

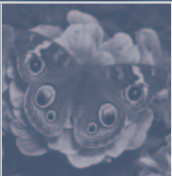
STATE
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PARKS®

may 2007



GATEWAY NATIONAL RECREATION AREA

A Resource Assessment



National Parks Conservation Association®
Protecting Our National Parks for Future Generations®

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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 or contact: NPCA, Center for State of the Parks®, P.O. Box 737, Fort Collins, CO 80522; Phone: 970.493.2545; E-mail: 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, its members, and partners work together to protect the park system and preserve our nation's natural, historical, and cultural heritage for generations to come.

- * More than 325,000 members
- * 9 regional offices
- * 35,000 activists

A special note of appreciation goes to those whose generous grants and donations made this report possible: Dr. Dorothy Canter, Con Edison of New York, Ben and Ruth Hammett, the Efroymsen Fund of the Central Indiana Community Foundation, G. Unger Vetlesen Foundation, John Ben Snow Memorial Trust, MSST Foundation, Tiffany & Co., and anonymous donors.

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REPORT SUMMARY



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Touch the bricks of a Civil War-era fort; catch a glimpse of a migrating hawk soaring overhead on its way to Central America; examine a rare, delicate orchid; watch volunteers restore vintage aircraft; or build a sandcastle, picnic with family, and surf along a sandy beach. Many Americans associate these kinds of experiences with remote or better known national parks such as Yellowstone, Yosemite, Cape Hatteras National Seashore, or Wright Brothers

National Memorial. What may come as a surprise is that all of these opportunities—and more—are possible within our nation's most populous urban area at Gateway National Recreation Area, one of our nation's 390 national parks.

Gateway National Recreation Area, located in New York City and northern New Jersey, protects more than 26,000 acres of land and waters offering an array of recreational,

Gateway plays host to more than 400 species of birds and butterflies, which live in or visit the park during seasonal migrations.



Many of Gateway's historic structures evoke aspects of our nation's aviation history. Views from the control tower at Floyd Bennett Field encompass the crisscrossing runways of New York's first municipal airport.

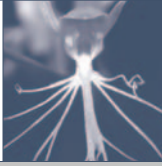
cultural, and natural values. More than 330 species of birds and 71 species of butterflies live within the park or stop-over at Gateway during their arduous seasonal migrations along the Atlantic coast. The park protects endangered birds such as the piping plover and least tern, and works to restore declining habitats such as maritime forests and salt marsh.

Gateway is also a living museum full of history that can be seen, touched, and fully experienced by visitors. Gateway's buildings, landscapes, and archaeological sites illuminate important aspects of the region's social, maritime, aviation, and architectural history. For example, among the hundreds of buildings and structures within the park are some great

samples of America's coastal defenses from the Revolutionary War through the Cold War.

Gateway National Recreation Area was created in 1972 to preserve and protect recreational, natural, and cultural resources and to provide a national park experience for the region's urban residents. Indeed, the *Congressional Report* issued at the park's authorization notes that "this will be the first Federal recreation area in the heart of an urban complex, and it will bring the national parks program closer to the people than ever before." Unfortunately, when the park was created, many of the natural and cultural resources had been affected by previous uses and by development of the surrounding area. Salt marshes had long been filled, Jamaica Bay had been repeatedly dredged, and the maritime and deciduous forests had been covered in pavement. Buildings evoking facets of history stood in disrepair, their integrity threatened by decades of neglect.

Gateway, along with the entire National Park System, has for more than a decade suffered from chronic under funding. The gap between need and actual budgets has, over the years, affected the staff's ability to restore historic buildings and maintain education programs. Though much work is still needed to help Gateway realize its full potential, the natural, cultural, and recreational values of the park are undeniable. To have 26,000 acres of federally protected lands and waters in the heart of one of our nation's most densely populated areas is remarkable. The park's location and many varied resources has made it a favorite among a host of conservation and special-interest groups that want to protect it for the future. Efforts by the Park Service, partner organizations, and community groups to restore areas in Brooklyn, Queens, and Staten Island in New York City and Monmouth County in northern New Jersey contribute to the goal of offering an outstanding national park experience for regional residents and visitors.



THE GATEWAY ASSESSMENT



Recognizing Gateway National Recreation Area's importance within the New York City metropolitan area and the National Park System as a whole, NPCA's Center for State of the Parks endeavored to determine the current conditions of the park's natural and cultural resources. Center for State of the Parks researchers interviewed park staff, examined resource conditions on the ground, consulted Park Service experts, and reviewed available publications and docu-

ments. Researchers then analyzed all of the collected data using the Center for State of the Parks' established, peer-reviewed methodologies, which include a set of more than 200 questions and discrete metrics, in order to arrive at numerical scores for natural and cultural resource conditions (see Appendix). The following report describes Gateway's diverse natural and cultural resources, summarizes current conditions of those resources, describes some of

The Jamaica Bay Wildlife Refuge is a favorite place to reconnect with nature, and is one of the East Coast's prime birdwatching venues.

At Jacob Riis Park, much work has been done to restore the exterior of the historic bathhouse.



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the ways resource managers are working to improve resource conditions, and touches on some of the varied educational and recreational opportunities available to park visitors.

