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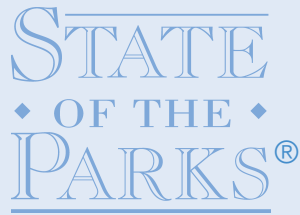
January 2006

# BISCAYNE NATIONAL PARK

A Resource Assessment

National Parks Conservation Association





## Center for State of the Parks

More than a century ago, Congress established Yellowstone as the world's first national park. That single act was the beginning of a remarkable and ongoing effort to protect this nation's natural, historical, and cultural heritage.

Today, Americans are learning that national park designation alone cannot provide full resource protection. Many parks are compromised by development of adjacent lands, air and water pollution, invasive plants and animals, and rapid increases in motorized recreation. Park officials often lack adequate information on the status of and trends in conditions of critical resources.

The National Parks Conservation Association initiated the State of the Parks® program in 2000 to assess the condition of natural and cultural resources in the parks, and determine how well equipped the National Park Service is to protect the parks—its stewardship capacity. The goal is to provide information that will help policy-makers, the public, and the National Park Service improve conditions in national parks, celebrate successes as models for other parks, and ensure a lasting legacy for future generations.

For more information about the methodology and research used in preparing this report and to learn more about the Center for State of the Parks®, visit [www.npca.org/stateoftheparks](http://www.npca.org/stateoftheparks) or contact: NPCA, Center for State of the Parks®, 230 Cherry Street, Fort Collins, CO 80521; Phone: 970.493.2545; E-mail: [stateoftheparks@npca.org](mailto:stateoftheparks@npca.org).

Since 1919, the National Parks Conservation Association has been the leading voice of the American people in protecting and enhancing our National Park System. NPCA and its 300,000 members and hundreds of partners work together to protect the park system and preserve our nation's natural, historical, and cultural heritage for generations to come.

- \* More than 300,000 members
- \* 8 regional offices
- \* 35,000 activists

A special note of appreciation goes to those whose generous grants and donations made the report possible: Ben and Ruth Hammett, Tracy and Gene Sykes, the Efroymsen Fund of the Central Indiana Community Foundation, and anonymous donors.

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## REPORT SUMMARY



Biscayne National Park is located along the southeastern margin of the Florida peninsula and encompasses much of Biscayne Bay, making it one of the largest marine parks in the National Park System (see map on page 26). The park protects part of the third-largest coral reef system in the world and the longest stretch of mangrove forest remaining on Florida's east coast, providing habitat and nursery grounds for most of the region's important commercial and recreational

fish, shellfish, and crustaceans. Many visitors travel to Biscayne to dive, snorkel, canoe, kayak, windsurf, or fish, further underscoring the importance of conserving the park's resources. The park also harbors many endangered species, including the West Indian manatee (*Trichechus manatus*), American crocodile (*Crocodylus acutus*), and Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*).

Historic structures and archaeological

Biscayne National Park protects part of the third-largest coral reef system in the world.

Healthy marine ecosystems are critical to recreational activities such as snorkeling, diving, canoeing, and fishing.



NATIONAL PARK SERVICE/JOHN BROOKS

resources remain on some of the park's keys, while at least 44 shipwrecks lie beneath the park's waters, telling of the people who visited or lived in the region before the park was established.

As with other natural areas in southern Florida, most notably Everglades National Park, major water diversion, drainage, and canal projects throughout the 20th century have altered the natural hydrologic flows and ecological processes that once characterized the region. Biscayne Bay has changed from a naturally functioning estuary driven by rain and groundwater flows to an artificial system driven by controlled releases of freshwater from human-made canals, which has damaged benthic communities and harmed fisheries.

Water projects, agricultural and urban development in south Florida, recreational and commercial fishing, and other activities continue to threaten Biscayne National Park's resources and the health of the park. The park faces a compromised coral reef framework; dramatic declines in

important fish populations; changes in the quantity, quality, timing, and distribution of freshwater flows; the direct destruction of benthic vegetation; the alteration or destruction of coastal wetlands; saltwater intrusion in the Biscayne aquifer; and water and sediment contamination in areas directly adjacent to canals and creeks that drain into the bay. Although the Comprehensive Everglades Restoration Plan (CERP) currently under way in south Florida should address these and other issues affecting Biscayne Bay and Biscayne National Park, the plan competes with other priorities for limited funds.

The park's cultural resources also suffer as a result of funding and staffing shortfalls. One curator manages more than 4.5 million archive and museum collection items that belong to Biscayne and other south Florida national parks. The park lacks a Cultural Landscapes Management Program, needs several ethnographic studies, and lacks the staff and resources to document, monitor, and develop preservation



strategies for more than 100 archaeological sites listed in the Archaeological Sites Management Information System (ASMIS) database.

Biscayne's base budget has increased by just 2 percent since 2001, and a base increase of at least \$465,000 is needed. Law enforcement staff are responsible for dealing with illegal activities such as drug smuggling, visitor protection, and cultural and natural resources protection. Adequately fulfilling all of these duties is impossible with the current minimal staffing and funding levels.

Additionally, the park lacks a Comprehensive Interpretive Plan, required for all National Park Service sites. This plan, which addresses desired visitor experiences within the park, would guide the park in developing short and long range interpretation, education, and outreach goals to most effectively connect the public to the park. Initial steps to develop a Comprehensive Interpretive Plan began in 2000, but work on this document cannot continue until the park finishes its updated General Management Plan, a draft of which should be completed in 2006.

### RATINGS

Current overall conditions of Biscayne's known **natural resources** rated a score of 58 out of 100, which is a "poor" rating. Ratings were assigned through an NPCA evaluation of park research and monitoring data using NPCA's Center for State of the Parks comprehensive assessment methodology (see Appendix). Challenges include dramatic changes to the region's natural hydrology, effects of adjacent agricultural and urban development, threats to coral reef health, and overfishing.

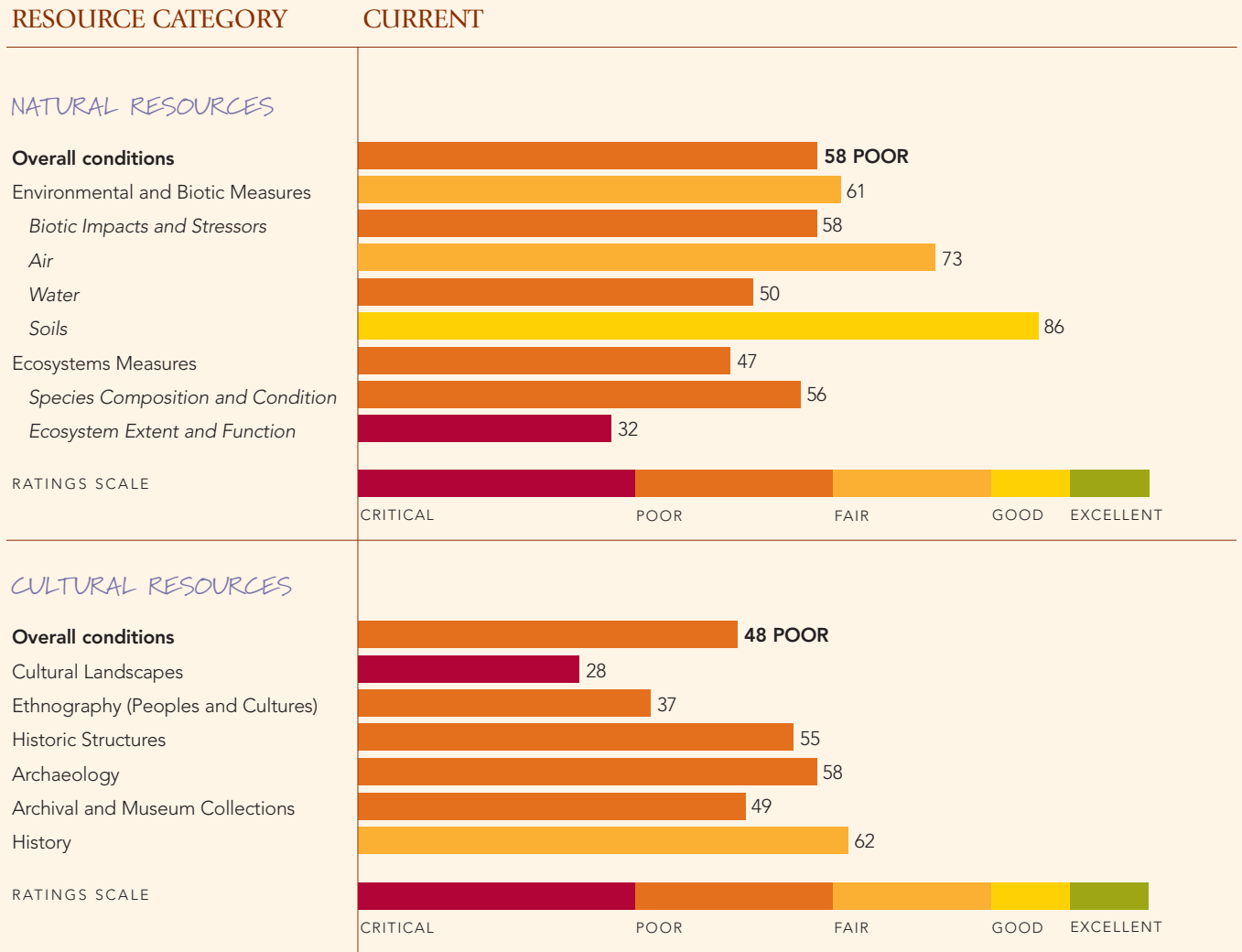
Overall conditions of the park's known **cultural resources** rated 48 out of a possible 100, also indicating "poor" conditions. Funding and staffing shortfalls make it difficult to properly protect resources. Biscayne lacks a cultural landscapes program, and several ethnographic studies are needed.

## BISCAYNE NATIONAL PARK AT A GLANCE

- Miami-Dade County is the only county in the United States to have two national parks within its borders. Biscayne and Everglades provide important recreational opportunities for local residents and visitors of south Florida. The parks also boost the region's economy. In 2003, a conservative estimate of 490,000 visitors to Biscayne spent an estimated \$23.33 million and supported 426 jobs in the local economy (estimates generated by the NPS Money Generation Model 2 developed at Michigan State University).
- Biscayne National Park, which encompasses two-thirds of Biscayne Bay, faces issues that arise because of its proximity to the burgeoning multicultural population of Miami-Dade County. A challenge facing park staff is how to adequately educate the diverse user community about the values and mission of the Park Service to ensure that visitors enjoy the park in ways that complement rather than harm resource protection efforts.
- Biscayne National Park is home to the longest stretch of mangrove forest remaining on Florida's east coast, at least 16 threatened or endangered wildlife species, and part of the third-longest chain of coral reefs in the world. Within Biscayne, coral reefs and the interlinked reef fisheries are the most threatened ecosystems because of human activities.
- The coastal waters of Biscayne National Park can be treacherous for large ships, as evidenced by the extensive collection of shipwrecks now managed by the park. The wrecks hold valuable information about the people who traveled to the region in the last five centuries, provide a popular destination for snorkelers and divers, and serve as habitat for a variety of marine species.



Note: When interpreting the scores for natural resource conditions, recognize that critical information upon which the ratings are based is not always available. This limits data interpretation to some extent. For Biscayne National Park, 88 percent of the information requirements associated with the methods were met.



The findings in this report do not necessarily reflect past or current park management. Many factors that affect resource conditions are a result of both human and natural influences over long periods of time, in many cases before a park was established. The intent of the Center for State of the Parks® is to document the present status of park resources and determine which actions can be taken to protect them into the future.

