletter was distributed by electronic and conventional mail in June 2009 to the project mailing list of government agencies, organizations, businesses, and individuals. The newsletter served as an invitation to the public scoping open house meetings and requested the public to convey concerns and issues related to the implementation of the plan. Three public scoping meetings were held on July, 7, 8 and 9, 2009 in Homestead, Miami, and Key Largo, Florida. Respondents were encouraged to comment electronically on the NPS Planning, Environment and Public Comment (PEPC) website, by letter, public comment form or in person at the open house.

The NPS received a total of 43 responses which included 28 individuals, 13 organizations, and two Native American Tribes. The 43 responses contained a total of 105 comments on the mooring buoy types and locations, visitor protection, visitor experience, natural resources protection, educational opportunities and other concerns about the project.

Five responses were not supportive of the installation of additional mooring buoys in the park because they would increase regulations in the park. Another concern was that installation of additional buoys would disperse visitor use, causing additional damage to areas currently less impacted. Fifteen responses supported the installation of buoys and markers in the park for several reasons, including causing park visitors to spread out among the buoys (reducing the frequency of crowding, visitor conflict, and impacts to the resource), and the addition of markers would improve navigation in and around the bay.

### **Agency Consultation**

#### **Historic Preservation Consultation**

As part of the Section 106 process, the NPS also sent the newsletter to the Florida State Historical Preservation Office (SHPO) and the Advisory Council on Historic Preservation on June 16, 2009. The letters invited them to participate in the planning process and informed them that the NPS plans to use this draft EA to fulfill the requirements of Section 106 of the NHPA as well as comply with provisions of NEPA.

A response from the Advisory Council on Historic Preservation (ACHP) requested the park's NEPA document include: a description of the undertaking and identification of the area of potential effect (including photographs, maps, drawings as necessary) and the steps taken to identify historic properties; a description of the historic properties and the characteristics that qualify them for eligibility to the National Register; an assessment of effects upon eligible historic properties; a record of the views of consulting parties and the public, and the consultation leading to resolution of any adverse effects the Section 106 process. The NPS

will work throughout the planning and implementation process of this plan / EA to ensure cultural resources are protected throughout the park.

#### **U.S. Coast Guard**

The U.S. Coast Guard shares responsibilities for markers in Biscayne National Park. A representative from the Coast Guard attended the January 2008 Internal Scoping meeting at the park, and provided information to the planning team on the roles and responsibilities of the Coast Guard in maintaining safe navigation. The NPS will continue to work with this agency throughout the planning and implementation process of this plan.

#### **U.S. Fish and Wildlife Service**

The U.S. Fish and Wildlife Service requested that special-status species be given special consideration during development of the plan. The NPS will use the NEPA compliance process to meet all requirements for addressing potential effects to listed species and their habitats.

#### **U.S. Army Corps of Engineers**

The Jacksonville District of the U.S. Army Corps of Engineers reviewed the newsletter and expressed no concerns or issues regarding the proposed buoy and marker plan in Biscayne National Park.

#### **American Indian Tribes**

The Miccosukee Tribe of Indians of Florida did not wish for formal consultation and did not have any concerns or comments regarding the park's Mooring Buoy and Markers Plan EA. The Seminole Tribe of Florida Tribal Historic Preservation Office (STOF-THPO) received the notice of the public scoping workshop and only requested to be sent any final reports concerning this project.

#### **Florida State Agencies**

The park will provide Florida State Clearinghouse with the Mooring Buoy and Markers Plan EA for processing through the appropriate state agencies.

The Florida Department of State initially determined the proposed activities stated in the newsletter are consistent with the Florida Coastal Management Program (FCMP) and will conclude their consultations during review of the environmental assessment. The Department of State further acknowledged the presence of cultural resources, including shipwrecks recorded within the project area and urged the NPS for additional coordination regarding potential impacts to such resources. The NPS will continue consultation with the Florida SHPO.

During public scoping, the Florida Fish and Wildlife Commission expressed concerns regarding the protection of special-status species, including manatee, sea turtles, and sawfish. The NPS will fully address potential effects to special-status species in the environmental assessment. The Commission offered assistance with the plan/ EA by providing subject matter experts for park resources, visitor protection, and navigation. The Commission also requested that the NPS include them as a partner in the planning and EA development process so concerns regarding buoy and marker placement can be addressed proactively. Furthermore, the Commission suggested that the NPS follow guidelines regarding conformity of mooring buoys and markers with Federal Waterway Marking Criteria. The NPS does adhere to these national criteria.

The remaining agencies did not submit comments.

All consultation correspondence can be found in Appendix A.

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**List of Recipients**

The following federal, state, local, and tribal government agencies have been sent a copy of this draft EA. In addition, elected officials, libraries, individuals, businesses, organizations, media outlets, and other groups that have expressed interest in Biscayne National Park in the past have been sent letters stating that this draft EA is available for review and comment.

**Federal Agencies**

National Park Service

U.S. Coast Guard

U.S. Fish and Wildlife Service

Advisory Council on Historic Preservation

National Oceanographic and Atmospheric Administration

National Marine Fisheries Service

**State Agencies**

Florida Department of Environmental Protection

South Florida Water Management District

Florida Fish and Wildlife Conservation Commission

Florida State Historic Preservation Office

Florida State Clearinghouse

**Local Agencies**

Miami-Dade County

**American Indian Tribes**

Miccosukee Tribe of Indians of Florida

Seminole Tribe of Florida

**Libraries**

Key Largo Branch Library

Miami-Dade Main Library

South Dade Regional Library

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- 2010c E-mail message from Dave Conlin, NPS archeologist, to Seth Wilcher, Parsons cultural resource specialist, April 5, 2010, regarding information on 19<sup>th</sup> Century Wooden Vessel.
- 2010d E-mail message from Charles Lawson, NPS archeologist, to Seth Wilcher, Parsons cultural resource specialist, April 5, 2010, regarding shipwreck condition assessments.
- 2010e Superintendent's Compendium, Biscayne National Park.
- 2010f Personal communications between Wayne Rybeck, Visitor protection Specialist / Prosecutions Supervisor Biscayne National Park, and Aaron Sidder, Parsons. April 2.
- 2010g Personal communications between Didier Carod, Federal Visitor protection Officer / Chief Ranger Biscayne National Park, and Aaron Sidder, Parsons. April 2.
- 2010h Personal communications between Kenneth Ginger, Facility Manager Biscayne National Park, and Aaron Sidder, Parsons. April 5-6.