RATINGS

Using NPCA's Center for State of the Parks comprehensive methodology, current overall conditions of Gateway's known natural resources scored 53 out of 100, which is a "poor" rating. Historic military uses and land development prior to Gateway's establishment as a park and the ongoing urbanization and landscape modification surrounding it have resulted in the loss of significant natural habitats and native species, as well as major changes in hydrology, nutrient cycles, and sediment transport within its watersheds and estuarine waters. In addition, regional pollution affects the park's air and waters, and invasive, non-native species have replaced native ones in many areas. Park staff continue to target some of these pressing concerns through habitat restoration and protection projects.

Overall conditions of the park's known

cultural resources scored 46 out of a possible 100, indicating "poor" conditions. As with natural resources, many factors have long been at work to the detriment of the park's cultural resources. Many buildings were not considered to be historic when Gateway was established, were abandoned from previous uses, and so were left to languish. Prior to 1972, cultural landscapes in general were not widely recognized for their importance, so no effort had been directed toward their maintenance and preservation before Gateway was established. While the park has made efforts to improve the care of its cultural resources, critical baseline information on some cultural resources is lacking. In addition, just 30 percent of the park's museum collections are cataloged, and curatorial staff are unable to finish cataloging the collections without additional support. The cost of caring for hundreds of structures forces park managers to make difficult maintenance decisions. Some structures have deteriorated beyond the point of restoration, and others continue to deteriorate as a result of under-funded maintenance needs.

RESOURCE MANAGEMENT HIGHLIGHTS

- A pilot restoration project on two acres of salt marsh at Big Egg Marsh in Jamaica Bay has shown some initial success, and is being monitored closely by park staff. Partner groups, including the Army Corps of Engineers, the NY/NJ Port Authority, and the Environmental Protection Agency's Harbor Estuary Program, have made this project possible by providing funding. Knowledge gained through this project will help guide the Park Service and other federal and state agencies in nearby projects such as the effort to restore 40 to 60 acres of salt marsh at Elder's Point.
- In the 1980s and 1990s, the New York City Audubon Society, in partnership with the Park Service, initiated a program to create desirable habitat for grassland birds on 140 acres in the center of Floyd Bennett Field. In attempting to replicate the grassy ecotype of the Hempstead Plains—60,000 acres of prairie that once covered much of Long Island—hard work and collaboration led to initial success. More recently, however, vegetation management has faltered, and the targeted grassland birds (upland sandpipers, horned larks, and various sparrows) no longer nest in the fields.
- The New York City Department of Environmental Protection is reclaiming the Pennsylvania Avenue and Fountain Avenue landfills and converting them into upland habitat also modeled after the Hempstead Plains, with the notion of creating a habitat complementary to that found at Floyd Bennett Field. These formerly off-limits landfills will eventually provide open space for taking a walk, reading a book, birding, or simply enjoy-

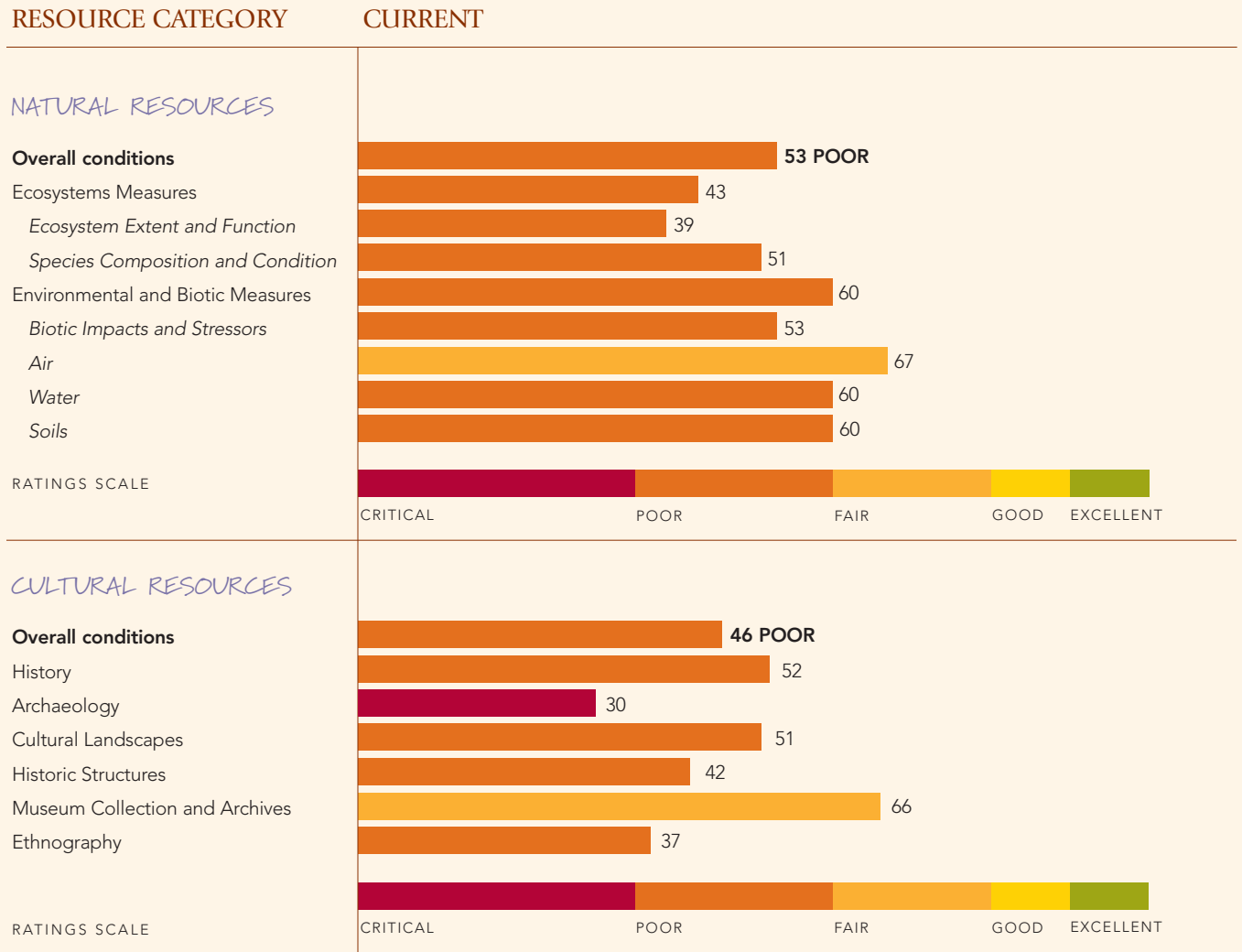
ing a respite from the usual hustle and bustle of the city. These grassy landfills will also be higher in elevation than surrounding areas and will thus provide the public with previously unavailable vistas of Jamaica Bay and its environs.