## RESOURCE MANAGEMENT HIGHLIGHTS

- **New General Management Plan.** Biscayne is in the process of updating its General Management Plan (GMP) to replace the last plan that was developed in 1983. Work on this update began in 2000 and the park expects to release a draft GMP in 2006. Public input on the plan will be solicited through public meetings, open houses, mailings, and the park's web site ([www.nps.gov/bisc/](http://www.nps.gov/bisc/)).
- **Damage Recovery Program.** In 1995, Biscayne established the Damage Recovery Program to address seagrass and coral reef habitats damaged by boats running aground in the park. The goal of this program is to restore the resources that have been damaged; limit the physical damage to natural resources caused by groundings; and develop more effective law enforcement, resource management, and education strategies to prevent future incidents.
- **Maritime History Program.** Biscayne has a wealth of submerged archaeological resources, and the park is a leader in underwater archaeology in the Park Service. Staff recently authored an underwater archaeological site-monitoring program that redefines site documentation standards and could improve shipwreck protection nationwide.
- **Fisheries Management Plan.** In cooperation with the Florida Fish and Wildlife Conservation Commission, Biscayne is developing a Fisheries Management Plan scheduled for completion in early 2006. The plan will guide fisheries management activities for the next ten to 15 years by promoting management actions that will lead to viable fish populations and habitat and provide for continued recreational fishing opportunities.
- **Coral Nursery Program.** Biscayne has established an innovative program focused on restoring damaged reefs with corals grown in a field nursery rather than using corals from undamaged reefs. Coral fragments rescued from grounding sites are raised in the protected areas of the park, and once they are large enough to survive the rigors of the coral reef environment, they are transplanted back on the damaged reef. Transponders with unique identification numbers are embedded in the transplants, allowing researchers to electronically monitor individual coral fragment growth and survival rates.
- **Ecosystem Restoration.** Biscayne is participating with other agencies on the Comprehensive Ecosystem Restoration Plan (CERP) projects for the Biscayne Bay Coastal Wetlands, RECOVER Southern Estuaries team and State Water Regulations (such as Initial Reservations and Minimum Flows and Levels) to ensure adequate water volume, timing, and delivery to the park and other portions of Biscayne Bay. Currently, the park receives inadequate freshwater that is delivered as point source discharges, which damage fisheries resources and benthic (living at or near the bottom) communities. This water is also threatened by redirection to urban and other water interests. These CERP projects are the means by which the park may protect its existing water and request additional water for restoration. These projects are threatened by a lack of funding for land acquisition and construction associated with restoration and a more natural distribution of freshwater.

## KEY FINDINGS

- Biscayne's base budget has increased by just 2 percent since 2001 for a fiscal year 2005 budget of \$3.53 million. The park needs an additional \$300,000 to maintain current staffing and service levels. A base budget increase of at least \$465,000 is needed to increase law enforcement and maintenance capabilities so that visitor facilities, services, and resource protection efforts meet the park's stated Government Performance and Results Act (GPRA) goals.
- Critical needs at Biscayne include rebuilding visitor protection capabilities, improving the ability to meet recurrent maintenance needs (particularly related to boat repairs), and enhancing the ability to work with other agencies' ecosystem restoration staff on park issues.
- Important unfilled or unfunded positions include a maintenance mechanic, facility management specialist, water quality specialist, biologist, environmental education ranger, small craft operator, and law enforcement rangers. Additional needs include a staff person with historic preservation expertise, a resource management/interpretive division liaison to better inform the public of high profile resource related park projects (including ecosystem restoration), and an archaeologist.
- Biscayne National Park faces a variety of challenges because of its proximity to Miami and the changes to the landscape caused by urban development.
- Boats running aground on coral reefs or in seagrass beds can severely damage these ecosystems. Protected manatees and sea turtles, which are often near the surface, are also at risk of being hit by boats. Boaters need to be educated to be aware of their surroundings at all times and use extreme caution in shallow areas to avoid damaging underwater resources and wildlife.
- Though only short-term, inconclusive trend data are available, coral reef cover in Biscayne National Park has declined from 1984 to 2000, both for terrestrial bank-barrier reefs (from 29 percent to 11 percent) and patch reefs (from 26 percent to 17 percent). Species diversity within coral reefs has declined by 13 to 29 percent from 1989 to 1991.
- Recent studies suggest that up to 27 of 35 fish species examined in Biscayne National Park are overfished; 13 of these species can be legally taken at sizes that are below their size of sexual maturity. Through the Fisheries Management Plan, the park is working with other regulatory agencies to address these issues.
- Coastal wetland communities that form the western edge of Biscayne National Park have been fundamentally changed from pristine conditions. Already greatly diminished in extent outside of the park boundaries by urban and agricultural land uses, the spatial extent and distribution of these coastal communities has shifted, most likely because of changes in salinity caused by drainage activities and perhaps sea level rise. Scrub mangroves have extended inland and freshwater marshes have declined in size and extent.
- Tropical hardwood hammocks that occur on islands within the park harbor many





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rare and endemic species. Hammocks on a few islands have suffered previous habitat destruction, and existing habitat still faces threats, particularly from invasive, non-native species.

- One curator manages the museum collections of Biscayne National Park, Big Cypress National Preserve, Dry Tortugas National Park, and Everglades National Park. These collections include more than 4.5 million items; 93 percent of Biscayne's more than 700,000 items are uncataloged and inaccessible. To correct the deficiencies, at least four positions need to be filled: an archivist, archives technician, museum technician, and a registrar to be shared among the south Florida national parks.
- A historic structures report for Boca Chita Key, which is recognized as a historic district in the National Register of Historic Places, is needed to guide development of a cyclic maintenance plan to ensure sensitive maintenance practices and loss mitigation of the district's ten historic structures.
- Biscayne needs a complete survey of both terrestrial and underwater archaeological resources; part of this effort could be accomplished by filling the park's vacant archaeologist position.
- Traditional use studies, oral histories, and in-depth ethnographies are needed to help the park better understand traditionally associated groups of people, and the park needs a Native American Graves Protection and Repatriation Act (NAGPRA) agreement with identified traditionally associated groups. This will become increasingly important as artifacts are uncovered during continuing archaeology projects.



## PRESERVING THE CRYSTAL CLEAR WATERS



Biscayne National Park is a favorite recreation destination.

Approximately 5,000 years ago, seawater inundated a limestone depression and formed present-day Biscayne Bay, a shallow (average depth is less than one meter) subtropical lagoon, which is the largest estuary on the southeast coast of Florida. Biscayne Bay teems with fish and wading birds, and its crystal clear waters reveal the magnificent colors of the benthic communities beneath. Biscayne National Park, which encompasses about two-thirds of the

bay, contains some of the best-preserved parts of the bay.

Creation of Biscayne National Park was not a simple process. Agricultural and urban development had been increasing in south Florida since the turn of the 20th century, and resort and vacation home development followed as more people became aware of the region's subtropical climate and recreational opportunities. Populations grew and the natural environ-



ment was further altered. Between 1910 and 1940, artificial islands were built in north Biscayne Bay by dredging the bay bottom, while other areas were filled. The number of hotels on Miami Beach increased from 60 to 250 between 1930 and 1939. In the 1950s and 1960s, some developers wanted to connect south Biscayne Bay's eastern barrier islands with a series of causeways, roads, and bridges.

Setting aside lands and waters as part of a national park was becoming more and more urgent as natural ecosystems were dramatically changed. While the idea of a park had many champions, including vacuum cleaner magnate Herbert W. Hoover, Jr., some local landowners fought against park establishment. Despite their opposition and anti-park tactics—landowners bulldozed a 125-foot-wide swath, now called "Spite Highway," down the

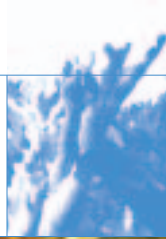
center of Elliott Key in attempts to despoil the area—Congress approved creation of Biscayne National Monument in 1968. The park grew in size in 1974; it grew again in 1980 and was redesignated as Biscayne National Park. The park now encompasses about 70,000 hectares (173,000 acres), 95 percent of which include marine waters.

Biscayne National Park is a special place that has increasingly become a refuge for those seeking peaceful recreation amidst the burgeoning growth of Miami, a city whose development has already engulfed northern Biscayne Bay, changing its natural physical structure, ocean circulation, depth and topography, turbidity (amount of sediment suspended in the water), and salinity patterns. In fact, it is the park's proximity to Miami and its urban environment that presents the greatest resource challenge.

Settlers on Elliott Key who opposed creation of a national park bulldozed a road that came to be called "Spite Highway." Today much vegetation has regrown and rangers lead hikes down the old road during the winter months.



KODAK/NATIONAL PARK SERVICE/NEIL MONTANUS



## THE BISCAYNE ASSESSMENT

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Biscayne National Park

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Biscayne's coral reefs are alive with colorful fish, coral, and other marine creatures.

### NATURAL RESOURCES— RESTORATION AND PRESERVATION AMIDST A LEGACY OF ECOLOGICAL CHANGE

The assessment rated the overall condition of natural resources at Biscayne National Park a 58 out of 100, which ranks park resources in “poor” condition. Prominent factors influencing the ratings are principally associated with

historic alterations to natural freshwater flows to Biscayne Bay, but are also associated with ongoing commercial and recreational activities both inside and immediately adjacent to the park. Chief among these factors are sub-minimal freshwater flow and poor water quality entering the park, overfishing, salinity, residential and agricultural development, and boat groundings.



HISTORIC DEVELOPMENT OF MIAMI-  
DADE COUNTY—ENVIRONMENTAL  
ALTERATIONS PRESENT AN ONGOING  
RESOURCE PROTECTION CHALLENGE

Sawgrass plains and freshwater marl marshes once bordered Biscayne Bay on the mainland, while a series of discontinuous islands and shoals lay to the east. Increasing human settlement and development of southeast Florida during the last century has substantially altered the natural setting. Increasing salinity has forced the sawgrass plains to retreat westward, and in areas that have not been directly altered by development, habitat has shifted to more salt-tolerant mangrove systems.

Biscayne Bay in conjunction with Barnes and Card sounds serve as the principal eastern outlet of Everglades flow into the Florida Straits. Historically, the bay received significant freshwater input from the greater Everglades system. The water that Biscayne Bay received prior to the mid-20th century was clear and low in particulates because it

had been filtered through freshwater marshes. There was also considerable groundwater flow into Biscayne Bay as the water pressure in interior marshes drove subsurface flows eastward from the Everglades.

Agricultural uses began to dominate the region in the early part of the 20th century, and then were gradually replaced by urban uses during the latter half of the century as populations in the greater Miami region grew at unprecedented rates. To promote both agricultural and urban uses, massive water diversion and drainage projects were undertaken in south Florida to alleviate flooding in areas that had once been sloughs and freshwater marshes. These areas were then developed.

Major drainage and canal projects that took shape under the auspices of the Central and Southern Florida Project for Flood Control (known as the C&SF project), passed by the U.S. Congress in 1948, fundamentally transformed the natural hydrology of the region. They altered the volume, distribution, and timing of

Massive water diversion and drainage projects transformed the natural hydrology of the region.



freshwater inputs into Biscayne Bay; resulted in significant changes in benthic and coastal habitats, as well as changes to the estuarine system toward a marine community structure; and allowed for saltwater intrusion of the Biscayne aquifer, the potable water supply for all of southeast Florida. The C&SF project degraded water quality; forced an approximate 6-foot drop in the water table; and increased turbidity of water flowing toward the bay.

Modifications to Biscayne Bay itself, especially the northern portions of the bay closest to Miami, also contributed to problems. Modifications included the construction of two artificial inlets; dredging of the bay bottom by up to 40 feet; the construction of many artificial islands and causeways; the construction of the Intracoastal Waterway, an 8-foot-deep and 75-foot-wide channel that was dredged from north to south to allow ships to pass through the bay; and the destruction of coastal wetlands bordering the bay. For example, 80 hectares of mangrove forest in southern Key Biscayne were destroyed for developments that later failed. In addition to these modifications, raw sewage was dumped directly into the bay from the 1930s until the late 1940s.

Development next to the park threatens resources. Establishing a buffer between the park and adjacent development would help mitigate these threats.

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Continued alteration of the bay environment came with a price. Bay waters and sediments were contaminated by agricultural runoff and sewage, and during the 1990s scientists found a correlation between fish deformities and concentrations of hydrocarbon pollutants in the bay. Pollution hotspots were noted around canals or creek inputs into the bay: Biscayne Canal, Arch Creek, Little River, Miami River, and Black Creek, all in the northern bay except for Black Creek, which drains directly into park waters.

#### CONTEMPORARY ADJACENT LAND USE—RESOURCE STABILITY FURTHER THREATENED

A complex matrix of urban, agricultural, and natural areas surrounds Biscayne National Park. The highly developed urban and industrial areas of Miami shift to a mixture of agricultural and suburban developments just south of the city, while undeveloped coastal wetlands dominate even farther south.

Populations in south Florida have exploded in the last century, especially in Miami-Dade County. In 1900, fewer than 5,000 people lived in the county; the population is projected to reach nearly three million people by 2020. The population of Homestead/Florida City, which borders Biscayne National Park, is expected to top more than 50,000 by 2008, nearly double the population recorded in the 2000 census.

Increased population growth further strains the limited freshwater supply; generates more water and air pollution; and decreases groundwater recharge because of impenetrable surfaces such as buildings, roads, and parking lots.

Adjacent land use plays an important role in the quantity and quality of waters entering Biscayne Bay. In general, stream flows from urban areas occur more rapidly and over a shorter period of time than flows from vegetated or wetland areas, leading to “flashier” systems with pulsed surface water inputs and reduced groundwater inputs. Overland water

*continued on page 14*



## PROJECTS AIMED AT RESTORING SOUTH FLORIDA'S ECOSYSTEMS

A variety of restoration projects are planned for south Florida and Biscayne National Park. The Comprehensive Everglades Restoration Plan (CERP) is the regional program designed to restore south Florida's ecosystem while providing flood control and water supply services to an expanding human population. Currently, the projects that will benefit Biscayne Bay are all suffering from decreased funding in conjunction with increased costs.