- 2010i Personal communication between Kimberly Gomez, Office Administrator/Acting Administrative Officer, Biscayne National Park, and Aaron Sidder, Parsons, April 5.
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- 2010k Personal communications between Terry Helmers, Volunteer, Biscayne National Park, and Jacklyn Bryant, Parsons, January 2010.
- 2010l Personal communications between Lelaina Marin, NPS Natural Sounds Program, Fort Collins, CO, and Aaron Sidder, Parsons. February-March.
- 2010m Personal communication between Elsa Alvear, Supervisory Resource Management Specialist, Biscayne National Park, and Parsons. June.
- 2010n E-mail message from Vanessa McDonough, NPS fishery and wildlife biologist, to Aaron Sidder, Parsons environmental scientist, June 25, 2010, regarding piping plover occurrence in Biscayne National Park.

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**APPENDIX A:**  
**CONSULTATION LETTERS AND**  
**PUBLIC SCOPING INFORMATION**



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Ms. Kelly Yasaitis Fannizo  
Advisory Council on Historic Preservation  
Old Post Office Building  
1100 Pennsylvania Avenue, NW, Suite 809  
Washington, DC 20004

Subject: Section 106 Consultation, Mooring Buoy and Markers Plan EA  
Biscayne National Park

Dear Ms. Fannizo:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing a Mooring Buoy and Marker Plan and Environmental Assessment (EA) at Biscayne National Park. A scoping brochure that describes the project and schedule is included with this letter.

The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. The marine areas of the park are a great place to recreate, and embedded and floating aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. The Maritime Heritage Trail includes historic shipwrecks. During the coming months, the National Park Service will evaluate and analyze the potential environmental impacts of the proposed alternatives.

We believe that this plan may have the potential to affect properties that may be eligible for inclusion in the National Register of Historic Places. We want to ensure that this plan provides appropriate protection for cultural resources which could be affected. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800.

This letter also is to notify your office that we plan to use the EA process to accomplish compliance for Section 106, in accordance with the National Historic Preservation Act, as amended, and the National



Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies will be invited to submit comments in writing and during public meetings. We invite you to participate in these meetings.

As soon as the EA is available, we will send it to you for your review, comment, and concurrence that the Section 106 process has been completed. Additional supporting data, including results of archeological inventories and National Register nomination forms, as appropriate, will be included with the EA transmittal to your office. As required by 36 CFR 800, the State Historic Preservation Office has been notified regarding inclusion of Section 106 compliance within the EA.

We look forward to your participation in the planning process. We believe that it will result in better planning for cultural resources management and will help ensure that cultural resources are adequately considered during the preparation of the EA.

If you have any questions or want additional information, please contact Elsa Alvear, Chief of Resource Management, via phone (305) 230-1144 ext. 3007 or email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

A handwritten signature in cursive script that reads "Mark Lewis".

Mark Lewis  
Superintendent

Enclosure



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Frederick Gaske  
State Historic Preservation Officer and Division Director  
Division of Historical Resources, Department of State  
500 S. Bronough Street, Room 305  
Tallahassee, FL 32399-0250

Subject: Section 106 Consultation, Mooring Buoy and Markers Plan EA  
Biscayne National Park

Dear Mr. Gaske:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing a Mooring Buoy and Marker Plan and Environmental Assessment (EA) at Biscayne National Park. A scoping brochure that describes the project and schedule is included with this letter.

The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. The marine areas of the park are a great place to recreate, and embedded and floating aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. The Maritime Heritage Trail includes historic shipwrecks. During the coming months, the National Park Service will evaluate and analyze the potential environmental impacts of the proposed alternatives.

We believe that this plan may have the potential to affect properties that may be eligible for inclusion in the National Register of Historic Places. We want to ensure that this plan provides appropriate protection for cultural resources which could be affected. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800.

This letter also is to notify your office that we plan to use the EA process to accomplish compliance for Section 106, in accordance with the National Historic Preservation Act, as amended, and the National



Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies will be invited to submit comments in writing and during public meetings. We invite you to participate in these meetings.

As soon as the EA is available, we will send it to you for your review, comment, and concurrence that the Section 106 process has been completed. Additional supporting data, including results of archeological inventories and National Register nomination forms, as appropriate, will be included with the EA transmittal to your office.

We look forward to your participation during planning. We believe that it will result in better planning for cultural resources management and will help ensure that cultural resources are adequately considered during the preparation of the EA.

If you have any questions or want additional information, please contact Elsa Alvear, Chief of Resource Management, via phone (305) 230-1144 ext. 3007 or email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

A handwritten signature in cursive script that reads "Mark Lewis".

Mark Lewis  
Superintendent

Enclosure



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Paul Souza  
Field Supervisor, South Florida Field Office  
U.S. Fish and Wildlife Service  
1339-20th Street  
Vero Beach, FL 32960

Subject: Section 7 Consultation, Mooring Buoy and Marker Plan/Environmental Assessment  
Biscayne National Park, Miami-Dade County

Dear Mr. Souza:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing a Mooring Buoy and Marker Plan and Environmental Assessment (EA) for Biscayne National Park. A scoping brochure that describes the project and schedule is included with this letter.

The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. The marine areas of the park are a great place to recreate, and embedded and floating aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. During the coming months, the National Park Service will evaluate and analyze the potential environmental impacts of the proposed alternatives.

In accordance with Section 7 of the Endangered Species Act, we wish to begin informal consultation with your agency so that we may fully evaluate the potential effects of the plan on federally listed species. We welcome your input on any aspect of the project. However, we are specifically requesting information about the presence of listed threatened and endangered species in the vicinity of Biscayne National Park, along with any pertinent critical habitat designations.

This letter also is to notify your office that we plan to use the EA process to accomplish compliance for Section 7, in accordance with the Endangered Species Act, and the National Environmental Policy Act





(as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies are invited to submit comments in writing and participate in public meetings.

We look forward to your participation during planning. We believe that it will result in better planning for listed species management and will help ensure that listed species are adequately considered during the preparation of the EA.

If you have any questions or want additional information, please contact Elsa Alvear, Chief of Resource Management, via phone (305) 230-1144 ext. 3007 or email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

A handwritten signature in cursive script that reads "Mark Lewis".

Mark Lewis  
Superintendent

Enclosure



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. David Bernhart  
Assistant Regional Administrator  
National Marine Fisheries Service  
Protected Resources Division  
263-13<sup>th</sup> Avenue South  
St. Petersburg, FL 33701

Subject: Section 7 Consultation, Mooring Buoy and Marker Plan/Environmental Assessment  
Biscayne National Park, Miami-Dade County

Dear Mr. Bernhart:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing a Mooring Buoy and Marker Plan and Environmental Assessment (EA) for Biscayne National Park. A scoping brochure that describes the project and schedule is included with this letter.

The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. The marine areas of the park are a great place to recreate, and embedded and floating aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. During the coming months, the National Park Service will evaluate and analyze the potential environmental impacts of the proposed alternatives.