- A new visitor center at the Jamaica Bay Wildlife Refuge employs Leadership in Energy and Environmental Design (LEED) standards put forth by the U.S. Green Building Council. Geothermal sources provide heat, automatic window shades control the amount of sunlight entering the building, special reflectors amplify sunlight to reduce the need for electric lights, and flooring and cabinets are made from quick-growing, sustainably farmed bamboo.
- In 2004, after many years of negotiations, the Park Service entered into a 60-year lease with Sandy Hook Partners, LLC, for the rehabilitation and adaptive use of 35 historic buildings at Fort Hancock. Through another partnership, the Sandy Hook Foundation and the New Jersey Lighthouse Keepers Society helped rehabilitate the historic Sandy Hook lighthouse keeper's quarters.

The new visitor center at the Jamaica Bay Wildlife Refuge was built using state-of-the-art, environmentally conscious technology.



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 Gateway National Recreation Area, 83 percent of the information requirements associated with the methods were met.



The findings in this report represent a snapshot of the park in 2007, and 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 pre-dating the park's creation. The intent of the Center for State of the Parks is to document the present status of park resources and provide some recommendations for actions that could be taken to protect them in the future.

GATEWAY NATIONAL RECREATION AREA AT A GLANCE

- Gateway National Recreation Area was created in 1972 as one of the first urban national parks. It was meant to “preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features.” Particularly notable was the intent of Congress to provide recreational opportunities for urban residents who might not have the chance to visit other national parks.
- The Jamaica Bay Wildlife Refuge within Gateway National Recreation Area is the only national wildlife refuge under the management and protection of the National Park Service (others are managed by the U.S. Fish and Wildlife Service). Because of the wide diversity of bird species that live within or migrate through the refuge, the National Audubon Society and the American Bird Conservancy designated Jamaica Bay as an Important Bird Area.
- Gateway National Recreation Area harbors remnants of diverse habitats that are locally, regionally, and nationally important, including maritime forest and shrub communities, salt marshes, a swamp white oak forest, colonial shorebird colonies, and heron rookeries. JoCo Marsh in Jamaica Bay supports the only laughing gull colony in the state of New York.
- Gateway National Recreation Area is home to more buildings and structures than all parks in the Park Service’s Northeast Region combined. Nearly 400 buildings are included on the park’s list of classified structures. Most of these structures illustrate significant stories in our nation’s history, but many are in poor condition.



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- The park provides diverse recreational opportunities to engage people of all ages and interests. History enthusiasts and scholars can explore some of the park’s historic structures, which embody aspects of our nation’s coastal defenses over the last several centuries. Serious and amateur athletes can kayak or windsurf through Jamaica Bay, around Sandy Hook, or off Great Kills. Birders and naturalists can observe hundreds of resident and migratory species. Families can enjoy time together hiking, swimming, and picnicking; and schools can take advantage of the natural and cultural history programs offered by the Park Service or other organizations such as the New York City Audubon Society or the Linnaean Society of New York.

Gateway harbors peregrine falcons, a species once federally listed as endangered. Although the species was delisted in 1999, it is still listed as endangered in New York State.