Although not yet approved, the Biscayne Bay Coastal Wetlands Project (BBCW) is one of 68 planned CERP projects. The BBCW Project encompasses 5,500 hectares (13,600 acres), including the park's entire mainland, and is designed to restore estuarine function and provide habitat for fish and wildlife in the bay by redistributing water flow. Specific objectives include re-establishing the oyster reef community and productive nursery habitat for the many fish, shellfish, and crustaceans that rely on the bay, as well as reconnecting the estuarine wetlands to the adjacent freshwater wetlands. The project will divert canal flow through coastal marshes and creeks, which should help re-establish productive nursery habitat along the shoreline, re-establish a stable persistent estuarine zone, and reduce the abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in the bay near canal outlets.

While the BBCW Project aims to provide better storage to attenuate flows to Biscayne National Park and Biscayne Bay by increasing wetland habitat, other CERP projects aim to restore the historic quantity of water delivered to the bay. Two of these, the Wastewater Reuse and the Lake Belt Reservoir projects, are based upon minimally tested and uncertain technologies.



ELIZABETH MEYERS

Although both projects have associated pilot projects, only the Lake Belt Reservoir is currently authorized in order to determine the feasibility of using the technologies on a larger scale. The Wastewater Reuse pilot project has been identified as the only source of additional water for the bay, but the project has not been funded and is not recommended for funding until 2012.

In addition to coastal wetland restoration projects, Biscayne National Park is currently developing two Programmatic Restoration Plan/Programmatic Environmental Impact Statement (RP/PEIS) documents to address coral reef and seagrass restoration in the park. These plans will aid managers in fulfilling the park's purpose of preserving and protecting seagrasses and coral reefs by helping staff determine when restoration is needed, identifying a range of restoration methods and techniques, and guiding selection of the most appropriate methods.

Projects aim to restore estuarine function and provide habitat for fish and and wildlife in Biscayne Bay.

## BISCAYNE'S FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

### Endangered

Green sea turtle (*Chelonia mydas*)  
Hawksbill sea turtle (*Eretmochelys imbricata*)  
West Indian manatee (*Trichechus manatus*)  
American crocodile (*Crocodylus acutus*)  
Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*)  
Smalltooth sawfish (*Pristis pectinata*)  
Key Largo cotton mouse (*Peromyscus gossypinus allapaticola*)  
Wood stork (*Mycteria americana*)  
Least tern (*Sterna antillarum*)  
Beach jacquemontia (*Jacquemontia reclinata*)  
Johnson's seagrass (*Halophila johnsoni*)

### Threatened

Loggerhead sea turtle (*Caretta caretta*)  
Piping plover (*Charadrius melodus*)  
Eastern indigo snake (*Drymarchon corias couperi*)  
Bald eagle (*Haliaeetus leucocephalus*)  
American alligator (*Alligator mississippiensis*)

### Candidate

Staghorn coral (*Acropora cervicornus*)  
Elkhorn coral (*Acropora palmata*)  
Florida semaphore cactus (*Consolea corallicola*)

flows into Biscayne Bay have been virtually eliminated in the northern bay, but are still prevalent in the extant coastal wetlands bordering the southern bay.

Urban and industrial complexes in the northern bay contaminate freshwater sources with chemicals and sewage. Agricultural lands, which comprise about 8 percent of Miami-Dade County and border the park and parts of Biscayne Bay, contaminate bay waters with nutrients and pesticides. The South Miami-Dade Landfill at Black Point on the bay is a known source of contaminants, and litigation is pending involving contamination from the South Miami-Dade sewage treatment plant adjacent to the landfill.

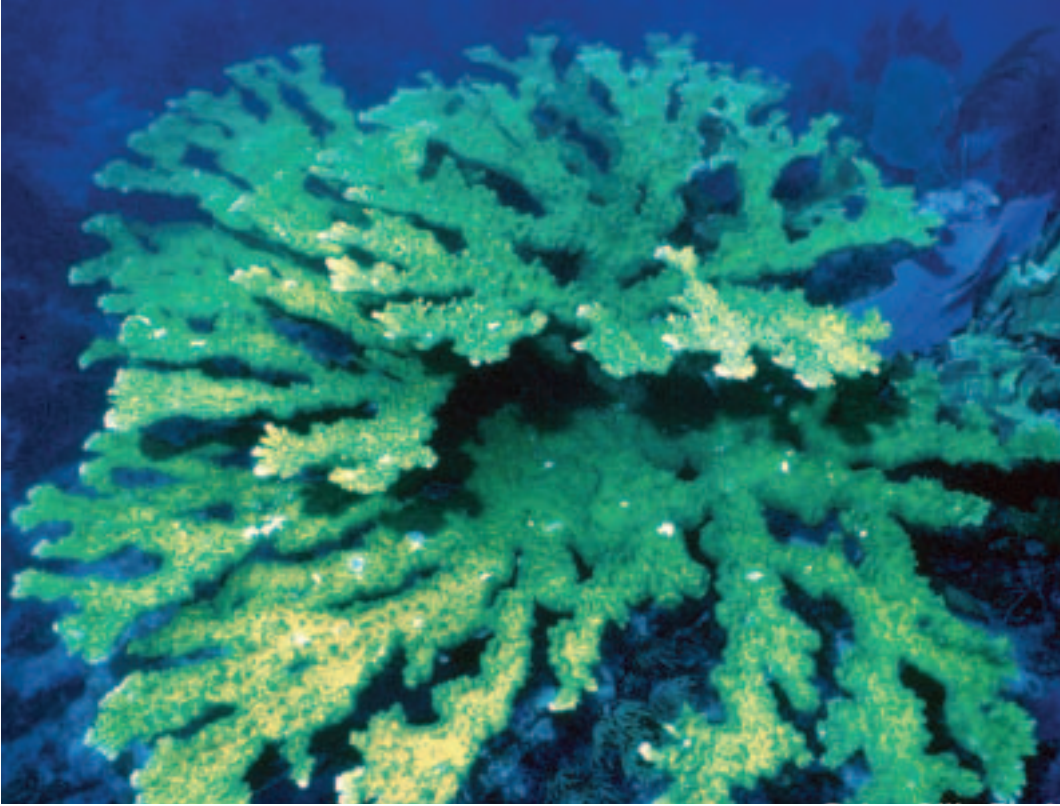
Increased adjacent development has long been identified as a threat to Biscayne National Park. Establishing a buffer between the park and adjacent development would help mitigate these threats, but funds to support land acquisition have never been allocated.

Within the past decade, state and local officials have initiated land acquisition programs: the Florida Save Our Rivers (SOR) Program and Miami-Dade County's Environmentally Endangered Lands (EEL) Program. These programs have identified lands adjacent to the park boundary as environmentally important lands to acquire. With the inception of CERP, the funds set aside to purchase these previously identified parcels have been redirected to support the Biscayne Bay Coastal Wetlands project, a CERP project that recommends purchasing many of the same areas affecting Biscayne National Park. With the recent erosion of CERP funding, this project is now being downsized to fit the reduced budget rather than the restoration project that is needed to meet the protection and preservation goals identified by multiple agencies under the Biscayne Bay Coastal Wetlands Project and the original SOR and EEL land acquisition projects.



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All corals in Biscayne are included on state or federal protection lists.

#### NATIVE SPECIES—BIODIVERSITY AT RISK FROM INTRODUCED SPECIES

Biscayne National Park is renowned for harboring many commercially and recreationally important fish and shellfish, and for providing nursery grounds for many coral reef species. The park is home to at least 325 fish and macro-invertebrate, 200 bird, about 30 mammal and reptile, and six amphibian species.

Biscayne Bay and the coastal wetlands and uplands that surround it also provide critical habitat for more than 172 species of concern—species that are included on at least one state or federal protection list. All coral species are either state or federally listed. In Biscayne National Park, there are at least 16 federally endangered or threatened species and an additional three species are candidates for listing.

More than 450 plant species live in the park, but 130 of them are non-native. Of these, 14 are listed on the Florida Exotic Pest Council's list of most invasive species, including: Brazilian pep-

per (*Schinus terebinthifolius*), Australian pine (*Casuarina equisetifolia*), sisal hemp (*Agave sisalana*) and seaside mahoe (*Thespesia populnea*). The Park Service has partnered with the Florida Department of Environmental Protection to fight these four highly invasive species; other non-native invaders still persist.

There have been no quantitative surveys of non-native freshwater fish species in the creeks and canals that enter Biscayne National Park, though there have been a few qualitative distribution studies. A group of six non-native Mayan cichlids (*Cichlasoma urophthalmus*) was observed in 2001, and one individual was caught in a seine by park staff in 2004. The Mayan cichlid has the potential to disrupt native aquatic communities, particularly through competition and predation. Additional surveys are needed to determine what other non-native fish are present in the park and if any pose threats to native species.



Mangroves, which grow along the shoreline, shelter fish and other wildlife.

#### COASTAL WETLANDS—HABITAT CHANGES AND BIODIVERSITY LOSSES AFFECT MANGROVE COMMUNITIES

Biscayne's coastal wetland communities represent one of the few remaining tracts of coastal wetlands in southeastern Florida. Disturbance of the region's natural hydrological cycle has altered the park's wetlands from their natural condition, but restoration of some of their natural structure and function might be possible.

When Biscayne National Monument was established in 1968, coastal wetlands had been extensively altered during attempts to convert them into agricultural lands and to regulate flooding and mosquito populations. Before the area was artificially drained, freshwater marshes dominated by sawgrass (*Cladium jamaicense* Cranz) are believed to have extended nearly to the coast of Biscayne Bay, separated from it in some places by a narrow fringe of mangrove forest. A series of canals and ditches built through the coastal

wetlands changed freshwater flows from the Everglades into Biscayne Bay and affected water exchanges between freshwater and saline wetlands. As a result, coastal wetlands changed: salt-tolerant species, especially mangroves, have expanded inland, encroaching on freshwater marshes. Currently, the western movement of saltwater is bounded by the L-31E levee, the storm surge levee. The freshwater wetlands that once existed east of the levee have been replaced by mangrove communities, and the areas west are isolated by the levee and owned by private individuals. In addition, private individuals also own the area between the levee and the park.

Although it is not possible to know in detail what the pre-disturbance coastal wetlands were like, it is evident that the wetlands of today differ greatly from their pre-drainage state. Freshwater marshes, which by 1940 had been degraded relative to 1928 aerial photographs, are now in even worse condition. The remaining freshwater marsh has retreated inland, and tidal creeks that provided habitat for various woody species and tall mangrove forests have been filled or disturbed and now support non-native trees and mangroves, removing nursery habitat for fish and other organisms. Tidal flows now penetrate the interior much less often and are limited by the eastern levee system. The connections between the saltwater and freshwater systems are necessarily bounded by the L-31E levee. The technology exists to allow for positive freshwater and nutrient flow into the bay without permitting saltwater movement inland.

Changes in vegetation have resulted in changes in both terrestrial and marine wildlife communities. Before drainage projects disrupted freshwater flows, coastal wetlands bordering Biscayne Bay likely served as foraging habitat for wading birds like roseate spoonbills (*Ajaia ajaia*). American alligators (*Alligator mississippiensis*) also might have used the tidal creeks and surrounding marshes of Biscayne Bay before

they were altered. Crocodiles and some coastal bird rookeries were much more prevalent. Loss of the connection between the freshwater wetlands and Biscayne Bay has resulted in decreased wading bird habitat, decreased forage fish habitat for game fish, decreased juvenile fish habitat, and a serious disruption of the ecosystem related to the loss of wetlands and the need for drainage that results in severe changes in salinity over short time frames.

Mangrove-lined shores shelter juvenile and subadult gray snapper, schoolmaster snapper (*Lutjanus apodus*), and great barracuda (*Sphyraena barracuda*). These animals are sensitive to the serious changes in salinity that range from hypersaline to freshwater in a matter of hours, while overall high salinity persists well into the wet season. Loss of mangroves in some northern parts of Biscayne Bay, loss of freshwater wetlands, and salinity alterations have resulted in a loss of habitat for these species.

Protecting the lands to the west of Biscayne National Park from development and reconnecting them to the park and the bay would benefit the natural communities through improved habitat while benefiting the human population by preventing development in the area listed by Miami-Dade County emergency management as a high hazard zone because of storm surge and flooding potential.