In accordance with Section 7 of the Endangered Species Act, we wish to begin informal consultation with your agency so that we may fully evaluate the potential effects of the plan on federally listed species. We welcome your input on any aspect of the project. However, we are specifically requesting information about the presence of listed threatened and endangered species in the vicinity of Biscayne National Park, along with any pertinent critical habitat designations.

This letter also is to notify your office that we plan to use the EA process to accomplish compliance for Section 7, in accordance with the Endangered Species Act, and the National Environmental Policy Act



(as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies are invited to submit comments in writing and participate in public meetings.

We look forward to your participation during planning. We believe that it will result in better planning for listed species management and will help ensure that listed species are adequately considered during the preparation of the EA.

If you have any questions or want additional information, please contact Elsa Alvear, Chief of Resource Management, via phone (305) 230-1144 ext. 3007 or email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

A handwritten signature in cursive script that reads "Mark Lewis".

Mark Lewis  
Superintendent

Enclosure



## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Miles Croom  
Assistant Regional Administrator  
National Marine Fisheries Service  
Habitat Conservation Division  
263-13<sup>th</sup> Avenue South  
St. Petersburg, FL 33701

Subject: Consultation, Environmental Assessment for Mooring Buoy and Marker Plan  
Biscayne National Park

Dear Mr. Croom:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing a Mooring Buoy and Marker Plan and Environmental Assessment (EA) for Biscayne National Park. A scoping brochure that describes the project and schedule is included with this letter.

The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. The marine areas of the park are a great place to recreate, and embedded and floating aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. During the coming months, the National Park Service will evaluate and analyze the potential environmental impacts of the proposed alternatives.

We believe that the proposed plan may have the potential to affect essential fish habitats. Therefore, in keeping with the requirements of the Magnuson-Stevens Act and NPS policy, we invite your input and participation in the planning process. Additionally, we will send you a copy of the EA for your review and comment as soon it is available.

A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies are invited to submit comments in writing and participate in public meetings.



We look forward to your participation during planning. We believe that it will result in better planning for listed species management and will help ensure that listed species are adequately considered during the preparation of the EA.

If you have any questions or want additional information, please contact Elsa Alvear, Chief of Resource Management, via phone (305) 230-1144 ext. 3007 or email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

A handwritten signature in cursive script that reads "Mark Lewis".

Mark Lewis  
Superintendent

Enclosure



## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Ms. Lauren Milligan  
Florida State Clearinghouse Coordinator  
Florida Department of Environmental Protection  
3900 Commonwealth Blvd., Mail Station 47  
Tallahassee, FL 32399-3300

Subject: Advance Notification, Mooring Buoy and Marker Plan/ Environmental Assessment  
Biscayne National Park

Dear Ms. Milligan:

In accordance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) has started preparing an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park. The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys.

The enclosed Scoping Notice is forwarded to your office for processing through appropriate State agencies. A 45-day public scoping period will end on July 31, 2009. During this time, non-governmental stakeholders, interested parties, and the general public, as well as government agencies are invited to submit comments in writing and participate in public meetings.

Your expeditious handling of this notice will be appreciated. To help facilitate review of this project, we are also sending a copy of this notice directly to the State Historic Preservation Officer.

If you have any comments or questions please contact Elsa Alvear, Chief of Resource Management, at (305) 230-1144 ext. 3007 or via email at [elsa\\_alvear@nps.gov](mailto:elsa_alvear@nps.gov).

Sincerely,

Mark Lewis  
Superintendent

Enclosure





IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Chairman Billy Cypress  
Miccosukee Tribe of Indians of Florida  
P.O. Box 440021 Tamiami Station  
Miami, FL 33144

Dear Mr. Cypress:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park. The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys.

This EA is now being prepared by the National Park Service (NPS) in accordance with the National Environmental Policy Act (NEPA). More detail on this project is included in the enclosed scoping brochure. In addition to government-to-government consultation, the Miccosukee Tribe of Indians of Florida is invited to participate during a 45-day public scoping period to end July 31, 2009. During that period, non-governmental stakeholders, interested parties, and the general public, as well as tribes and government agencies will be invited to submit comments in writing and during public meetings.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the EA for the proposed Mooring Buoy and Marker Plan at Biscayne National Park. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Thank you for your time and interest in this important project.

Sincerely,

Mark Lewis  
Superintendent

Enclosure





IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Fred Dayhoff, NAGPRA and Section 106 Representative  
Miccosukee Tribe of Indians of Florida  
HC61 S.R. 68  
Ochopee, FL 34141

Dear Mr. Dayoff:

The National Park Service (NPS) is now preparing an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park, in accordance with the National Environmental Policy Act (NEPA). The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. More detail on this project is included in the enclosed scoping brochure.

NPS has recently sent a letter to Mr. Billy Cypress, Chairman of the Miccosukee Tribe of Indians of Florida, inquiring about government-to-government consultation concerning this EA.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Chairman Cypress for your records. In sending these documents, we intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Mark Lewis  
Superintendent

Enclosures:  
Agency Scoping Notice  
Letter to Tribal Leader





IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Steve Terry, NAGPRA and Section 106 Representative  
Miccosukee Tribe of Indians of Florida  
Tamiami Station  
P.O. Box 440021  
Miami, FL 33144

Dear Mr. Terry:

The National Park Service (NPS) is now preparing an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park, in accordance with the National Environmental Policy Act (NEPA). The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. More detail on this project is included in the enclosed scoping brochure.

NPS has recently sent a letter to Mr. Billy Cypress, Chairman of the Miccosukee Tribe of Indians of Florida, inquiring about government-to-government consultation concerning this EA.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Chairman Cypress for your records. In sending these documents, we intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Mark Lewis  
Superintendent

Enclosures:  
Agency Scoping Notice  
Letter to Tribal Leader



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Mitchell Cypress, President  
Seminole Tribe of Florida  
6300 Stirling Road  
Hollywood, FL 33024

Dear Mr. Cypress:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park. The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys.

This EA is now being prepared by the National Park Service (NPS) in accordance with the National Environmental Policy Act (NEPA). More detail on this project is included in the enclosed scoping brochure. In addition to government-to-government consultation, the Seminole Tribe of Florida is invited to participate during a 45-day public scoping period to end July 31, 2009. During that period, non-governmental stakeholders, interested parties, and the general public, as well as tribes and government agencies will be invited to submit comments in writing and during public meetings.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the EA for the proposed Mooring Buoy and Marker Plan at Biscayne National Park. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Thank you for your time and interest in this important project.

Sincerely,

Mark Lewis  
Superintendent

Enclosure





IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Willard S. Steele, THPO  
Seminole Tribe of Florida  
Ah-Tah-Thi-Tiki Museum  
HC-61, Box 21-A  
Clewiston, Florida 33440

Dear Mr. Steele:

The National Park Service (NPS) is now preparing an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park, in accordance with the National Environmental Policy Act (NEPA). The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. More detail on this project is included in the enclosed scoping brochure.