KEY POINTS

- Gateway National Recreation Area was created in 1972, long after the surrounding area had become one of the most populous in the nation. Not surprisingly, much of the land within the park had been significantly developed or disturbed for various projects. Large extents of Jamaica Bay's barrier peninsula and marshes were filled for fortifications and associated complexes, while its northern edge, once a massive city dump, is now a landfill.
- Jamaica Bay's once shallow waters, as well as those of Raritan Bay, have been repeatedly dredged for channels and port facilities. Jetties, groins, and offshore channels along Sandy Hook and the Rockaways have affected underwater communities and diminished natural processes that deposit sand on the area's beaches and sediments on wetlands.
- Roads and paved surfaces crisscross each of Gateway's units, and with the exception of the salt marshes, there are no remaining areas that support undisturbed natural vegetation. Over time, these disturbances within the park and surrounding region have disrupted and diminished natural hydrological and biogeochemical cycles.
- Gateway's resource managers and park administrators face incredible challenges addressing the maintenance and management needs of more than 400 buildings and structures in various states of repair. Maintenance costs and staff time associated with managing these buildings are staggering. Park staff have been working on a management strategy that will help staff to prioritize needs as well as measure progress toward meeting management goals.
- A number of Gateway's planning and management documents are outdated or missing, and existing plans do not always relate to one another. For example, the park's general management plan was completed in 1979, there are no resource management plans for cultural resources, existing plans do not adequately address natural resource concerns, and interpretive plans are outdated. Most importantly, the park needs an updated general management plan and a resource stewardship plan to guide natural and cultural resource management.
- Staffing and funding shortfalls affect all aspects of the park's operations, and create situations where park managers must allocate money and staff time strategically, recognizing that all needs cannot be met with current funding levels. Park managers must make difficult decisions when resource protection competes with other park needs such as adequately staffing beaches with lifeguards. Sometimes funding shortfalls and restrictions on the use of existing funds translate to vacant staff positions and unmet resource protection needs.
- Gateway has a rich array of archaeological resources. The Park Service has built upon the foundation of knowledge gathered by state archaeologists and assorted amateurs at the turn of the 20th century. Archaeological surveys have been done at various locations throughout the park, but additional work is still needed to provide complete baseline information for the park as a whole. Known sites need to be more fully evaluated using modern standards; this is particularly important at sites threatened by coastal erosion.



PARK CREATION—NATIONAL PARK EXPERIENCE BROUGHT TO MILLIONS OF URBANITES

The concept of taking national parks to the people was new and controversial in 1972, the year that Gateway National Recreation Area was established. Gateway's creation firmly placed the National Park Service at the nexus of demands about urban recreational needs, the 'race for space,' and the sanctity of its historical mission. Gateway and other urban national parks pit the historical Park Service mission that the parks ought to be limited to the preservation of historic and natural resources against a modern view that parks can play a major role connecting with people. It also aired the question about how long the public benefits from the National Park System can persist if they are not equitably available to all Americans.

As Gateway was one of the first urban recreation areas, and one that would require a lot of support, it was at the heart of this controversy. While it is true the park contains some fine examples of both natural resources (Jamaica

Bay estuary, Sandy Hook's holly forest) and cultural resources (historic Floyd Bennett Field, the Sandy Hook Lighthouse), Gateway really offered something perhaps even more significant: political relevance.

From park planners to elected officials, visionaries in the latter half of the 20th century understood the need to connect the changing demographics (economic as well as cultural) of our nation with national parks and their mission. Gateway was created and supported in order to provide that portal. Indeed, the very name "Gateway" was supposed to inspire its role as a park that was not only the portal to the Big Apple, but also a portal for millions to the National Park System.

In a historical context, Gateway's creation dates back to the Robert Moses era, a time during the mid-20th century when this urban planner designed projects that shaped much of New York City. But federal interest was probably first aroused in 1958, when Congress created the Outdoor Recreation Resources Review Committee to advise the legislative branch on

Gateway has more than 400 buildings and structures; many of them have decayed beyond repair. Others continue to deteriorate as the Park Service struggles, with limited funds, to develop and implement a management strategy.

the condition of America's urban spaces. Over the following years, non-profit organizations and governmental panels advised Congress and the Kennedy Administration on the growing crisis in urban open space.

Books such as Rachel Carson's *Silent Spring* (1962) and Stewart Udall's *Quiet Crisis* (1963) helped fuel increased environmental awareness, which was dubbed "The New Environmentalism." Udall, who was the U.S. Secretary of the Interior at that time, noted that the United States was the richest nation on earth, but Americans lived in an environment of "vanishing beauty, and...shrinking open space." Udall embraced the notion of expanding the traditional concept of America's national parks, and was an ardent supporter of federal efforts to bring the national park experience to urban dwellers. This concept of preserving land on those shrinking spaces adjacent to America's urban centers gained momentum throughout the mid-1960s as one way to escape the increasingly frenetic urban way of life.

On the heels of urban unrest and cries for social justice, a "Parks to the People" movement grew in the nation's cities, and when it crossed with the environmental movement already afoot, it culminated in the creation of Gateway National Recreation Area, Golden Gate National Recreation Area in San Francisco, Cuyahoga National Recreation Area near Cleveland, Chattahoochee River National Recreation Area near Atlanta, and Santa Monica Mountains National Recreation Area outside of Los Angeles. A "National Recreation Area" was a new designation that expanded on the role that many local and state parks played in providing recreational opportunities, while also including mandates to preserve and protect natural and cultural resources. Many hoped that Gateway would provide a national park experience for millions of people who lacked the means or opportunity to travel to more remote and

distant parks, while also preserving regional features of great importance.

Through the creation of Gateway, many complementary needs were to be addressed: open space would be preserved within a major metropolitan area, recreational opportunities would be provided to millions of urban residents, and special natural and cultural resources would be protected. It is clear that establishing a park within a major metropolitan area created a variety of challenges that must be addressed before the park can fulfill its goals and achieve its mission. It is also clear that additional funding is needed to adequately protect the park's natural resources and maintain and manage its cultural ones.