### CORAL REEFS—DIVERSE, COMPLEX ECOSYSTEMS AT RISK

Coral reefs are among the most diverse and complex ecosystems in the world. They are often considered the rainforests of the oceans, harboring a wealth of biodiversity and natural chemicals, which may have importance for human health. While coral reefs cover just 0.2 percent of the oceans' area, they are estimated to provide habitat for 33 percent of all marine fish species and countless other species. They house a complex community of organisms; support economically important fisheries; attract tourism dollars for the diving, fishing,

### MANATEES—HUMAN ACTIVITIES THREATEN THESE GENTLE MARINE GIANTS

The West Indian manatee is one of Biscayne National Park's most endangered species. These docile, bewhiskered marine mammals live in the shallow coastal waters of Florida and neighboring states, and are also found in some freshwater rivers and streams. They are herbivorous, feeding regularly on seagrass and other submerged vegetation, and grow to be about nine to ten feet long and weigh about 1,000 pounds.

Human activities pose the greatest threats to these animals. Collisions with boat hulls and propellers can injure or kill manatees; the incidence of propeller scarring is so high that researchers use the scars to identify individuals. Manatees are also injured or killed in water control floodgates and by fishing gear. Habitat destruction is another key threat to the species.

Manatees are protected under the Marine Mammal Protection Act (1972), the Endangered Species Act (1973), and the Florida Marine Sanctuary Act (1978). A variety of state, federal, and private agencies and organizations work to protect manatees and their habitat. Creating sanctuaries and other protected areas, enforcing reduced boat speeds in known areas of manatee use, and educating the public about manatees and how to protect them are important conservation efforts.

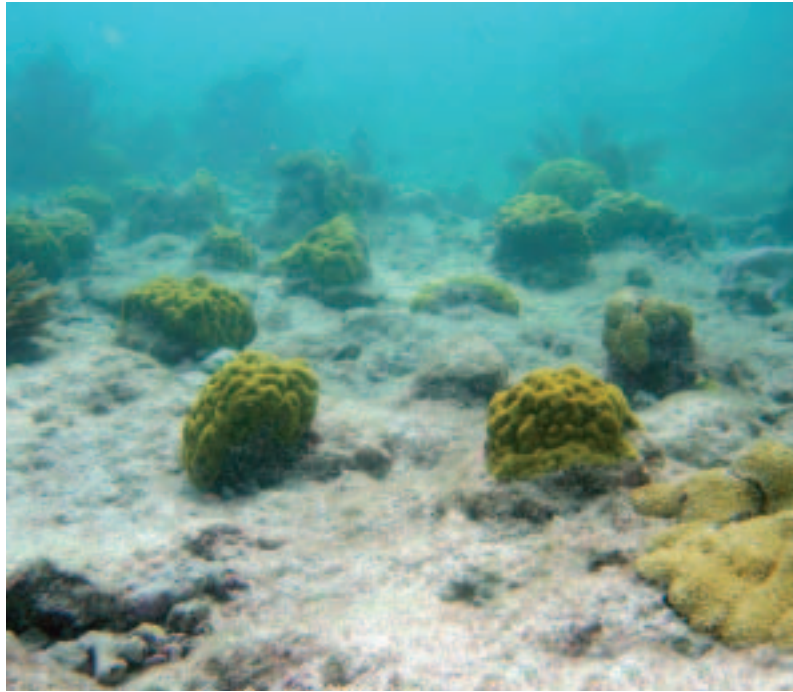
When traveling in manatee habitat, it is critical to:

- Obey all posted speed limits
- Use caution when traveling in shallow waters
- Wear polarized sunglasses to help spot submerged manatees and other wildlife such as sea turtles



GAYLEN RATHBURN / US FISH AND WILDLIFE SERVICE





Corals are reattached to reefs damaged by vessel groundings.

and boating industries; and protect shorelines from erosion.

The Florida Reef Tract extends from Fowey Rocks on the northern boundary of Biscayne National Park to Loggerhead Reef on the western boundary of Dry Tortugas National Park. Coral reefs cover about half of Biscayne National Park and are composed of a complex assortment of approximately four thousand patch reefs.

Of the different ecosystems found in Biscayne National Park, reefs are the most threatened by known and unknown human-caused pressures, and their functional processes are the least understood. Several interacting factors have prompted scientists to label this ecologically, economically, and aesthetically unique system an “ecosystem at risk.” Florida reefs are located near the northernmost limit of reef development and adjacent to a large and rapidly growing urban center, making this system especially vulnerable to coral disturbances like eutrophication, sedimentation, and pollution commonly associated with coastal development. Southeast Florida has considerable industrial and agricultural activities that pollute nearshore waters, and addi-

tional pressures on reefs come from extensive recreational and commercial fishing and careless boating activities.

A decline in reef health in southeastern Florida and the Florida Keys is well documented by various studies. Live coral cover in the Florida Keys National Marine Sanctuary decreased by 38 percent from 1996 to 1999, and observations of coral disease increased. Over the past several decades, coverage and species abundance on coral reefs within Biscayne National Park and the south Florida Reef Tract has also declined. Coral cover was measured in the early 1980s on transitional bank-barrier and patch reefs in the park at 29 percent and 26 percent, respectively. Nearly two decades later, coral cover was 11 percent on transitional bank-barrier reefs and 17 percent on patch reefs in the park. From 1989 to 1991, both bank-barrier and patch reefs in Biscayne National Park also experienced a decline in coral diversity (number of species) of between 13 and 29 percent.

Loss of the coral reef ecosystem, or major components of the coral reef community, will have a cascading effect on mangrove, seagrass, and hardbottom ecosystems found in the park because they are all highly interconnected and interdependent.

Overfishing is the greatest direct threat to the coral reefs in Biscayne National Park, and has dramatically altered reef fish populations throughout the Florida Keys. Pressure comes not only from commercial fishing, which is allowed in Biscayne National Park according to the park’s enabling legislation, but also from recreational fishing in south Florida, which has grown exponentially since 1964, with no limits on the number of boats allowed to fish. Overfishing not only affects the size of harvestable stocks but also can lead to major shifts in community structure, both of fish species and reef communities as a whole. Overfishing can lead to short-term losses in biodiversity—the loss of species with critical



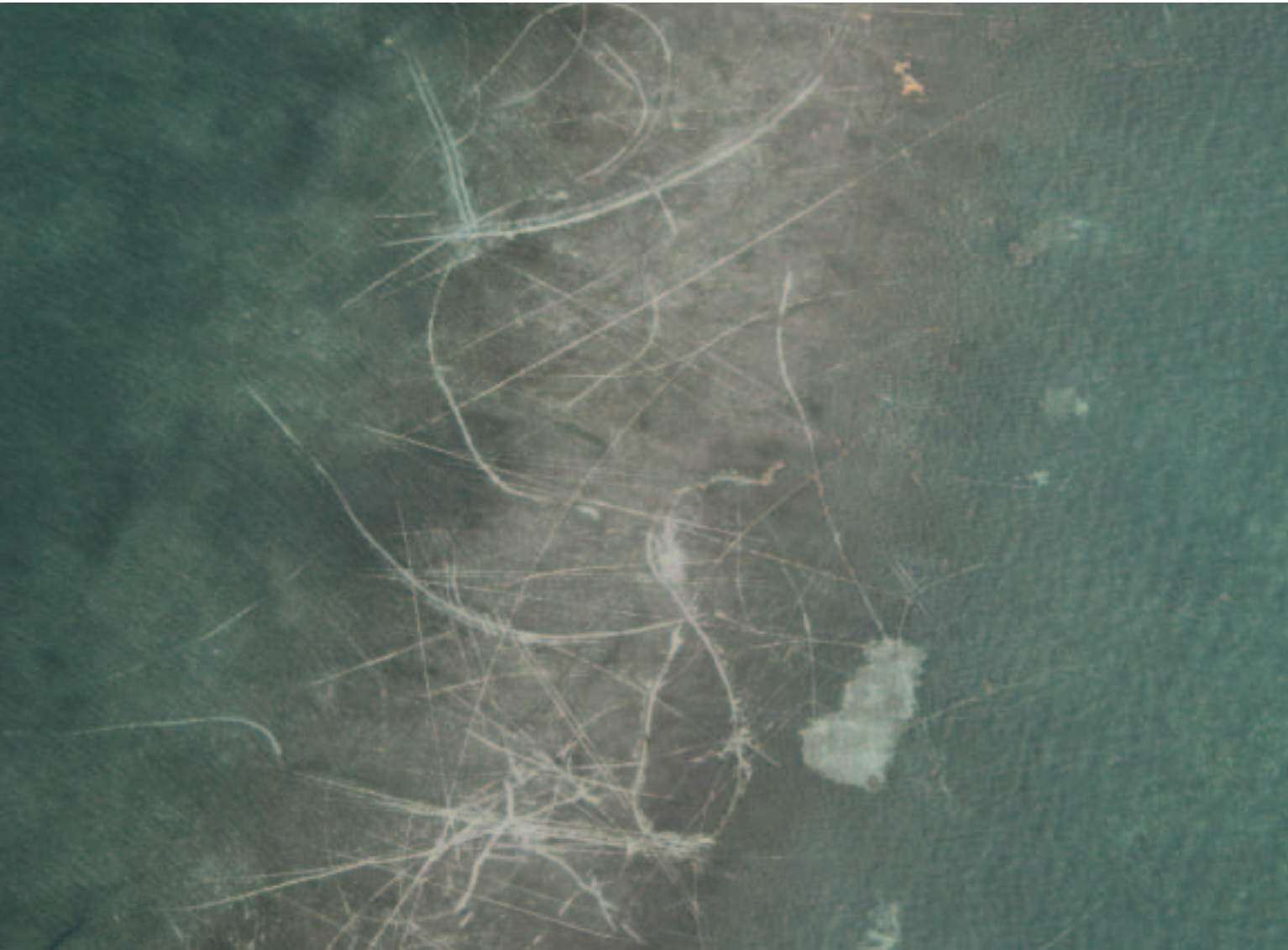
roles in the ecosystem—and may also lower the resilience of the reef to other threats. Specific ecological services provided by the reef ecosystem can also be affected: aesthetic quality, shoreline protection, fisheries production, and carbonate production.

Protection of Biscayne’s coral reef fisheries resources is essential to the long-term health of the reefs and recreational activities such as snorkeling and diving that depend on healthy reefs. Several, mostly very small, no-take zones—areas where harvesting fish is prohibited—have been established in the Florida Keys National Marine Sanctuary to conserve dwindling fish stocks, and early results show improvements. However, to date, the National Park Service has not set aside any no-take reserves within Biscayne National Park.

Vessels that run aground also damage these fragile systems. At Biscayne National Park, there have been five major coral reef groundings since 1980. About 200 groundings—where vessels are stuck on the reef or in the shallows long enough to be observed or to require commercial assistance to get off—are reported annually. Ten percent of these documented groundings occur on reefs, in addition to an unknown number of undocumented reef groundings each year. Each of these smaller groundings damages between five and 150 square meters of reef, usually requiring rehabilitative action to stabilize broken coral colonies, salvage coral fragments, and limit further damage.

Park staff try to reach as many visitors as possible to educate them about avoiding reefs and groundings, but with so few staff and so many

Prop scars mar sea-grass beds throughout Florida’s waters, and damaged sea-grasses can take years to recover.





When a vessel runs aground in a seagrass bed, the propellers cut or uproot seagrasses, leaving a "scar."

visitors and potential access points, this is a challenging task. Developing and maintaining a navigational aids program to warn boaters of shallow waters and other hazards would help decrease the number of groundings.

Diseases, increasing levels of greenhouse gases in the atmosphere, and rising sea surface temperatures also affect coral reef health.

#### SEAGRASSES—COMMUNITIES ARE PREDOMINANTLY HEALTHY YET FRAGILE

The seagrass communities of Biscayne Bay serve many important functions, including: providing habitat and food to commercially and recreationally important fish and shellfish and threatened and endangered species; acting as nutrient and sediment traps; and stabilizing the bottom substrate. Among myriad other species, seagrass communities support pink shrimp (*Penaeus duorarum*), spiny lobster (*Panulirus argus*), blue crab (*Callinectes sapidus*), spotted sea trout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellata*), snook (*Centropomus undecimalis*), and gray snapper (*Lutjanus griseus*).

Biscayne Bay is an important refuge for juvenile spiny lobster, and a large portion of the bay is designated as a lobster sanctuary. The West

Indian manatee, listed as an endangered species in 1967, lives in the bay and feeds on aquatic plants such as manatee grass. Although few sea turtles nest within Biscayne National Park compared with areas north or south of the park, the animals are commonly seen feeding in seagrass meadows, a critical habitat between the reefs and in Biscayne Bay.

Seagrass communities of the Biscayne Bay and Florida Bay systems together cover an estimated 550,000 hectares of southern coastal Florida and form one of the largest seagrass systems in the world. The major seagrass species in Biscayne Bay—turtlegrass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), and manatee grass (*Syringodium filiforme*)—together cover 64 percent of the total area of the bay. Widgeon grass (*Ruppia maritima*) occurs in the mouths of canals and rivers where salinity is lower, and Johnson's seagrass (*Halophila johnsoni*) is found in small patches in central Biscayne Bay, its southern limit along the Atlantic Coast in Florida. Johnson's seagrass was first recognized as a separate species in 1980 and has been federally protected since 1998 under the Endangered Species Act.