NPS has recently sent a letter to Mr. Mitchell Cypress, Chairman of the Seminole Tribe of Florida, inquiring about government-to-government consultation concerning this EA.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Chairman Cypress for your records. In sending these documents, we intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Mark Lewis  
Superintendent

Enclosures:  
Agency Scoping Notice  
Letter to Tribal Leader



IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Mr. Enoch Kelly Haney, Principal Chief  
Seminole Nation of Oklahoma  
P.O. Box 1498  
Wewoka, Oklahoma 74884

Dear Mr. Haney:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park. The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys.

This EA is now being prepared by the National Park Service (NPS) in accordance with the National Environmental Policy Act (NEPA). More detail on this project is included in the enclosed scoping brochure. In addition to government-to-government consultation, the Seminole Nation of Oklahoma is invited to participate during a 45-day public scoping period to end July 31, 2009. During that period, non-governmental stakeholders, interested parties, and the general public, as well as tribes and government agencies will be invited to submit comments in writing and during public meetings.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the EA for the proposed Mooring Buoy and Marker Plan at Biscayne National Park. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Thank you for your time and interest in this important project.

Sincerely,

Mark Lewis  
Superintendent

Enclosure





IN REPLY REFER TO:

## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Ms. Natalie Deere  
Historic Preservation Officer  
Seminole Nation of Oklahoma  
P.O. Box 1498  
Wewoka, Oklahoma 74884

Dear Ms. Deere:

The National Park Service (NPS) is now preparing an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park, in accordance with the National Environmental Policy Act (NEPA). The purpose of this EA is to assist the NPS in analyzing the impacts from different alternatives to manage its embedded and floating marker system, as well as to determine criteria for adding or relocating markers and mooring buoys. More detail on this project is included in the enclosed scoping brochure.

NPS has recently sent a letter to Mr. Enoch Kelly Haney, Chairman of the Seminole Nation of Oklahoma, inquiring about government-to-government consultation concerning this EA.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Chairman Haney for your records. In sending these documents, we intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Mark Lewis  
Superintendent

Enclosures:  
Agency Scoping Notice  
Letter to Tribal Leader



## United States Department of the Interior

National Park Service  
Biscayne National Park  
9700 S. W. 328th Street  
Homestead, Florida 33033-5634



L7615

June 16, 2009

Dear Friend of Biscayne National Park:

The National Park Service (NPS) plans to prepare an environmental assessment (EA) for a proposed Mooring Buoy and Marker Plan at Biscayne National Park (park). A description of the proposed plan is included in the enclosed brochure. The NPS, in compliance with the National Environmental Policy Act of 1969 (NEPA), is requesting public input on the proposed action and alternatives and the environmental topics and issues to be included in the EA.

The marine areas of the park are a great place to recreate, and aids to navigation and informational markers are integral to safe boating practices. Additionally, mooring buoys can be utilized to protect sensitive marine resources such as seagrass beds, coral reefs, and historic shipwrecks. To ensure visitor safety and resource protection, the park is proposing a plan to manage mooring buoys and aids to navigation. This plan is also intended to formalize the park's Maritime Heritage Trail in order to offer a greater variety of visitor experiences. During the coming months, the NPS will evaluate and analyze the potential environmental impact of the proposed alternatives.

The purpose of the enclosed brochure is to provide you with information about the project and related issues and ask for your help. We invite you to attend one of the public scoping meetings being held July 7-9, 2009 to learn about the proposed project, to ask questions, and share ideas, issues, and concerns. The open house will begin at 6:00 pm, where attendees can review project material and meet informally with staff. This will be followed by a brief presentation at 6:15 pm, and subsequently a public comment session. NPS staff will be available to discuss the project and record your ideas and input. Your opinions matter a great deal to us, and we want to hear from you. Please share your ideas, suggestions and concerns about this project with us by providing written comments and attending the public scoping meetings.

Please provide your input on or before July 31, 2009. We look forward to hearing from you.

Sincerely,

Mark Lewis  
Superintendent

Enclosure





# Mooring Buoy and Marker Plan

ENVIRONMENTAL ASSESSMENT

June 2009

## SCOPING NOTICE

The National Park Service (NPS) is preparing an environmental assessment (EA) to address options for mooring buoys and information and regulatory markers within Biscayne National Park, Miami-Dade County, Florida. The NPS has contracted with Parsons, a qualified consultant, to assist with the preparation of the EA. This notice begins the EA process by requesting your comments on the scope of the analysis that will be conducted.

### Three Public Scoping Workshops will be held:

July 7, 2009

Miami-Dade College  
Aviation Bldg F222-223  
500 College Terrace  
Homestead

July 8, 2009

Crowne Plaza Miami Airport  
950 W. Lejeune Road  
Miami

July 9, 2009

Holiday Inn Resort  
99701 Overseas Hwy  
Key Largo

The public is welcome to attend at any time between 6 and 8 p.m. A short presentation will begin at 6:15 pm, after which the public is invited to meet informally with staff, view the exhibits, and make written and/or verbal comments.

## BACKGROUND

Waters within Biscayne National Park are marked to assist boating navigation by a system of aids to navigation (ATONs). This system employs a variety of markers using a simple arrangement of colors, shapes, numbers and light characteristics to mark navigable channels and hazards to navigation. Buoys are installed and managed by a variety of agencies to denote sensitive areas and closures; these aids are installed with the concurrence of the U.S. Coast Guard to ensure that their placement does not present a hazard to safe navigation. Aids found within the park include embedded markers such as lighted structures, day markers (both lighted and non-lighted), poles and pilings, as well as floating buoys. Markers are in place to assist navigation through routes or around hazards, or to give information such as the presence of scientific sites or swim areas. Some markers within the park are managed by other agencies

(such as the U.S. Coast Guard or Miami-Dade County) or private entities (such as Florida Power and Light). The park also manages several mooring buoys to prevent anchor damage to resources while allowing boaters easy access to dive, snorkel, or fish at reefs and historic shipwrecks.

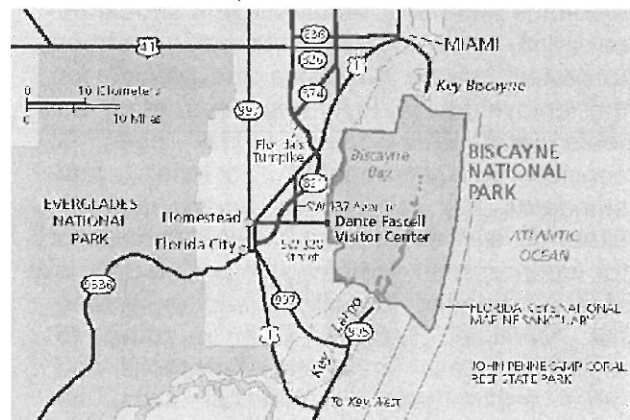


Figure 1. Location map. Biscayne National Park is located south of Miami.