JAMAICA BAY, SANDY HOOK, AND STATEN ISLAND—THREE DIVERSE UNITS ENCOMPASS A VARIETY OF RESOURCES

Gateway National Recreation Area includes 26,658 acres of uplands, wetlands, and marine estuary distributed among three units: Jamaica Bay (New York), Staten Island (New York), and Sandy Hook (New Jersey). These units each contain natural resources that are important to preserve, as well as cultural resources that speak to different aspects of our national heritage.

Each unit maintains its own management and resource staff that is composed of members who represent different fields of expertise. These resident experts, though stationed at specific units, share their knowledge throughout Gateway. Help is also available from Park Service regional staff, university sources, and specialized centers such as the Olmsted Center for Landscape Preservation, though costs are often involved. Overall park management is housed at historic Fort Wadsworth on Staten Island. In an unusual arrangement, Gateway shares some of the land it manages with two other federal agencies, the U.S. Coast Guard and U.S. Army Reserve, and has allowed the City of New York to use portions of Floyd Bennett Field for municipal needs such as



driver training and helicopter maintenance. The U.S. Park Police and Park Service law enforcement rangers provide park protection.

Jamaica Bay

The Jamaica Bay Unit includes nearly all the salt marshes, islands, and bay bottom of Jamaica Bay, as well as portions of the western end of the Rockaway Peninsula, a largely developed sandy

spit between the bay and the Atlantic Ocean. The shore and islands within Jamaica Bay are highly dynamic as a result of fluctuating tides, erosion, longshore currents, and other coastal factors. More stable uplands within the Jamaica Bay Unit include Floyd Bennett Field, Fort Tilden, Jacob Riis Park, and Rockaway Point. Overall, this unit of Gateway includes 6,192 acres of upland, 1,000 acres of salt marshes, and

During summer months, free concerts sponsored by community organizations draw people to Gateway.



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11,350 acres of bay and ocean bottom.

The open water, benthic areas, intertidal flats, marsh islands, and upland areas of Jamaica Bay are designated as the Jamaica Bay Wildlife Refuge, the only wildlife refuge managed by the National Park Service. The refuge provides critical habitat for a variety of birds and marine life, and the wetlands within help filter pollutants and protect against storm surges. Surrounded by a sea of concrete, asphalt, and glass, the green spaces of Jamaica Bay beckon to birds and butterflies migrating along the Atlantic Flyway. According to a report by the New York City Department of Environmental Protection, more than one-fifth of all North American bird species commonly visit Gateway during migrations.

The green spaces of the Jamaica Bay Wildlife Refuge are also a sanctuary for city dwellers seeking opportunities to reconnect with nature. Benches stationed along the refuge's West Pond Trail invite visitors to sit and relax with a good book or train their binoculars on the many waterfowl that visit the refuge's two freshwater ponds. Unknown to many, the refuge is considered one of the East Coast's best birdwatching venues.

The Jamaica Bay Unit is also the home of many significant historic resources such as the Floyd Bennett Field Historic District, which includes New York City's first municipal airport. Here many civilian aviation records of the "Golden Age of Aviation" were set and broken.

During World War II, the site became an important naval air station where manufacturers sent newly built warplanes before they were deployed. After the war ended, Floyd Bennett Field continued to be active, serving in the defense of the New York City area until 1971.

Across the Gil Hodges Bridge on Flatbush Avenue, still within the Jamaica Bay Unit, are the Fort Tilden Historic District and Jacob Riis Park Historic District. Fort Tilden contains several concrete batteries that were part of an extensive network of fortifications that stood ready to defend the New York City area from sea and air attack; today many of these structures stand unoccupied. The Fort Tilden chapel, however, plays host to a children's performing arts center. Various park partners manage large expanses of recreation fields for soccer, cricket, and softball, and visitors have access to the beach and picnic areas.

Jacob Riis Park—named for the late-20th century journalist, who was a voice for the urban poor and an advocate for healthful recreation—features miles of beautiful beach that potentially could be further improved with the type of sand renourishment that the U.S. Army Corps of Engineers has provided to adjacent beaches operated by the City of New York. The centerpiece of the beach is a historic bathhouse that is a masterpiece of Art Deco architecture. Constructed under Robert Moses during the New Deal, the park was designed to give New York City's growing immigrant population a place to escape tenement life and reconnect with shoreline natural beauty and recreation.

Jacob Riis Park partly fulfills these goals for today's visitors. On brisk winter mornings, joggers can run along the beach where waves from the Atlantic Ocean crash into the sand. They may be joined by determined anglers hoping to catch striped bass or bluefish. On hot summer days, thousands of beach-goers stake out their plots of sand for afternoons of sunbathing, swimming, and picnicking. Neither Jacob Riis Park nor Floyd Bennett Field are

directly connected to the city's public transportation system, however, which means that access to these park sites is challenging for urban residents who lack personal vehicles.

Staten Island

The Staten Island Unit includes about 1,100 acres on three tracts located along the eastern shore of Staten Island, as well as two islands, Hoffman and Swinburne, south of the Verrazano Narrows Bridge in the Lower Bay. The unit's three principal land tracts are Fort Wadsworth, Miller Field, and Great Kills Park.