Seagrass habitat in Biscayne Bay is most extensive in the central bay, where 75 percent of the bottom is rooted vascular vegetation, and least extensive outside Biscayne National Park in the northern bay, where human activities have altered the environment so extensively that normal seagrass communities are not observed north of the Port of Miami.

Seagrass communities are affected by degraded water quality, turbidity, salinity changes, water temperature changes, interruption of overland flow of freshwater to the wetland fringe, unnatural amounts and timing of freshwater releases from canals, propeller scarring, and destruction or perturbation of coastal wetlands.

Boating impacts are the most common and pervasive form of physical damage to seagrasses, especially in the populated areas of northern Biscayne Bay but also within Biscayne National

Park. In Biscayne Bay, the concentration of boating activities in small areas of the northern and central bays has led to local areas of moderate to severe prop scarring.

When a vessel runs aground in a seagrass bed, the propellers normally cut or uproot seagrasses, leaving a "scar." The damage can take 15 years or more to recover, and in areas of high currents, the seagrass may never grow back. Of the 200 documented groundings in the park each year, about 90 percent occur in shallows that are often covered by seagrass. Damage in Biscayne Bay is concentrated in the northern bay near Miami where recreational boat traffic is dense, and in the central bay in popular fishing and high traffic areas that have complicated and/or shallow depth and topography and near cuts providing access between bay and ocean waters.

Localized water temperature changes also affect seagrasses. Turtlegrass, like most marine organisms, cannot survive in waters that are warmer than about 35 degrees Celsius (95 F). A 50 percent decline in density of turtlegrass was measured when summer water temperatures were 3 to 4 degrees above the ambient temperature of 30 degrees Celsius. In the late 1960s, thermal pollution from the Florida Power and Light Turkey Point Power Plant raised water temperatures by as much as 6 degrees Celsius and caused seagrasses around cooling canal outflows to die.

Human activities in the Biscayne Bay watershed and in the bay itself have led to a decline in water quality that has affected seagrass distribution. Through the 1990s and more recently, continued efforts to improve water quality in the Biscayne watershed have been successful. Despite urbanization and other development in north Biscayne Bay, water quality in much of the remainder of the estuary is good. Since controls on direct discharge and sewage outfalls were implemented in the latter half of the 20th century, the seagrass community within Biscayne National Park is in generally good condition.

### TROPICAL HARDWOOD HAMMOCKS— RARE PLANT SPECIES TAKE REFUGE IN THESE UNIQUE HABITATS

Biscayne National Park encompasses 42 islands, which occur as a narrow chain about eight to 14 kilometers east of the mainland shoreline on the eastern side of Biscayne Bay. A few large, elevated islands provide habitat for upland hardwood forests.

Elliott Key, at 13 kilometers long and less than a kilometer wide (668 hectares), is the park's largest island and part of the Florida Keys, which extend in a 210-kilometer-long chain south to Key West. Biscayne National Park's other large islands include: Old Rhodes Key (259 hectares), Sands Key (169 hectares), Totten Key (154 hectares), and Little Totten Key (80 hectares). These islands, which are all part of the extensive Florida Keys system, support small, but critically important, hardwood forests that together cover about 40.5 hectares and support several rare and endangered species.

Biscayne National Park's hardwood ham-



BRETT SEYMOUR/SUBMERGED RESOURCES CENTER

Hardwood hammocks provide habitats for the rare semaphore prickly pear cactus.



Much of the hardwood hammock habitat of Elliott Key was destroyed to grow pineapples, which were favorite treats in northern markets.



HISTORICAL ASSOCIATION OF SOUTHERN FLORIDA



U.S. FISH AND WILDLIFE SERVICE

The park's hardwood hammocks provide habitat for the Schaus swallowtail butterfly, federally listed as endangered.

mocks provide essential habitat for the buccaneer palm (*Pseudophoenix sargentii*) and the semaphore prickly pear cactus, both rare plant species; the Schaus swallowtail, a federally listed butterfly; and the federally listed threatened eastern indigo snake (*Drymarchon corais couperi*).

Within the United States, the tropical ham-

mocks of Biscayne's islands represent an ecosystem type that is found only in south Florida. In fact, the park's forests, because they grow on Key Largo Limestone, represent a distinctive subset of this forested ecosystem that is found in an even more limited area. Biscayne National Park and nearby Key Largo contain the principal remaining areas of this forest type that are secure from the rampant development that has transformed south Florida. Very little if any of the coastal tropical forests have escaped human disturbance and all have been susceptible to alteration.

Since the late 19th century and continuing until establishment of Biscayne National Monument in 1968, humans have altered the forest habitats on the islands, particularly Elliott Key. A pineapple plantation was already established by 1886 and much of the hammock was cut and burned for pineapple and lime farms by the turn of the 20th century. By 1920, farming and collecting for ornamental plantings drove the rare buccaneer palm to near extirpation on Elliott Key.

Elliott Key and Sand Key were slated for resi-

dential and highway developments in 1960 when they still were privately owned. In 1968, park opponents used a bulldozer to widen an existing road down the middle of Elliott Key to 125 feet, removing 49 hectares of hardwood hammock, including a buccaneer palm grove, in the process. Though the park's hardwood hammocks are protected today, they are still threatened by invasive, non-native species.

#### MARINE FISHES—HABITAT DEGRADATION AND OVERFISHING THREATEN POPULATIONS

Fishing is a widespread and economically important activity in south Florida. Many people visit the state's coastal national parks to fish or to dive or snorkel to see fish and other marine species. In addition to recreational fishing, commercial fishing is also allowed in Biscayne National Park. Commercial fishers capitalize on the variety of valuable species that inhabit park waters. In fact, the park and surrounding parts of Biscayne Bay contain important nursery grounds for a number of recreationally and commercially important fish species. Habitat degradation and overfishing threaten fish populations and could damage both recreational and commercial fishing industries in the park and the rest of the bay.

The most recent comprehensive assessment of the fishery resources of Biscayne National Park, completed in 2001, was based on data obtained from three principal sources: 1) surveys of recreational anglers, 2) reef-fish visual census conducted by the National Oceanic and Atmospheric Administration and the University of Miami, and 3) rollerframe trawl surveys conducted by the University of Miami. A total of 325 fish and macroinvertebrate species were found to occur in Biscayne National Park after compilation of these data sources.

Biscayne National Park has been directly and indirectly subjected to significant physical alterations, which have greatly affected the quality of

fish habitats and detrimentally affected fishery resources. Canals and oceanic passes have altered the salinity of the area, resulting in loss of the brackish habitats that estuarine fishes such as the red drum require. This species used to be abundant in areas now within the boundaries of the park, but they became rare by the 1950s because of habitat changes. Attempts to restock them in the park failed.

Red grouper (*Epinephelus morio*), gray snapper, and other species also depend on habitats found within Biscayne National Park. During their early life stages, they depend on the mangrove and seagrass environments within the eastern bay in the park, and far fewer juveniles occur outside of Biscayne Bay. In fact, Florida and Biscayne bays appear to be the primary nursery habitats for gray snapper in south Florida.

In addition to habitat changes, overfishing affects red grouper, gray snapper, and other important fish species. In 2003, the National Marine Fisheries Service declared red grouper and several other species to be overfished. A study in 2001 that used data for 35 reef fish species from three families (*Serranidae*, *Lutjanidae*, and *Haemulidae*) collected in Biscayne National Park showed that populations of these species were under heavy fishing pressure. As evidence, the average length of legal-sized fish was usually at or near the minimum legal catch size. More important was the finding that suggests 27 of the 35 species were overfished with respect to size and maturity; 13 of these species can be legally taken at sizes that are below their size of sexual maturity, indicating that individuals may be harvested before they can replenish populations. Survey data also indicated that, at least for some species, a high proportion of the recreational catch was under the legal catch size.

Many experts agree that the only way to achieve successful recovery of some overfished species is to set aside no-take zones where harvesting fish is prohibited. Biscayne National

Habitat changes and overfishing affect gray snapper and other species.



FLORIDA KEYS NATIONAL MARINE SANCTUARY

Park does not currently contain any no-take zones. Managing fish populations on an ecosystem-wide scale is also critical, as many species migrate between the park and waters outside park boundaries.

Pollution presents another potential problem for Biscayne National Park's fish. Within the bay portion of the park, surveys have documented a number of fish with external abnormalities such as stunted or missing fin rays, scale abnormalities, depressions in the dorsal profile, and jaw deformities. Abnormalities were particularly evident in gray snappers. Anomalous growth patterns were also seen in shrimp and crabs caught in and around canal discharges. Researchers

found a significant relationship between the prevalence of fish deformities and the historical concentrations of hydrocarbon pollutants occurring in the sediments of Biscayne Bay. These pollutants come from a variety of sources, including automobile exhaust, power plant emissions, and agricultural runoff. Some of the deformities may be caused by injuries from fishing gear, but research has not been done to identify the specific causes.

#### SHRIMP TRAWLING—BYCATCH AND HABITAT DAMAGE RESULT

Commercial shrimping is allowed in Biscayne National Park, but this activity affects non-target

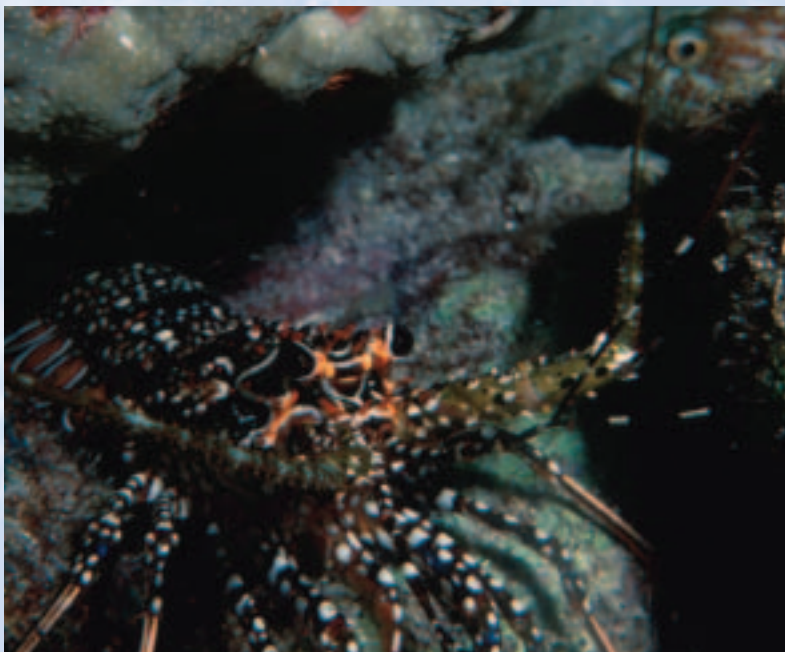


## SPINY LOBSTERS: ECOLOGICALLY, ECONOMICALLY, AND RECREATIONALLY IMPORTANT SPECIES

The Caribbean spiny lobster (*Panulirus argus*) is a species of special concern in south Florida because of its economic importance. Since 1986, spiny lobster has consistently ranked as the first or second most valuable commercial fishery in Florida, alternating with pink shrimp. The annual dockside value of the commercial lobster fishery in Florida now fluctuates between \$20 and \$30 million, which does not include ancillary economic benefits (i.e., “multiplier effects”) such as the value of the large recreational sport diving fishery for lobster. Each year, more than 150,000 people purchase permits to recreationally fish for lobster in south Florida, accounting for about 20 percent of the total recorded catch.

Ecologically, spiny lobster is an important component of the south Florida marine ecosystem for several reasons. It is a locally abundant, large benthic predator of a variety of gastropods, bivalves, crustaceans, echinoderms, and small fishes. Juvenile lobsters provide food for some important fishery species and a variety of large predators such as sharks and rays. Lobsters are thus an integral component of the trophic structure in south Florida, both as predators and prey.