**Figure 2 Navigational marker within Biscayne National Park.**

### **PURPOSE AND NEED**

The purpose of this project is to increase the protection of marine natural and cultural resources while enhancing visitor enjoyment of these resources, as well as to protect human health and safety through the appropriate use of mooring buoys, aids to navigation, and informational signs. Vessel groundings can be dangerous. Vessel groundings, improper anchoring, and visitor crowding in or near sensitive habitats can cause considerable damage to seagrass beds and coral reefs. It can take years and even decades for seagrasses and corals to recover from grounding and anchoring damage, and in some areas, they may never grow back; instead forming sandy areas, such as by the Sand Key sandbar. The park is reviewing its current navigational and mooring system to determine whether moorings and navigational markers should be removed, relocated, or increased in number to protect marine resources and provide for the enjoyment of park resources such as reefs and shipwrecks. The park is considering appropriate criteria and standards for establishing future mooring sites, as well as defining desired conditions for mooring sites and navigation. The park is also considering formalizing and expanding the Maritime Heritage Trail in order to facilitate access to historic shipwrecks and other submerged archeological sites, by installing mooring buoys and providing diver cards and brochures for each of these sites.

### **PRELIMINARY ALTERNATIVES**

The NPS is considering two preliminary alternatives to manage the markers and mooring buoys in Biscayne National Park:

1. No Action .
2. Formal system of mooring buoys and markers.

The alternatives are described below and compared in Table 1.

#### **Alternative 1: No Action**

In conformance with National Environmental Policy Act (NEPA) standards, a "No Action" alternative is included. The term "No Action" implies the existing methods for installing and maintaining mooring buoys and navigational markers, i.e. current conditions, would continue. Shortages of mooring buoys on reefs and wrecks have been noted during high use seasons and events, resulting in visitors anchoring in ways that can damage seagrasses or historic shipwrecks. Many shallow areas are not marked or poorly marked and experience repeated groundings. The Maritime Heritage Trail is informal, with few mooring buoys, and little information provided to visitors. The No-Action alternative includes the use of NPS employees in a limited capacity to help maintain and repair the most critical ATONs and buoys.

#### **Alternative 2: Formal system of mooring buoys and markers.**

The proposed plan for mooring buoys and navigational markers will describe criteria and standards for establishing future mooring sites and installing navigational markers, will define desired conditions for mooring sites and navigational conditions in the park, and will describe management options for a few areas in the park where boating visitors are concentrated in confined areas resulting in resource damage, visitor conflicts, and unsafe conditions, for example the sandbar at Sands Key. The plan will examine whether some high-use areas need different or additional navigational or informational markers. The plan will also strive to ensure the mooring buoy and navigational marker system provides a variety of sustainable visitor experiences near natural and cultural resources, such as by formalizing and expanding the Maritime Heritage Trail. This will include creating a set



of standards and criteria for future sites to be included, publishing their specific locations, and providing information on these sites to visitors. The plan will also clearly define the responsibilities for maintenance of buoys and markers within the park.



**Figure 3. Recreational vessel using a mooring buoy in Biscayne National Park.**

## Preliminary Resource Considerations

Preliminary consultations identified the following issues and concerns about the project. The NPS is collecting limited baseline data to help evaluate effects on some of the most important resource concerns. The resource considerations identified to date include:

- Marine life (especially seagrasses and coral reefs)
- Cultural resources (including historic shipwrecks)
- Wildlife and protected species
- Human health and safety
- Visitor experience

If public or agency concerns arise, additional resources may be evaluated.

**TABLE 1. Mooring Buoy and Marker Plan comparison of alternatives.**

ELEMENT	Alternative 1. No action (current management).	Alternative 2. Formal system of mooring buoys and markers.
Shallow areas (reefs, seagrass beds)	No criteria established for marking. Few areas sufficiently marked.	Criteria established for marking. Markers added, removed, or relocated.
Maritime Heritage Trail	Informal. Minimal information provided. Three sites with mooring buoys.	Formal. Dive cards and brochures produced. Locations publicized. Additional sites considered for inclusion.
Closed areas (ex. Arsenickers), boundary markers	Few, or no, markers.	Criteria established for marking and crowding. Markers added.
No-anchor areas	No limits on anchoring near mooring buoys or other areas.	Criteria established for limiting anchoring.
Operations	Two to three employees and volunteers maintain most critical buoys and ATONs. Markers maintained by other agencies.	New employees dedicated solely to maintenance of buoy and ATON system.

There will be opportunities for the public to be informed about and participate in the EA process. Figure 6 describes the timeline for this project.

MOORING BUOYS  
Biscayne National Park

Biscayne Bay

Biscayne Key

Blackie Shoal

Triumph Reef

Lignumvitae

Hawk Channel

Cape Sable Creek

Oyster Reef

Allens Reef

Anchovy Reef

Elkhorn Reef

Puckhorn Wreck

Oak Buny Reef

Florida Elephant

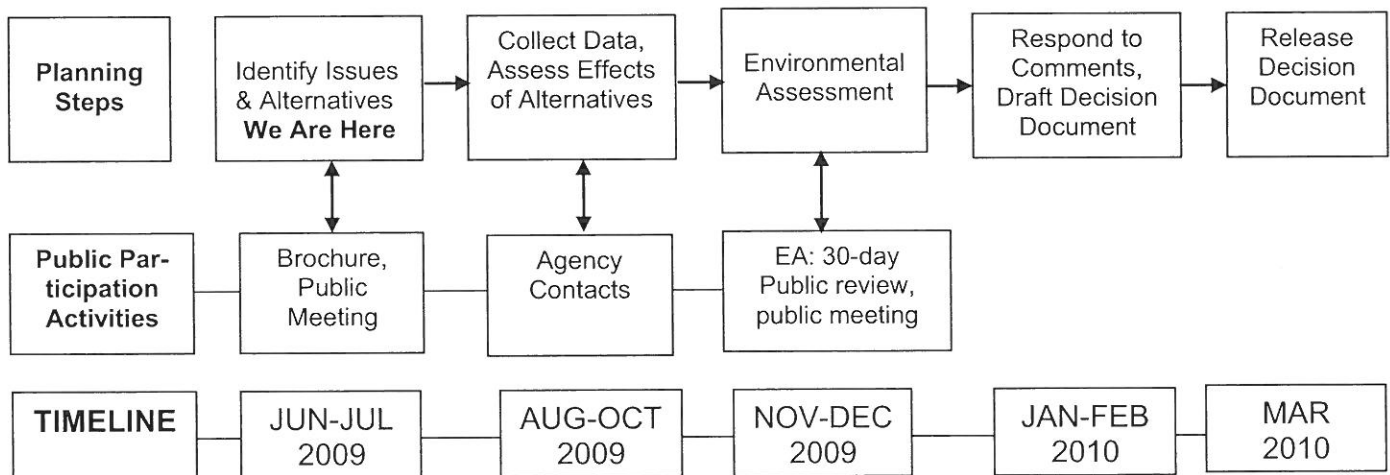
Scale bar: 0 to 1 mile, 0 to 1.6 kilometers

NOT FOR NAVIGATIONAL USE

Figure 5. Map of mooring buoys and channel markers near reef areas.