As in all the units of Gateway, well before the park was created, most of the salt marshes were backfilled and drained, the forests and maritime shrub communities were cleared, and the landscape was graded. Much of this work was done to support military uses. The land currently occupied by Fort Wadsworth was used for military purposes from the 1600s until 1994, first by the Dutch, then the English, and then by the American government. When the fort closed, it had the distinction of being the longest-run U.S. military installation in constant operation. Fort Tompkins and Battery Weed, granite forts built by the federal government around the time of the Civil War, still stand as icons of the history of our national defense. Although military uses altered much of the natural landscape at Fort Wadsworth, there are still some forested and other natural areas that attract wildlife and offer opportunities for small-scale restoration, which could be accomplished through partnerships with local naturalists, nearby residents, and school groups.

Construction at Miller Field Historic District began in the 19th century with a mansion built by the ferry and railroad baron Cornelius Vanderbilt. The mansion was torn down to make way for a World War I airfield that gained recognition for providing aerial coastal defense for the New York City region. It was the home of the 27th Division Air Corps of the National Guard, and played host to aviation giants

Charles Lindbergh and Admiral Richard Byrd. An unusual double seaplane hangar, built in 1920, is one of the most important historic buildings remaining at Miller Field as it reflects a unique period in early aviation history. In another corner of the site, a mature woodland features rare swamp white oak, cherry, poplar, and even American beech trees, which attract migratory birds, a host of resident nesting birds, butterflies, and other insects. Most of the rest of Miller Field is composed of soccer and baseball fields that provide recreational opportunities for local users.

Much of Great Kills Park was once salt marsh, but ongoing landfill operations increased the elevation and promoted growth of an upland vegetation community. This part of Gateway includes abundant fresh water and a wooded canopy—rare within the park—which makes it good habitat for migratory and resident birds, insects, small mammals, reptiles, and amphibians.

Hoffman Island is densely vegetated and harbors a heron colony as well as roosting sites for other waterbirds. Swinburne Island, the smaller of the two islands, is home to a large colony of double-crested cormorants (*Phalacrocorax auritus*) during the summer. In winter, it also provides a rare wildlife-viewing opportunity: From the boardwalk along Father Capodanno Boulevard and with the aid

Named an Important Bird Area by the National Audubon Society and American Bird Conservancy, Jamaica Bay Wildlife Refuge offers the potential to view more than one-fifth of all North American bird species.



DON RIEFE

of binoculars or spotting scopes, wildlife enthusiasts can watch seals sunning themselves on the island's rocky shoreline. The animals are also sometimes seen hunting or swimming near the Staten Island shores.

Sandy Hook

Sandy Hook, a major portion of which was once a New Jersey state park, encompasses about 2,044 acres and includes six miles of beach. This park unit is a barrier peninsula; in recent geologic history, it has changed back and forth between an island and a peninsula as storms and ocean currents moved sand. Atlantic barrier island formations such as Sandy Hook are generated and constantly reshaped by coastal geomorphologic processes that move sand with ocean currents. Sandbars initially rise above the waves and then become dunes; the dunes are covered in vegetation and eventually form stable islands or peninsulas. As a point of reference for this dynamic, the historic Sandy Hook Lighthouse was completed in 1764, and at that time it was about 500 feet from the tip of the peninsula; today, the lighthouse is 1.5 miles (about 7,920 feet) from the end of the peninsula.

Built by the British, the Sandy Hook Lighthouse guided ships to New York Harbor for centuries, and it remains an active navigation aid today. It is the oldest lighthouse in constant operation in the United States and is a national historic landmark, the highest level of significance for our nation's historic sites. Volunteers

and additional funds from the Sandy Hook Foundation and New Jersey Lighthouse Society enabled the park to refurbish the lighthouse, install exhibits, and help interpret the structure.

Life-saving stations are also parts of Sandy Hook's historic landscape; the unit's Spermaceti Cove Life Saving Station is listed on the National Register of Historic Places. Archaeological sites within the Sandy Hook Unit represent colonial, maritime, Revolutionary War, and War of 1812 history, as well as history related to late-18th century British Loyalist and free African-American communities.

Sandy Hook is home to nearly intact military landscapes that include Fort Hancock and the Sandy Hook Proving Ground Historic District, the first U.S. Army proving ground where new weapons and equipment were tested. These landscapes form the nucleus of a fort that evolved through two centuries, defending the New York and New Jersey coasts from the early-19th century through 1974. The U.S. Army first fortified the Sandy Hook peninsula during the War of 1812, and the fort and its associated military resources are designated as a national historic landmark. The fort continued to evolve by adding anti-aircraft defenses and a NIKE air defense system in the 1950s.

The historic uses of Sandy Hook as a military base shaped the unit's history and resources, and ensured its preservation from further development. Since the army abandoned the area and the Park Service took ownership, some areas have been reclaimed by native species and vegetation communities. Sandy Hook now includes a wide range of ecological communities such as sandy beaches, shallow bay communities, extensive tidal marshes, grass-covered dunes, shrub-covered back-dunes, freshwater woodlands, and a maritime forest dominated by American holly. Current issues within this unit, as in many other beachfront parks, include trampled dunes, habitat fragmentation from crisscrossing roads and trails, and the invasion of numerous non-native species.

Miles of sandy beach at Jacob Riis Park provide opportunities to reconnect with nature and relax with family, though the beach is not easily reached through the region's mass transit system.