The Caribbean spiny lobster is a tropical, marine species that tolerates neither estuarine conditions nor cold waters. Within the continental United States, these animals persist in large numbers only off the south coast of Florida, although small, inconsistent populations occur on rocky reefs within the Gulf Stream’s influence off the coasts of Georgia, South Carolina, and North Carolina. By far the largest adult populations of spiny lobster and the only nursery areas for the species occur in south Florida, including Biscayne



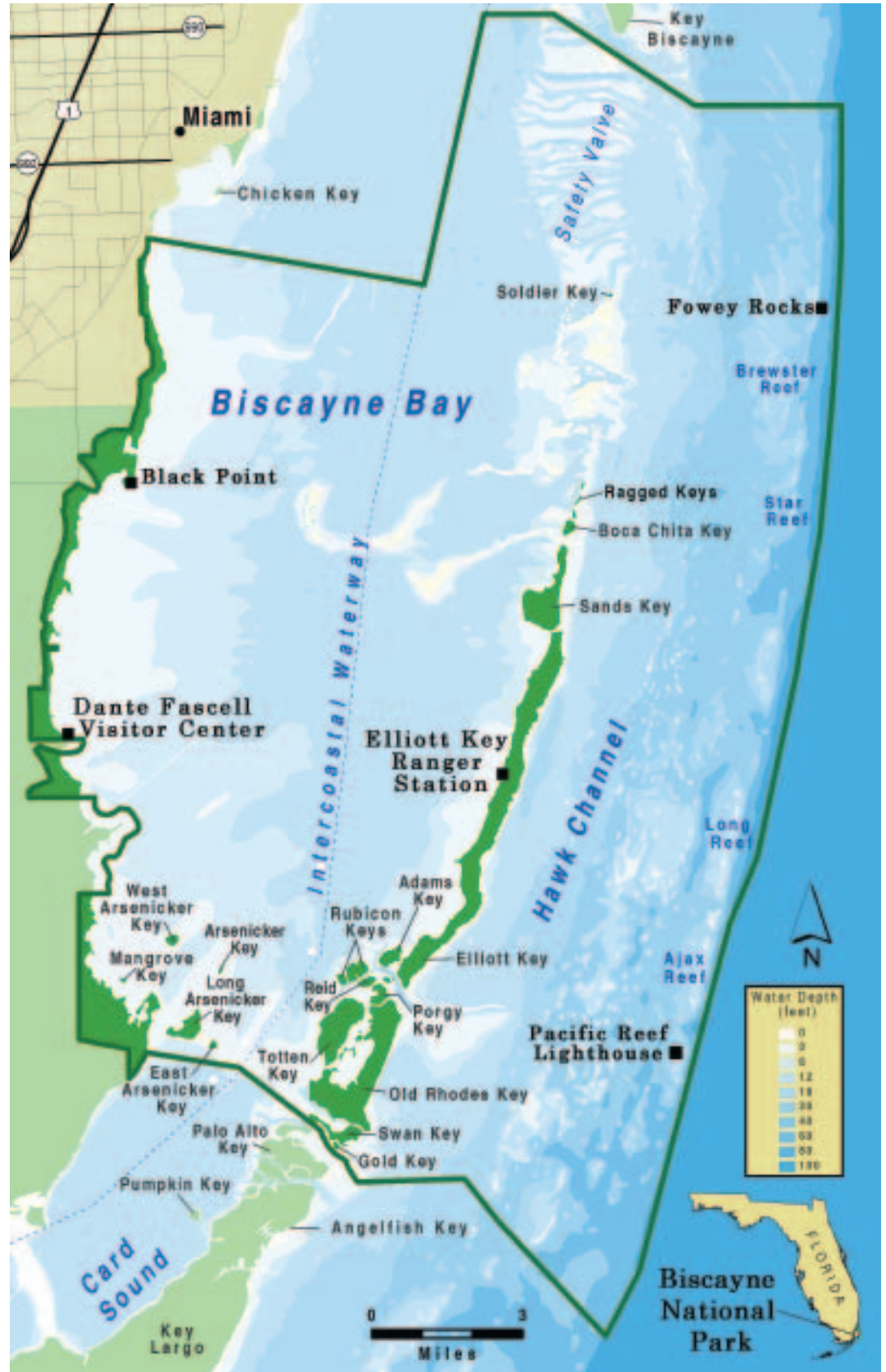
PAIGE GILL/FLORIDA KEYS NATIONAL MARINE SANCTUARY

National Park. Surveys of juvenile lobster in the park indicate that they are most abundant in eastern and central Biscayne Bay where their nursery habitat—hard-bottom and seagrass with ample stands of bushy, red macroalgae—is most abundant. Adult lobsters are found primarily on the oceanside portion of Biscayne National Park, to the east of the fringing keys.

Diminished water quality (i.e., eutrophication and chemical contaminants), altered salinity, and nursery habitat change are the gravest threats to the persistence of lobsters in Biscayne National Park. Other threats include: commercial shrimping activities, hurricanes, and climate change. Salinity changes that occur as a result of the region’s altered hydrology can make existing juvenile habitats unusable and are a stressor to larger lobsters. Salinities that fall outside preferred ranges may also promote the PaV1 virus, a deadly disease that is already widespread in south Florida.

Spiny lobsters are threatened by altered salinity, nursery habitat change, commercial shrimping activities, hurricanes, and climate change.

BISCAYNE  
NATIONAL  
PARK







Roller frame trawlers damage hardbottom fish habitat in the park, and lobsters and federally listed threatened and endangered species such as sea turtles can get caught in shrimp trawls.

species and causes habitat damage. A 1969 report on the effects of inshore commercial fishing activities within Biscayne National Monument concluded that the loss of fish as bycatch of the shrimp fishery was very low, and it was recommended that the bait shrimp fishery be allowed to continue. Bycatch is the term used to describe non-target species that are captured in addition to target species.

Findings from a 1985 assessment of the Biscayne Bay bait shrimp fishery disagree with the 1969 report. The more recent study generated a list of juvenile gamefishes captured and discarded as bycatch of the shrimp fishery that included 27 recreationally important fishes. Gray snapper was listed among the five species of fishes that dominated the bait shrimp bycatch. The researchers stated that juvenile fish mortality because of capture and handling was generally unknown but suggested that “a high percentage” of gray snapper were likely to sur-

vive but that mortality rates for other species such as yellowtail snapper, spotted seatrout, and hogfish were probably much higher. In addition to fish, lobsters and sea turtles can get caught in shrimp trawls.

Biscayne Bay’s live bait shrimp fleet also has been shown to damage hardbottom fish habitat. The same 1985 assessment referenced above estimated that the commercial bait shrimp fleet sweeps about 20 percent of Biscayne Bay’s bottom four times annually. Studies published in 1997 detected no significant damage to seagrass habitats but documented obvious damage to soft corals and sponges. A 1982 study found that 80 percent of corals, 50 percent of sponges, and 38 percent of gorgonians were crushed, uprooted, turned over, or otherwise damaged by the passage of shrimp roller trawls in the southern portion of Biscayne Bay. This damage was still evident at least 11 months after the passage of the trawl.





Park visitors explore Boca Chita Key, which was once a private vacation retreat owned by the Honeywell family.

### CULTURAL RESOURCES— MORE PROTECTION NEEDED, ESPECIALLY FOR SUBMERGED ARCHAEOLOGICAL RESOURCES

Biscayne scored an overall 48 out of 100 for cultural resource conditions, including archaeology, cultural landscapes, history, historic structures, archive and museum collections, and ethnography (peoples and cultures). This score indicates that the park's cultural resources are in "poor" condition. The scores for cultural resources are based on the results of indicator questions that reflect the National Park Service's

own Cultural Resource Management Guideline and other policies related to cultural and historical resources.

The park is home to prehistoric mounds, 18th century shipwrecks, and historic structures that represent early resort development of the 1930s. Funding and staffing shortfalls make it difficult to care for these and other cultural resources in the manner they deserve.

### CULTURAL LANDSCAPES—PARK LACKS LANDSCAPE PROGRAM

Cultural landscapes illustrate how people lived on the land and used its resources. Evidence of

the Biscayne area's earliest inhabitants has been mostly destroyed by development on the mainland, but some can still be found in the keys and waters of the park. A midden (or shell mound) on an offshore key indicates the area was intensively settled by 1000 A.D., and a major Tequesta village from approximately 2,000 years ago is located five miles north of the park. Biscayne's most obvious cultural landscapes date to the 19th and 20th centuries and contain structures that are recognizable to visitors. These landscapes illustrate 1930s resort life of the wealthy and agricultural settlement on the keys.

Cultural landscapes are the least developed area of the park's cultural resource program. Biscayne is likely to have significant historic and cultural landscapes, but no formal survey has taken place, and the park lacks a cultural landscape program and onsite expertise.

A lack of funding prevents Biscayne from developing a cultural landscapes program, and there is no indication that funding will become available in the near future. In spite of this shortfall, the park recognizes the significance and potential of two sites—Boca Chita Key and the Israel Lafayette "Parson" Jones property—and manages them as significant landscapes. These sites are carefully assessed prior to maintenance work and crews removing invasive plants are careful not to disturb species that likely are parts of the historic landscapes.

Boca Chita Key was formerly the vacation home of the Honeywells, owners of the Minneapolis Honeywell Heat Regulator Company. From 1937 to 1939, Mark and Olive Honeywell spent time on the island and commissioned the construction of a number of structures. As prominent members of society, they hosted elaborate parties on the island for their wealthy friends—one event featured elephant rides. Honeywell's wife died in 1939, and he sold the island in 1942. Still remaining from Honeywell and previous owners are a lighthouse, pavilion, chapel, engine house, garage,

guesthouse, seawall, and bulkhead. Today Boca Chita is accessible to a broader population. The park's concessioner offers trips to the island, and visitors with boats can visit on their own to camp or just enjoy the beautiful ocean views.

The Parson Jones site, located on Porgy and Totten keys, was the former home of Israel Lafayette "Parson" Jones and his family during the late 19th and early 20th centuries. Jones is a prominent figure in Florida's African-American history for several reasons: his family became one of the largest key lime producers in Florida from before World War I until World War II; he was instrumental in establishing the Mount Zion Baptist Church in Miami; and in 1925 he sold part of his property for an impressive \$250,000—quite a profit over the \$300 he had paid for Porgy Key in 1897. Ruins, the remains of a key lime plantation, and other evidence of the Jones settlement remain on Porgy and Totten keys.

#### ETHNOGRAPHY (PEOPLES AND CULTURES)—PROGRESS BEING MADE, BUT ADDITIONAL STUDIES NEEDED

Before Biscayne became a national park, many different groups of people used the area's resources. Now that the Park Service manages the area, staff have a responsibility to foster relationships with people who were traditionally associated with the area and protect the resources that are important to them. Sixteen associated tribes

Boca Chita Key houses structures that were built in the late 1930s.



ELIZABETH MEYERS

## HISTORIC AFRICAN AMERICAN BEACH AND MIAMI ARCHAEOLOGICAL SITE COULD BECOME PARTS OF THE NATIONAL PARK SYSTEM

Virginia Key Beach Park, located just outside the boundary of Biscayne National Park, could soon become part of the National Park System. Established in 1945, the beach was the only officially recognized place in south Florida where African Americans could go to enjoy the ocean. All other beaches were for whites only. Virginia Key Beach Park became a popular gathering place where people met to relax, socialize, and celebrate religious ceremonies such as weddings and baptisms.

The city of Miami closed the beach in 1982, but many people hope the beach and surrounding ecologically important areas will become part of the National Park System. Former Rep. Carrie Meek (D-FL) introduced legislation in 2002 authorizing a study of Virginia Key Beach for possible inclusion in the National Park System. The Park Service Southeast Regional Office planning team initiated a Special Resource Study of the 33-hectare park in 2005. The public can provide input on the study by visiting <http://parkplanning.nps.gov/>.

Miami Circle, potentially the most important archaeological discovery in the southeastern United States, is a recently uncovered site in downtown Miami that was added to the National Register of Historic Places in 2002. The Miami Circle Special Resource Study, initiated in 2003, will determine the national significance, suitability, and feasibility of including the site in the National Park System as part of Biscayne National Park.

have been identified so far, including the Seminole, Miccosukee, Independent Miccosukee, and the Seminole of Oklahoma. Biscayne staff maintain relationships with these groups and consult with them on a regular basis, but the depth of these relationships is constrained by funding and time limitations.

Biscayne staff recognize the significance of ethnographic resources, and these resources are considered during park planning processes. In addition, the Park Service's regional cultural anthropologist assists the park with ethnographic management and helped complete an ethnographic overview and assessment in 2003. This report outlines how American Indian tribes, African Americans, Cuban Americans, Nicaraguans, and Haitians are associated with the park.

Although the park makes an effort to include all associated groups in planning processes, additional ethnography work is needed. Because of funding and staffing constraints, the park has not completed a traditional use study, ethnographic oral and life histories, ethnographic landscape studies, cultural affiliation and lineal descent studies, or ethno-histories.

Biscayne also needs a Native American Graves Protection and Repatriation Act (NAG-PRA) agreement with associated tribes. This will become increasingly important as the park continues archaeology work and new artifacts are recovered. Some of the artifacts undoubtedly will need to be repatriated to the appropriate tribe, and agreements and processes should be put in place for their return.