<http://parkplanning.nps.gov>

National Park Service  
Biscayne National Park  
**Attn:** Mooring Buoy EA  
9700 SW 328<sup>th</sup> St.  
Homestead, FL 33033



**Figure 6. EA Process and Timeline**

Please use this form to record your comments regarding proposed improvements to the Biscayne National Park Mooring Buoy and Marker Plan. These comments will be considered in developing options and the Environmental Assessment for this project. **Please return this form by July 31, 2009.** Additional sheets may be attached if needed. Fold the form so the NPS address is showing and tape or staple the edges together to mail it.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

## Mailing List

I am interested in receiving future correspondence for this action. (Please check one) ☐ yes ☐ no

**Note: If this form is not returned, your name will be removed from the mailing list for this project.** (Please correct mailing label if in error)

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*If you wish to be added to the mailing list to receive periodic updates concerning the Mooring Buoy and Marker Plan Environmental Assessment, please provide your mailing information below. The ease and speed of e-mail correspondence is preferred.*

Name: \_\_\_\_\_ E-mail Address: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Thank you for your time and interest in Biscayne National Park.

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FOLD HERE

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44¢ POSTAGE REQUIRED
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National Park Service  
Biscayne National Park  
Attn: Mooring Buoy EA  
9700 SW 328<sup>th</sup> Street  
Homestead, FL 33033

## **APPENDIX B:**

### **IMPAIRMENT DETERMINATION FOR THE MOORING BUOY AND MARKER PLAN**

#### **IMPAIRMENT DEFINED**

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 minimize to the greatest degree practicable adverse impacts on park and monument resources and values. However, the laws do give NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given NPS management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent it affects 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 a goal in the park's General Management Plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park.

#### **HOW IS AN IMPAIRMENT DETERMINATION MADE?**

*NPS Management Policies 2006* directs decision makers to use professional judgment in making an impairment determination. This means that the decision maker must consider any environmental assessment or analyses required under NEPA, consultations required under Section 106 of the National Historic Preservation Act, relevant scientific and scholarly studies, advice and insights offered by subject matter experts, and the results of public involvement activities.

Park resources and values that may be impaired include scenery; natural and historic objects; wildlife and the habitats that sustain them; ecological, biological, and physical processes; natural visibility; natural landscapes and soundscapes; water and air resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals.

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 to park resources and values. These impacts areas are not generally considered to be park resources or values according to the Organic Act.

## **PURPOSE AND SIGNIFICANCE OF BISCAYNE NATIONAL PARK**

Biscayne National Park was established by Congress in 1968 “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.”

### **Park Significance**

- The park's fabric of Florida 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 find inspiration in Biscayne's tranquility, solitude, scenic vistas, underwater environment, and the sound of nature's voices.
- The park encompasses the northernmost extent of fragile and dynamic Florida coral reefs and coastal systems characterized by numerous transitions in the physical and biological environment.
- Biscayne National Park provides a rare opportunity to experience largely undeveloped Florida Keys.
- Biscayne National Park preserves unique marine habitat and nursery environments that are capable of sustaining diverse and abundant native fisheries.
- Its submerged and terrestrial cultural resources represent a sequence of rich history encompassing early settlement, maritime activities, agricultural and development of the islands, and the melding of diverse cultures.

## **IMPAIRMENT DETERMINATION FOR THE MOORING BUOY AND MARKER PLAN**

As directed by the NPS, in a memorandum dated July 6, 2010, an impairment determination must be completed for each resource impact topic carried forward and analyzed for the Preferred Alternative or selected action. The determination must include:

- 1) a brief description of the resource condition
- 2) whether the resource is necessary to fulfill the park's purpose
- 3) whether the resource is key to the natural or cultural integrity, or opportunity for enjoyment, of the park
- 4) whether the resource is identified as a significant resources
- 5) a “because statement” as to why the proposed action would or would not result in impairment of the resource

Five impact topics subject to the impairment determination were retained for analysis in the Mooring Buoy and Marker Plan EA. The table below lists the topics and indicates the impairment determination for each.

**Table B1. Impairment Determination Summary for the Mooring Buoy and Marker Plan**

Resource Topic	Is this resource necessary to fulfill the parks purpose or key to the park's resource integrity?	Would impairment of the resource result from implementation of the Preferred Alternative?
Benthic Habitats	Yes	No
Water Resources	Yes	No
Wildlife, Fish, and Essential Fish Habitat	Yes	No
Special-Status Species	Yes	No
Cultural Resources	Yes	No

### Benthic Habitats

Because of the park's shallow depths and clear water, its productivity is largely based on benthic (bottom) habitat. Submerged habitat in Biscayne National Park constitutes over 95 percent of the park. Of this submerged habitat, dense seagrass beds cover almost half, and hardbottom areas (hard and soft corals and sponges) another 25 percent (Lewis *et al.* 2000; Browder *et al.* 2005). Corals and seagrass meadows also have important algal components. These communities support life stages for a variety of marine mammals, birds, reptiles, fish, and invertebrates, including legally protected species and many others are of recreational and commercial value. Because of the important role these habitats play in supporting fish populations, wildlife, and the visitor experience, healthy benthic resources are necessary to fulfill the park's purpose, key to the natural integrity of the park, and are a significant resource within Biscayne National Park.

As described in Chapter 4 of the EA, a variety of impacts to benthic resources arise from sources and activities that are beyond the influence of the park. Engineering modifications to surface flows in the South Florida ecosystem have decreased the quantity and quality of freshwater reaching Biscayne Bay (Alleman *et al.* 2002). Resulting adverse impacts to benthic habitats from these modifications are most notable in the western portions of the park, in the vicinity of the canals that direct runoff into the bay. Moving east across the bay, environmental conditions improve with increasing distance from these land-based impacts and as the influence of the ocean and tides increases (Lirman *et al.* 2004).