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NATURAL RESOURCES—HAVEN FOR PEOPLE AND WILDLIFE AMIDST A LEGACY OF ECOLOGICAL CHANGE

The ongoing legacy of being a national park in the context of the most densely populated urban area in the United States includes profound effects on the condition and functionality of each of the terrestrial, freshwater, estuarine, bay, ocean, and aquatic-terrestrial systems within Gateway. Natural habitats have been dramatically altered in some areas, water inputs and sediment transport have been affected by the hardening of the surrounding landscape, and non-native species are widespread. NPCA's

Center for State of the Parks assessment rated the current overall condition of natural resources at Gateway National Recreation Area a "poor" score of 53 out of 100. Existing conditions are the product of historic uses before the park was created, as well as human activities that continue to affect park resources.

In the face of these challenges, Gateway's protected lands and waters remain valuable resources for wildlife and plants and provide opportunities to urban dwellers for education, recreation, and renewal. At Gateway, the Park Service has an opportunity and obligation to restore, preserve, and protect a variety of natural resources for today and for the future.

Gateway's salt marshes face a variety of threats, including development, pollution, and rising sea levels. A collaborative regional effort is under way to make the bay "swimmable and fishable" by 2010, but it lacks sufficient federal, state, and city funding.



Airport construction, which began in 1942, destroyed 4,500 acres of salt marsh. Today, Gateway borders the airport and must contend with toxic runoff, noise, and effects on nearby seabird colonies and other wildlife.

GATEWAY TO A NATION—SETTLEMENT OF NEW YORK CITY

The New York City metropolitan region has a long and diverse history of increased settlement, development, and modernization, which can be partly attributed to the region's natural resources that included productive forests, clean rivers and streams, and estuarine waters that teemed with food.

Today's Gateway National Recreation Area includes the tribal homelands of the Lenape people, also called the Delaware people by European colonists who moved to the region. Starting in the 17th century, the Dutch settled the area, followed by the English, and then came an influx of people from all over the world, which eventually gave New York City the distinction of being the nation's "melting pot."

In 1785, the city became America's first national capital, and by 1820, it was the nation's largest city. It has historically been and continues to be the major East Coast entry point for immigrants to the United States.

New York's impressive growth, which has been a hallmark of the city and has contributed to a renaissance in culture and economic benefits to this nation, has come at the expense of incredible natural resources characteristic of the region and sufficient recreational opportunities for its residents. By the end of the 20th century, when Gateway was created, nearly all of the New York metropolitan area had been dramatically transformed, if not in fact completely re-landscaped. Most of the areas within the park had also been affected by previous uses and surrounding development, but because much of the land had been held by the government for military purposes, it was saved from the extensive development that occurred around it. The creation of Gateway National Recreation Area was an exciting opportunity to recapture some of what was lost, restore natural features, and provide park resources for present and future generations. In order to accomplish these goals, it is important to understand some of the human actions that have shaped Gateway's resources and made them what they are today.

As previously mentioned, well before the park was created, most of the salt marshes were drained and backfilled, the forests and maritime shrub communities were cleared, and the landscape was graded. Much of this work was done to support colonists' farms and later for 19th- and 20th century military uses.

Additionally, in the early 1900s, there were plans to make Jamaica Bay a port for international trade, and so a deep-water channel was dredged to provide access for larger ships. As part of this plan, Canarsie Pier, a component of the Jamaica Bay Unit, was originally constructed as a freight terminal. The channels and deep pits created a trap on the north side of the bay that prevented sediments from

reaching and replenishing bay islands, dramatically decreased the shallow-water benthic area in the bay, and affected many of the biotic interactions and species populations that previously occurred there.

Construction of a major international airport commenced along the shores of Jamaica Bay in 1942, which included backfilling the marshes along the northern shore. Construction of New York International Airport, which was soon renamed Idlewild Airport and then again renamed John F. Kennedy International Airport, resulted in the loss of about 4,500 acres of marshland. Since then, the airport's operations have disrupted a nearby seabird colony, polluted adjacent marshes with highly toxic runoff, and today dominates the park with intense noise pollution. Federal Aviation Administration and Department of Agriculture officials have also repeatedly sought to influence and direct park planning and restoration designs.

In spite of all these alterations to natural ecosystems, the 26,000 acres of lands and waters within Gateway National Recreation Area possess significant ecological potential, particularly within the surrounding context of intense urban development. Peregrine falcons (*Falco peregrinus*) can often be seen nesting on the various bridges around the park, and a close look in an unkempt thicket will reveal the delicate blooms of rare orchids. While the poor overall condition of the natural resources within Gateway is a very real and troubling problem, the park presents a rare opportunity not available in other large urban areas: Many unique resources are still present, others might easily be restored, and all would be readily available to a large urban population that would not ordinarily have the opportunity to experience and enjoy them.

NATIVE SPECIES—PARK PROVIDES IMPORTANT HABITATS

Gateway National Recreation Area includes an array of Atlantic maritime habitats that are locally, regionally, and nationally important.

HABITAT RESTORATION MADE POSSIBLE THROUGH PARTNERSHIPS

Gateway's location and many varied resources have made it a favorite among a host of conservation and special-interest groups that want to protect it for the future. Efforts by the Park Service, partner organizations, and park enthusiasts to restore and enhance park resources such as Jamaica Bay, Fort Hancock, and Crooke's Point contribute to the goal of offering an outstanding national park experience for regional residents and visitors.