### ARCHIVE AND MUSEUM COLLECTIONS—PROVIDING ADEQUATE CARE FOR IMPRESSIVE COLLECTIONS A STRUGGLE

Funding and staffing constraints make archive and museum collection management a challenge at Biscayne and the other south Florida parks. A single curator manages the museum collections of Biscayne National Park, Big Cypress

VIRGINIA KEY BEACH PARK TRUST





National Preserve, Dry Tortugas National Park, and Everglades National Park, which include more 4.5 million items. Some are archaeological objects that have been removed from the marine environment such as an 18th century cutlass, pewter plates and cups, and artillery. Additional staff are needed to manage these and other objects from the parks' impressive collections: an archivist, archives technician, museum technician, and a registrar. These staff would provide increased preservation, enhanced emergency preparedness, and improved accountability, and would also catalog collections and increase accessibility of collection items.

Currently, the park is only meeting 38 percent of the Park Service's museum management standards, and 93 percent of Biscayne's more than 700,000 items are uncataloged and inaccessible. Archival items such as maps, drawings, and slides comprise much of this backlog. If staffing and funding levels do not increase, it will likely take 30 years or more to address the existing backlog, assuming it does not worsen.

The archives and museum collections of the south Florida parks continue to grow, further underscoring the need for additional staff. From fiscal year 2002 to fiscal year 2004, the total collections of these parks increased 66 percent—about 1 million items are added to the collections each year. Funding to support collections management has not kept pace with this growth, and in fact, the collections management budget for the south Florida parks is significantly lower on a per-item level than the Park Service's southeast regional average. In fiscal year 2004, the south Florida parks had about \$0.024 to spend on accession, cataloging, storage, preservation, and access for each museum collection item. In contrast, according to the Park Service's southeast region, average costs in 1999 for cataloging alone varied from \$0.26 to \$2.97 per item. These figures do not include the costs of recording new items, storage, equipment, archival supplies, or providing access.

Because most of Biscayne's archaeological

artifacts are found underwater, they often require costly specialized conservation techniques once they are removed from the marine environment. The lack of a dedicated funding source for the appropriate conservation of these artifacts has severely limited the park's ability to protect objects that are threatened. For example, Hurricane Andrew in 1992 caused some objects from shipwrecks to wash ashore. These items were never treated and now one of them, a pewter spoon, is a total loss. Other losses as a result of the hurricane were never quantified, and there is no plan in place for protecting resources in the event of another catastrophic event.

Storage is also an issue at Biscayne. The park has less than 2,000 square feet of storage space, but at least 13,000 square feet of space are needed. Items from Biscayne and the other south Florida parks are stored at two main storage sites within Everglades National Park, the Beard Center, which meets 56 percent of Park Service storage standards, and the Robertson Building, which meets about 60 percent of Park Service standards. The Southeast Archeological Center in Tallahassee, Florida, provides additional storage space.

#### HISTORIC STRUCTURES—BUDGET CONSTRAINTS LIMIT WORK

Biscayne's historic structures include those built by Mark Honeywell on Boca Chita Key during the late 1930s. These ten structures are on the park's official List of Classified Structures, and of these, one is reported to be in poor condition, three are in fair condition, and six are in good condition. But these condition assessments were conducted in 1998, and current evidence demonstrates that all ten structures are deteriorating and in need of repair. One structure collapsed in 1999. New condition assessments are scheduled for 2006.

Boca Chita Key Historic District was recently listed in the National Register of Historic Places. The structures represent the architectural style of

ARCHAEO-  
LOGICAL  
ARTIFACTS  
FOUND  
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OFTEN  
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NIQUES

August Geiger, known for his Mission, Italian Renaissance, and Art Deco designs in the Miami area in the 1930s. To guide management, protection, and maintenance of structures on Boca Chita Key, a historic structure report is imperative. But there is no funding to complete this report, and even if funds were available, regional staff do not have time to work on such a report until at least 2008.

Threats to the park's historic structures include visitor damage and corrosion caused by the marine environment. Boca Chita is the most popular land-based visitor destination in Biscayne, but the park does not have enough staff to monitor resources and visitor activities. A fire built by a visitor on New Year's Eve of 2004 damaged the stairway of Boca Chita's historic chapel. Hurricanes and other natural disasters also threaten the park's historic structures. In 1992, Hurricane Andrew damaged much of Boca Chita Key—windows were broken, vegetation was torn away, and much of the south wall of the Boca Chita Bridge was destroyed.

In addition to those structures on Boca Chita Key, the park contains other historic resources that should be managed with an appropriate level of protection: cisterns built and used by early 19th century settlers; remnants of Spite Highway, a 125-foot-wide strip bulldozed down the center of Elliot Key in 1967 by national park opponents; Stiltsville, a community of people who lived in structures on stilts built over the

sea; and structures on Adams Key such as the original caretaker's house for the Cocolobo Club, a secluded retreat for the wealthy and influential. The Fowey Lighthouse, which was built during the mid-1870s and is listed in the National Register of Historic Places, is owned by the U.S. Coast Guard and is not under the management of the Park Service. The Parson Jones property, which includes building foundations and landscape and agricultural remains, is currently being documented, and a historic context study for the site is being developed.

Budget constraints limit the amount of work that can be done on historic structures. Biscayne's maintenance staff has been cut by 25 percent, the park lacks preventive maintenance programs for its structures, and there are no staff with historic preservation expertise. Maintenance staff would be interested in learning historic preservation skills, but mandatory daily tasks prevent staff from participating in training opportunities.

#### ARCHAEOLOGY—SITE SURVEYS NEEDED

In a park that is 95 percent water, it is no surprise that many of Biscayne's premier archaeological sites are shipwrecks. In fact, with the number of ships that have sunk in its waters, the offshore reefs of Biscayne are referred to as "ship traps." Of the park's 71 identified submerged archaeological resources, 44 are shipwrecks. Every year more remains of ships that fell victim to the reef tract are discovered. These vast submerged cultural resource sites are scattered throughout the park and date back to the 18th century.

The *HMS Fowey*, a British warship that sank in the offshore reefs in 1748, is perhaps the park's best known wreck. Only the starboard side of the ship has been located, suggesting the wreck is more widely dispersed than originally thought. Closed to the public, the site was exposed by Hurricane Andrew, leaving it open to deterioration by waves, weathering, pest infestation, and looters. Management of the

Evidence suggests that all ten historic structures on Boca Chita Key are deteriorating and in need of repair.



ELIZABETH MEYERS

shipwreck is complex because of international implications. People disagree about whether the site should be excavated further. Biscayne staff need to work with other stakeholders to devise a management plan, but current funding and staffing levels cannot accommodate this work.

Another shipwreck believed to be in the park is that of the *Nuestra Senora del Popolo*, a Spanish galleon that set sail in 1733. The Spanish slave ship *Guerrero* reportedly sank in the upper keys in 1827, but has not been located. A full survey of park waters is the first step to protecting these irreplaceable and potentially internationally significant resources.

In addition to shipwrecks, archaeological resources at Biscayne National Park include terrestrial sites such as American Indian shell middens and mounds and historic remains on several keys. But because Biscayne is primarily a marine park, most archaeological work has focused on marine resources. Only an estimated 1.25 acres of land have been surveyed for archaeological sites.

Biscayne has three listings in the National Register of Historic Places. With 40 archaeological sites, the Offshore Reefs Archaeological District is the park's most extensive listing. The Sweeting Homestead Site, which includes the remains of one of the first pioneer homesteads built on the park's keys in the late 19th century, and the Boca Chita National Historic District are also listed in the register. Other archaeological resources, including the Annie Higgs Homestead Site and American Indian mounds and middens on various keys, may be nominated to the National Register of Historic Places in the future.

Protecting archaeological resources can be an expensive task, and when those resources are underwater the costs increase. At current funding and staffing levels, Biscayne National Park is unable to provide the level of protection needed to ensure archaeological resources are not damaged, looted, or otherwise lost. Seventeen of 24 monitored shipwrecks in 2004 had visible human caused modifications.



NATIONAL PARK SERVICE/TERRY HELMERS

The park has 50 archaeological sites that have been identified as significant, though the limited number of park staff cannot visit each one annually. The park needs funds to fill a vacant archaeologist position, hire additional law enforcement rangers to protect resources, and conduct surveys to document resources. The park also needs more boats and additional funding for boat maintenance and fuel in order to increase site monitoring and patrolling.

Because Biscayne has only limited staff and money to protect archaeological resources, the park employs a variety of tactics. Archaeological site locations are not disclosed to the public, and rangers educate visitors about the importance of leaving artifacts where they are found and the consequences of illegal collecting. Though these tactics are useful, the real need is for additional law enforcement staff to investigate and prosecute collectors.

Illegal relic hunting is a threat to Biscayne's archaeological resources, but an even larger threat stems from recreational and commercial fishing techniques. Fishing spears and lobster traps are the most significant threats. Most damage is inadvertent—fishers are not aware that there are archaeological sites nearby that their

Biscayne National Park's waters conceal dozens of shipwrecks that provide habitat for marine life and are popular with snorkelers and divers.



## PARK STRIVES TO REACH DIVERSE POPULATION

Biscayne National Park, located only five miles from Miami, is the nation's closest national park to a major urban area. It is also one of the largest marine-based parks in the National Park System and the world.

Over the past century, south Florida and particularly, the Miami-Dade urban area, have experienced rapid population growth. More than 5 million people, including a diverse immigrant population, now inhabit the area. In fact, Miami-Dade County is one of very few counties where more than half of the residents are foreign-born. Just 42 percent of the county's population speaks only English at home, while half the population speaks Spanish at home. Even though nearly half of the park's interpretive staff is bilingual, this extremely diverse demographic mix can present language barriers and cultural challenges to park managers. Economic hardships also exist. About 21 percent of households in Miami-Dade County live below the poverty level.

These demographics reinforce Biscayne's need to reach out to non-traditional park users through enhanced environmental education and community outreach programs. Park visitors and neighbors who understand park resources and appreciate them for more than their basic recreational value are more likely to properly care for them. To help meet these goals, the park offers on- and off-site education and outreach programs. However, the park is currently only marginally able to meet its Government Performance Results Act (GPRA) goals as they relate to visitor understanding, and is unable to meet the public demand for its programs. Biscayne needs funds to hire a resource management/interpretive division liaison to better inform the public of high profile resource related park projects (including CERP), and to develop an outreach strategy that has 21st century relevancy to the multiethnic Miami-Dade population.

Only about 10 percent of Biscayne's visitors use the park's visitor center, which features educational exhibits, videos, and ranger walks and talks. Staff must try to reach the rest of the park's visitors through other means such as off-site educational programs and boat patrols.

The challenge associated with reaching the park's diverse group of visitors is further complicated by the fact that most park visitors are out on the water. Only about 10 percent of park users visit Biscayne's only staffed visitor center, in part, because it does not have a public marina or boat-launching site. The park has a visitor contact station and public dock on Elliott Key, but the contact station is closed because of funding and staffing shortfalls.

Developing and implementing a strategy to reach the other 90 percent of park visitors is difficult because of the limited number of park vessels and rising fuel and maintenance costs. Finding ways to overcome these limitations is critical to park operations.

Biscayne intermittently employs both paid staff and volunteers to provide information at three of the five local marinas and on park islands. The park has also partnered with public and private groups to produce free educational materials that are distributed at local marinas, marine supply stores, and at community outreach and special events. Initial contacts have been made with the U.S. Coast Guard to join forces on the Sea Partners Campaign, the Coast Guard's Marine Environmental Protection outreach and education program, and the U.S. Coast Guard Auxiliary, the agency that teaches most area boating safety classes. Limited Park Service staff prevents full integration of National Park Service messages into these already established programs.



ELIZABETH MEYERS

equipment is damaging. To alleviate some unintentional damage, the park could regulate techniques and methods.

In spite of funding, staffing, and resource protection challenges, Biscayne's archaeology program is strong. Staff recently authored an underwater archaeological site-monitoring program that redefines site documentation standards. This revolutionary new approach to underwater site stewardship could improve shipwreck protection nationwide. The park is also working to establish a Maritime Heritage Trail that will include five or six shipwreck sites, with information about each wreck's location and history. The park hopes to connect its trail to other regional shipwreck trails.

Excellent partnerships also benefit park resources. The Submerged Resources Center in Santa Fe, New Mexico, has completed underwater surveys at the park, and the center contributed funding for a public television documentary on the best management practices for submerged archaeological sites that featured Biscayne. The center also worked with park staff to develop training in underwater resource heritage protection.