The decline of corals in southeast Florida has been a concern for some time. Although many factors external to the park are likely responsible, recreational impacts to coral reefs include fishing and fish collecting; commercial impacts include anchoring and lost or abandoned fishing gear. Surveys by the Florida Wildlife Research Institute indicate that the density of fishing-related marine debris is greater in Biscayne Bay than in any other area surveyed throughout the Florida Keys (NPS 2008a). Both shallow and deep coral reefs in southeast Florida have declined in total cover and species diversity due to bleaching events and storm damage, with "only scant evidence of recovery in species numbers by 2003" (Somerfield *et al.* 2008).

Actions proposed under the Preferred Alternative would not dramatically reduce the widespread effects on benthic habitats within the park. Actions proposed within the plan would have long-term, negligible to minor benefits because groundings and effects of anchoring would be reduced at

specific locations. Because the proposed action would make localized improvements in conditions of benthic habitat and would make no contribution to long-term, widespread degradation, there would be no impairment of these resources or values under the Preferred Alternative.

## **Water Resources**

Biscayne Bay covers about 270 square miles, and has an average depth of six feet, with a maximum depth of about 13 feet (Browder *et al.* 2005). Prior to the 20<sup>th</sup> century, the bay was hydrologically connected to the larger South Florida ecosystem by streams, sloughs, surface sheet flows, and groundwater flows. As this water moved through extensive wetlands, mangrove forests, and limestone aquifers, it became clear, highly oxygenated, and naturally low in nutrients (Browder *et al.* 2005). Because of the important role water quality plays in supporting benthic habitats, fishes, wildlife, and the visitor experience, healthy water resources are necessary to fulfill the park's purpose, key to the natural integrity of the park, and are a significant resource within Biscayne National Park.

A variety of impacts to the park's water quality arise from sources and activities outside the park and beyond the influence of park policies, activities, and operations. An extensive system of levees, canals, and water control structures were constructed to provide flood control, and water supply, and agricultural uses. Today, the bay's watershed is the most highly urbanized area in Florida, with much of the surrounding land converted to agriculture (U.S. Fish and Wildlife Service 1999c). The flow of freshwater to the bay has decreased (McPherson and Halley 1996), and dredging of navigation routes has increased exchange with the ocean (Browder *et al.* 2005; Caccia and Boyer 2007) and made bay water saltier. These changes adversely impact the overall health of the bay ecosystem (Davis and Ogden 1994, McPherson and Halley 1996).

Actions proposed under the Preferred Alternative would not contribute measurably to the widespread effects on water resources within the park. Adverse effects on water quality resulting from installation of mooring buoys and markers would be negligible to minor because of their short-term and highly localized nature. Long-term effects from installing these components would be beneficial, and negligible to minor because sedimentation resulting from groundings and concentrated visitor activities would be somewhat reduced. Because the Preferred Alternative would result in long-term localized improvements to water quality, and would make no contribution to widespread adverse effects, and there would be no impairment of water resources or values under the Preferred Alternative.

## **Wildlife, Fish, and Essential Fish Habitat**

Biscayne National Park supports diverse biological communities that include sand and mud flats, estuaries, seagrass meadows, mangrove forests, and hard-bottom habitats (e.g., soft and hard corals, and sponges) (Sasso and Patterson 2000, Browder *et al.* 2005). These communities provide shelter, nesting, nursery, and roosting areas for 512 species of fish, approximately 190 bird species, 34 species of reptiles, 28 mammal species, 6 species of amphibians, 8 crustacean species, and a multitude of insects and other invertebrates (NPS 2008). Because of the important role these species play in supporting the marine and terrestrial ecosystems of the park, and the visitor experience, healthy wildlife, fish, and essential fish habitat resources are necessary to fulfill the park's purpose, key to the natural integrity of the park, and are a significant resource within Biscayne National Park.

A variety of impacts to the park's wildlife, fish, and essential fish habitat arise from sources and activities outside the park and beyond the influence of park policies, activities, and operations. Degradation of water resources and benthic habitats, as described above, would result in adverse effects on wildlife and fish dependent on those resources. In addition, the population of metropolitan Miami is growing, and due to the popularity of boating in South Florida, visitation to



the park is expected to increase. This would also increase boat-related habitat damage and wildlife disturbance. Numerous fish and invertebrate species are subject to overfishing from both commercial and recreational sources, adversely affecting the park's fishery resources (NPS 2008a). Declining fish and invertebrate numbers also impact marine mammals and birds by decreasing the amount of available prey. Ongoing and future Everglades restoration plans would provide limited improvements to wildlife habitats, which would be outweighed by the large-scale impacts of increasing park use and habitat degradation.

Actions proposed under the Preferred Alternative would not contribute measurably to the widespread effects on wildlife, fish, and essential fish habitat within the park. Because there would be no measurable overall reduction in benthic habitat, or long-term changes to water quality, effects on species would be limited to short-term disturbance. Adverse effects resulting from installation of mooring buoys and markers would be negligible to minor because of their short-term and highly localized nature. Because there would be no measurable contribution to widespread adverse effects on wildlife, fish, or essential fish habitat, there would be no impairment of these resources or values under the Preferred Alternative.

### **Special-Status Species**

As stated above, the fundamental purpose of the National Park System begins with a mandate to conserve park resources and values. Special-status species, and their habitats, occurring in national park units, are to be protected in an effort to assure their continued survival. Special-status species that could potentially be affected by the Mooring Buoy and Marker Plan include the Florida manatee, four species of sea turtles, and two species of corals. Because of the important role these species play in the park's ecosystem, they are necessary to fulfill the park's purpose, key to the natural integrity of the park, and are a significant resource within Biscayne National Park.

#### ***Florida Manatee***

The Florida manatee (*Trichechus manatus latirostris*) was first listed as endangered in 1967, while critical habitat was designated 1976. Biscayne National Park does not include any federally designated critical habitat for the Florida manatee. However, there are specially designated no-wake manatee zones in the park, for example in Homestead Bayfront Channel and Black Point Channel.

The Florida manatee continues to be threatened by past hunting and poaching and by the effects of boat impacts and propeller injuries (U.S. Fish and Wildlife Service 2001). Manatee are also killed and injured in water control structures across South Florida. Manatees are susceptible to mortality if water temperatures drop below seasonal norms within their range. However, cooperative, interagency manatee conservation and recovery programs in Florida implement a variety of action to reduce or prevent manatee deaths related to boating and water-control structures. In addition, efforts by many agencies and groups have resulted in many manatees rescued every year and returned to the wild. As a result of these efforts, manatee populations in Florida are responding with many sub-populations increasing and the Atlantic Coast sub-population which would include Biscayne National Park is found to be stable (U.S. Fish and Wildlife Service 2007c).