#### HISTORY—ADMINISTRATIVE HISTORY NEEDED

Biscayne National Park is part of a region with a diverse history that includes settlement by prehistoric peoples, Spanish exploration and shipwrecks, homesteads and pioneer settlement, and resort development of the 1930s. Although Biscayne does not have a staff historian, the park recently received funds to conduct a historic resource study of the Israel Lafayette "Parson" Jones site. This study is critical in providing a link between the local African-American community and resources in the park. Additionally, the Park Service Southeast Regional Office has recently completed a historic resource study entitled, *Cold War in South Florida*. This document is a comprehensive review of cold war activities in



RALPH MUNROE/HISTORICAL ASSOCIATION OF SOUTHERN FLORIDA

Biscayne National Park and the south Florida region as a whole.

Biscayne lacks an administrative history, though staff previously initiated a video and a book in an attempt to capture oral histories before the sources passed away. An archives management report was completed for Biscayne in December 2003. This report, coupled with additional record management procedures at the park, will prepare the park well for a future administrative history. Many of Biscayne's administrative documents were lost during Hurricane Andrew in 1992, and some were inadvertently disposed of during clean-up efforts. Internal education is needed so that park staff know how to properly care for, file, and store administrative documents.

There are many opportunities at Biscayne for additional cultural history research. Topics in need of further study include settlement within the park's boundaries, fishing history, archaeological context, Fowey's lighthouse, agricultural history, Cuban immigration and smuggling, and shipwrecks. To encourage graduate students and other historians to conduct work in the park, staff should complete a systematic review of historic research needs.

Pioneers settled on the keys and made their living by farming, fishing, and salvaging shipwrecks.





Volunteers remove tons of trash from the park each year, making Biscayne's lands and waters safer for wildlife and park visitors.

### STEWARDSHIP CAPACITY— PARTNERS AND VOLUNTEERS PROVIDE VALUABLE SERVICES

Stewardship capacity is a discussion of how well equipped the Park Service is to protect the parks. The most significant factor affecting a park's ability to protect its resources is the funding a park receives from Congress. Biscayne's base budget has increased by just 2 percent since 2001, for a fiscal year 2005 total of \$3.53 million. Additionally, Biscayne has been forced to absorb some cost of living increases and the increased costs associated

with employee benefits. These increases, coupled with static base funding, have created a deficit of \$300,000 for fiscal year 2006. These funds are needed to fill critical vacant positions, enabling the park to maintain core staffing and visitor services levels, and fund essential operating needs.

The park also needs an additional base increase of at least \$465,000 to restore law enforcement and maintenance capabilities to adequately maintain visitor facilities and services and to ensure resource protection actions necessary to successfully meet stated Government Performance and Results Act (GPRA) goals.



Critical unfilled or unfunded positions include a maintenance mechanic, facility management specialist, water quality specialist, biologist, environmental education ranger, small craft operator, and law enforcement rangers. Additional needs include a staff person with historic preservation expertise, a resource management/interpretive division liaison to better inform the public of high profile resource related issues and park projects, and an archaeologist.

Biscayne has been given approval to participate in the Park Service's network of Learning Centers, which supports science in the parks for the purpose of better understanding resources, but funding shortages prevent the park from establishing its own learning center. Such centers focus on providing a bridge between the scientific and research community and the general public. Biscayne would like to work more on communicating resource information to the public, and could do a bet-

ter job of this by hiring a resource management/interpretive division liaison, but funds are not available for this position.

Recognizing the National Park Service initiative to expand the use of volunteers and partners in accomplishing goals, Biscayne recently hired a community affairs and partnerships liaison who focuses on expanding the park's relationships with its many partners and the surrounding community.

Faced with significant funding and staffing shortfalls, the park increasingly relies on partners and volunteers to bridge the gap between what is needed and what the park can afford. Partners such as the South Florida National Park Trust, modeled after the National Park Foundation, provide financial assistance and other services to Biscayne. In fiscal year 2005, the trust allocated \$39,000 to support environmental education, \$46,000 to allow Biscayne to expand its volunteer and outreach programs, and \$37,860 to advance



Volunteers clean a sea turtle nesting beach.

## MARINE PARK WITH INTERNATIONAL BORDER FACES SIGNIFICANT LAW ENFORCEMENT CHALLENGES

Biscayne National Park is the closest national park to a major urban area; it is primarily a marine park, which brings additional challenges; and it shares 35 miles of its border with international waters, which leads to illegal immigration and smuggling issues. These conditions, combined with visitation levels that have increased about 56 percent since 1993, create challenges for Biscayne's limited number of law enforcement staff.

Biscayne's law enforcement division consists of eight full-time law enforcement staff to patrol and protect the largest marine park in the Park System. Five of these positions are full-time front line rangers and three are managers/law enforcement specialists who perform front line law enforcement duties as a secondary responsibility. These minimal staffing levels require that rangers patrol solo, potentially exposing them to dangerous situations. According to a 2003 rating by the Fraternal Order of Police, Biscayne is the sixth-most dangerous park for law enforcement rangers.

A Visitor Management-Resource Protection Assessment Program (VRAP) report indicates that the park needs base funding for ten more full-time employees. In addition, funding must include supplies, vehicles/vessels, fuel, and equipment. According to senior park staff, the law enforcement division has not received a base funding increase in the past 20 years.

The law enforcement division has six patrol vessels, many of which are reaching ten years in service and are unreliable and potentially unsafe. Four law enforcement rangers live in the park and rely on these vessels to respond to calls 24 hours a day. The park's limited number of maintenance/marine mechanic staff is unable to maintain the vessels adequately. Consequently, vessels break down, preventing

the rangers from adequately performing their jobs. The number of registered boats in Miami-Dade County has increased dramatically in the last 30 years, further underscoring the need for Biscayne to maintain adequate numbers of patrol vessels and rangers to conduct patrols.

South Florida is a major gateway for smuggling drugs, illegal aliens, Cuban refugees, and illegal products into the United States, and the park's location and open boundaries make it a popular place to engage in these activities. Smugglers often leave illegal immigrants on park islands, and federal agencies such as the U.S. Border Patrol and U.S. Customs Department often call upon park staff to investigate suspicious vessels traveling through the park. Park staff recently discovered a boat containing 400 illegal immigrants and a sailboat transporting 188 Haitians.

In addition to these law enforcement and visitor protection duties, park staff are also charged with protecting Biscayne's natural and cultural resources. Random boat checks indicate that poaching is widespread, and underwater archaeological resources need enhanced protection from looting.

Biscayne's overburdened law enforcement staff has low morale and is experiencing increased turnover. Partnerships with the U.S. Coast Guard and U.S. Customs Department, the Florida Fish and Wildlife Conservation Commission, and other state and regional law enforcement agencies provide some additional law enforcement support, but this is limited because of the vastness of the park, the lack of controlled entry, and the inability to visibly mark park borders. Increases in the park's base budget are the primary solution to Biscayne's law enforcement woes.

work on the park's Maritime History Program. Although the park fully appreciates and uses these non-appropriated funds, they are potentially non-recurring and non-sustainable funds that staff must spend time and resources applying for annually.

Other partner and community groups collaborating with Biscayne to achieve the objectives stated in the park's enabling legislation include the Trust for Public Land, Biscayne Bay Regional Restoration Team, Florida Fish and Wildlife Commission, the Coral Reef Task Force Local Action Teams, University of Miami and other local and regional colleges and universities, the U.S. Coast Guard, County Marine Patrol law enforcement, and the Southeast Florida Public Area Managers group, Community Partners, Citizens for a Better South Florida, and local elected and appointed county representatives.

In 2004, Biscayne, Everglades National Park, and the local community sponsored a workshop entitled *Gateway Communities: Key To Success*. This workshop generated great support for a greenway connecting Biscayne and Everglades National Parks via the expansion of a previously existing countywide bike path. Future proposed joint projects include the development of a Blueway Paddling Trail through Biscayne National Park, which would connect to an existing statewide blueway, allowing recreationalists to circumnavigate the entire state of Florida.

In addition to these and other partner groups, Biscayne relies on a growing pool of volunteers. In fiscal year 2004, volunteers donated about 11,000 hours of service to Biscayne. This represents a 10 percent increase from 2003. A group of about 50 individuals provides a variety of services on a regular basis. Volunteers staff the visitor center at least 75 percent of the time, conduct tours and on-site programs, act as visitor contacts at main access points to the park, represent the park at special events, conduct research and

WHAT YOU CAN DO TO HELP:

- **Participate in park planning efforts:** The public is invited to provide input on all park plans and studies. The park is currently writing a Fisheries Management Plan, updating its General Management Plan, and developing a Restoration Plan/Programmatic Environmental Impact Statement (RP/PEIS) to address coral reef restoration activities in the park. Special Resource Studies of Virginia Key Beach and Miami Circle are also under way. Copies of the park's planning documents and information on public involvement opportunities can be found at [www.nps.gov/bisc](http://www.nps.gov/bisc).
- **Support or become a member of groups helping to protect the park:** South Florida National Parks Trust, ([www.nationalparks.org/southflorida](http://www.nationalparks.org/southflorida)), Trust for Public Land ([www.tpl.org](http://www.tpl.org)), NPCA ([www.npca.org/support\\_npca/](http://www.npca.org/support_npca/)), and other regional organizations.
- **Volunteer in the parks.** Many parks are looking for dedicated people who can lend a helping hand. To learn about opportunities at Biscayne National Park, contact the park at 305.230.1144.
- **Become an NPCA activist and learn about legislative initiatives and protection projects affecting parks.** When you join our activist network, you will receive *Park Lines*, a biweekly electronic newsletter with the latest park news and ways you can help. Join by visiting [www.npca.org/takeaction](http://www.npca.org/takeaction).

inventories, map shipwreck sites, conduct fish counts, and assist with non-native plant removal and habitat restoration. Another 350 volunteers assist during special events such as the National Parks America Tour and the International Coastal Cleanup. Literally, tons of litter and marine debris were removed from parklands through these large-scale cleanups. The park would like to develop additional volunteer programs, but consistent funding is needed to support a full-time volunteer coordinator.





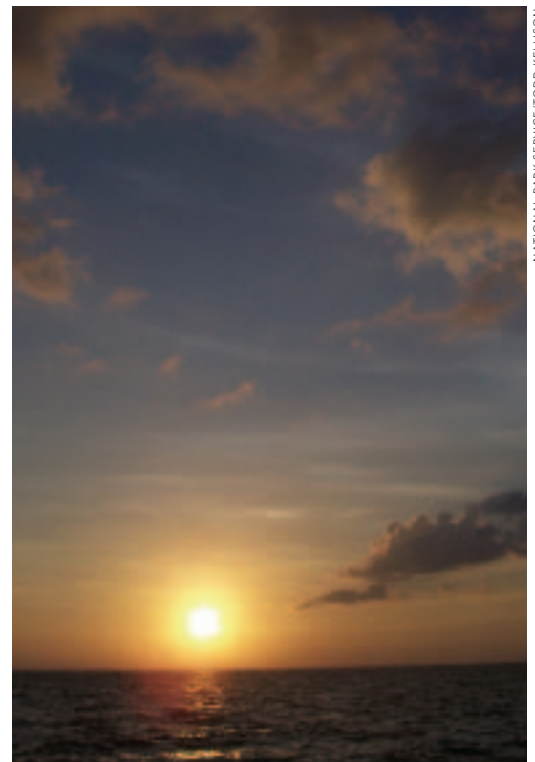
## APPENDIX: METHODOLOGY

To determine the condition of known natural and cultural resources at Biscayne National Park and other national parks, the National Parks Conservation Association developed a resource assessment and ratings process. It examines current resource conditions and evaluates the park staff's capacity to fully care for the resources. The assessment methodology can be found online at NPCA's Center for State of the Parks® web site ([www.npca.org/stateoftheparks/](http://www.npca.org/stateoftheparks/)).

Researchers gather available information from a variety of research, monitoring, and background sources in a number of critical categories. The natural resources rating reflects assessment of more than 120 discrete elements associated with environmental quality, biotic health, and ecosystem integrity. Environmental quality and biotic health measures address air, water, soils, and climatic change conditions as well as their influences and human-related influences on plants and animals. Ecosystems measures address the extent, species composition, and interrelationships of organisms with each other and the physical environment for indicator, representative, or all terrestrial and freshwater communities.

The scores for cultural resources are determined based on the results of indicator questions that reflect the National Park Service's own Cultural Resource Management Guideline and other Park Service resource management policies.

Stewardship capacity refers to the Park Service's ability to protect park resources, and



NATIONAL PARK SERVICE/TODD KELLISON

includes discussion of funding and staffing levels, park planning documents, resource education, and external support.

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and was also reviewed for technical accuracy by staff at Biscayne National Park.

NPCA's Center for State of the Parks represents the first time that such assessments have been undertaken for units of the National Park System. Comments on the methods are welcome.

# ACKNOWLEDGMENTS

For more information about the  
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NPCA thanks the staff at Biscayne National Park who reviewed the factual accuracy of information used in this report. We also thank peer reviewers for their valuable comments and suggestions.

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