The Preferred Alternative would enhance protection of manatees within the park by clearly identifying restricted speed zones. This would help to reduce potential manatee collisions particularly in the bay. Improved signage, along with increased education and enforcement efforts, would help to alert boaters to the presence of manatees in the park. This would have a long-term, localized, and minor beneficial impact on the manatee in the park. Because the Preferred Alternative would result in limited, long-term benefits to the manatee, and would make no contribution to widespread adverse effects, and there would be no impairment of Florida manatee resources or values under the Preferred Alternative.

## Sea Turtles

There are four special-status sea turtles that occur in Biscayne National Park: the green turtle (*Chelonia mydas*), the hawksbill turtle (*Eretmochelys imbricate*), the leatherback turtle (*Dermochelys coriacea*), and the loggerhead turtle (*Caretta caretta*). Sea turtle nests in the park are almost always loggerhead turtle nests.

The green sea turtle was originally protected under the Endangered Species Act on July 28, 1978. The breeding populations off Florida and the Pacific coast of Mexico are listed as endangered, while all others are threatened (National Marine Fisheries Service 2003b). The hawksbill sea turtle was listed as endangered in 1970, and its status has not changed since. The leatherback sea turtle was listed as endangered throughout its range in 1970. Loggerhead sea turtles were federally listed as threatened in 1978 due to past overhunting for its meat, leather, eggs, and fat.

Global populations of sea turtles have been dramatically reduced by hunting and egg collecting, and are now further threatened by effects of commercial fishing and shoreline habitat loss (Florida Fish and Wildlife Conservation Commission 2010a). Incidental catch during commercial shrimp trawling is a continuing source of mortality that adversely affects recovery (National Marine Fisheries Service 2003b). These threats are global in nature, and represent both direct injury to and mortality of turtles and loss of nesting habitat due to shoreline development. Some sea turtle species are also being affected by communicable disease. These combine to produce long-term, moderate to major, adverse effects on sea turtle populations.

The Preferred Alternative would disperse boaters in heavily concentrated areas would result in long-term, localized, and minor beneficial impacts to the sea turtles because it would better protect the resources that provide habitat for them, including nesting habitats, as well as reduce frequency of anchor damage to benthic habitats important to sea turtles. Because the Preferred Alternative would result in limited, long-term benefits to sea turtles, and would make no contribution to widespread adverse effects, and there would be no impairment of sea turtle resources or values under the Preferred Alternative.

## Corals

Staghorn coral (*Acropora cervicornis*) and elkhorn coral (*Acropora palmata*) were listed as federally threatened species under the Endangered Species Act in 2006 (Federal Register 2008). Within the park, *A. cervicornis* is found scattered throughout the reef tract in sparse colonies, whereas *A. palmata* is concentrated in a few discrete areas.

Along the Atlantic reef tract, once expansive reefs of staghorn and elkhorn coral have died since 1980. Populations have collapsed throughout their range from various threats; populations have declined by over 90 percent, and localized extirpations have occurred (National Marine Fisheries Service 2003e). The greatest direct source of region-wide mortality for both these corals has been disease outbreaks. Losses have been compounded by hurricanes, increased predation, bleaching, algae overgrowth, human impacts, and other factors. These species is also susceptible to damage from sedimentation and are sensitive to increased sea temperatures and salinity variation (National Marine Fisheries Service 2003 a,e).

In 1998, the United States Coral Reef Task Force was established to strengthen efforts for protecting coral reef ecosystems. Over 60 regional agencies collaborate in Florida to prevent the loss of elkhorn and staghorn corals. In addition, conservation programs protect elkhorn and staghorn corals through zoning, channel marking, education efforts and restoration work (Florida Department of Environmental Protection 2009).

The Preferred Alternative would address some of the sources of adverse impacts (e.g., boat-related activities groundings, anchor damage, and fishing gear) to corals at specific locations. This would include better warnings of submerged habitat, clearer delineation of restricted areas, enhanced law

enforcement, and increased boater knowledge of sensitive park resources. This would result in limited, localized benefits to staghorn and elkhorn corals. Because the Preferred Alternative would result in limited, long-term benefits to these corals, and would make no contribution to widespread adverse effects, and there would be no impairment staghorn and elkhorn resources or values under the Preferred Alternative.

## Cultural Resources

The lands and submerged bottomlands of Biscayne National Park are rich with archeological remains that document the cultural history of southern Florida and the Florida Keys. Submerged archeological sites include an array of shipwrecks and other representations of maritime casualties, demonstrating the international maritime heritage encompassed in the waters of Biscayne National Park. These shipwrecks, as well as other material remains, are now submerged archeological sites within the park and some are listed in the National Register of Historic Places (NRHP). Because of the important role these resources play in documenting the history of the park, they are necessary to fulfill the park's purpose, key to the cultural integrity of the park, and are a significant resource within Biscayne National Park.

The area of potential effect for the Mooring Buoy and Marker Plan includes the six shipwrecks of the Maritime Heritage Trail, the listed shipwrecks that contribute to the Offshore Reefs Archeological District, as well as the immediate park waters surrounding each submerged archeological resource which may be used for mooring buoys and informational markers. The shipwrecks that make up the Maritime Heritage Trail are the *Arratoon Apcar*, the *Erl King*, the *Alicia*, the *Lugano*, the *Mandalay*, and the *19th Century Wooden Sailing Vessel*. These wrecks lie along the Atlantic reef tract, in relatively shallows waters.

These resources are subject to the natural and inevitable effects of time, water currents, and storm events. The shipwrecks are also subjected to the inappropriate human actions of park visitors, such as dropping anchor or fishing in areas in which such actions are prohibited. According to the park's Fisheries Management Plan, surveys conducted during the early 2000s of 42 of the park's submerged archeological sites indicated that the structural integrity of submerged archeological sites was damaged or affected by numerous fishing-related threats, including anchor damage, lobster trap debris, hook-and-line gear, fishing nets, and spears from spearfishers (NPS 2008a). These past and on-going actions have resulted in long-term, minor to moderate, adverse effects.

Implementation of the Preferred Alternative would be expected to decrease damage to the park's submerged cultural resources. This alternative would reduce anchor strikes by prohibiting anchoring near sensitive resources and installing additional markers and mooring buoys near the shipwrecks, while requiring routine monitoring to record resource conditions. It could potentially expand the Maritime Heritage Trail; thus, it could increase awareness and protection of submerged resources which are currently vulnerable to damage. Any sites added would be subject to strict criteria to prevent the loss of portable artifacts; and, sites that are considered too sensitive would not be added to the trail in order to reduce the possibility of portable artifact removal resulting from visitation. The proposed action would have direct, localized, moderate, long-term, beneficial effects on the six shipwrecks included in the Maritime Heritage Trail, along with any others that could be part of an expanded trail. Because the Preferred Alternative would result in long-term benefits to the shipwrecks of the Maritime Heritage Trail, and would make no contribution to widespread adverse effects, there would be no impairment of cultural resources or values under the Preferred Alternative.



As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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