At Jamaica Bay, Gateway staff, partners, and volunteers have completed a pilot project aimed at restoring two acres of salt marsh at Big Egg Marsh, an effort to reverse the loss of salt marsh because of human disturbance and environmental changes. In 2003, thin layers of sediment were applied to the marsh surface using a pressurized spray nozzle. Following this treatment, about 20,000 plugs of *Spartina* grass were planted by park staff, volunteers, and staff associated with a number of local, state, and federal environmental agencies. Staff are monitoring the restoration, which promises to be a long-term success. Partly because of this pilot project, the Park Service is now engaged with the U. S. Army Corps of Engineers in a vastly greater effort—the restoration of 40 to 60 acres of salt marsh at Elder's Point

Some other habitat restoration and enhancement efforts are relatively simple and inexpensive, but the benefits to wildlife are substantial. For example, volunteers helped install tall poles with platforms at Crooke's Point. Osprey now use these platforms to build nests and raise their young.

Student Conservation Association interns help monitor the success of restoration efforts at Big Egg Marsh.



NATIONAL PARK SERVICE

The most seaward are the ocean front beaches stretching along Sandy Hook and on Rockaway from Riis Beach to Breezy Point. These quartz sand beaches are some of the park's greatest recreational assets; in addition, they provide nesting habitat for federally listed, endangered piping plovers (*Charadrius melodus*), threatened least terns (*Sterna antillarum*), oystercatchers (*Haematopus palliatus*), and black skimmers (*Rynchops niger*), and are key migratory way-stations for red knots (*Calidris canutus*) and dozens of other shorebirds. In fact, about one-third of New Jersey's piping plovers nest at Sandy Hook.

The backside of each beach is defined by the dunes, which build up as prevailing southwesterly breezes blow drying sands up the beaches. Behind the dunes, in the lee from the salt-laden air, is a series of distinct plant communities. These communities are composed of about 269 native vascular plant species, including 12 rare ones. The first is the swale community, which includes beach plum (*Prunus maritima*), bayberry (*Myrica pennsylvanica*), rose (*Rosa rugosa*), and pitch pine (*Pinus rigida*). As the prevailing salt spray diminishes, the swale community gives way to a shrub community,

and then to a classic maritime forest. While there is no significant tract of maritime forest left around Jamaica Bay, Sandy Hook still has a dense American holly (*Ilex opaca*) forest, comparable only to the Sunken Forest at Fire Island National Seashore.

In some areas even further from the sea, there are remnants of upland deciduous forests, such as the white oak (*Quercus alba*) stand in the northwest corner of Miller Field. Such remnant stands exemplify the natural communities present prior to the settlement and development of the area.

On the inland side of the ocean beaches, both along the western side of Sandy Hook as well as throughout all of Jamaica Bay, are expansive tracts of salt marshes. These marshes are primarily composed of grasses (*Spartina alterniflora* and *S. patens*) that were harvested as fodder by early settlers, and now serve as essential foraging grounds and nurseries for the region's fin- and shellfish.

Several species of rare plants reside in the salt marshes (*Aster tenuifolius*, *Cuscuta pentagona*, *Solidago sempervirens*, *S. rigida*, *Quercus phellos*, *Cyperus schweinitzii*). The sandy hillocks and shores among the marshes are critical nesting

Horseshoe crabs lay eggs along the shores of Jamaica Bay and Sandy Hook.



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Egrets and herons forage and nest within Gateway's salt marshes and other areas within the New York Harbor. Conservation efforts have been under way since the 1970s to protect these species collectively known as the "Harbor Herons."

habitat for the protected diamondback terrapin (*Malaclemys terrapin*), a turtle decimated in the 19th century because it was considered a delicacy. The salt marshes and several of the islands within Gateway also provide crucial foraging and nesting habitat for several species of egrets and herons. Known collectively as the "Harbor Herons," there has been an extensive conservation effort since the mid-1970s to monitor and protect the herons and egrets that nest in the New York Harbor area.

Finally, the park also includes all the waters within one-quarter mile from its shores, as well as the waters and submerged lands within Jamaica Bay. In the park's waters reside winter flounder (*Pseudopleuronectes americanus*), summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), striped bass (*Morone saxatilis*), and invertebrates such as blue crabs (*Callinectes*

sapidus), horseshoe crabs (*Limulus polyphemus*), blue mussels (*Mytilus edulis*), hard clams (*Mercenaria mercenaria*), and surf clams (*Donax varibilis*). Hudson Bay, which flows next to Fort Wadsworth, is the second largest producer of striped bass on the East Coast. In late spring, horseshoe crabs come ashore by the thousands all along Jamaica Bay and at Sandy Hook to lay their eggs—an impressive sight. In addition, the horseshoe crab eggs are an important food source for a variety of migratory birds such as the red knot, a candidate for federal listing under the Endangered Species Act.

According to the Jamaica Bay Ecological Research and Restoration Team (JBBERT), Jamaica Bay alone "supports 49 species of finfish, numerous shellfish and invertebrates, and a thriving eel population." Indeed, it is this extraordinary estuarine richness that brought early settlers to what is now Gateway.

COASTAL GEOMORPHOLOGY AND WATERSHED PROCESSES—ALTERED BY HARDENED LANDSCAPES AND SHORELINE STABILIZATION

Marine processes such as tides, coastal currents, storm surges, and associated shoreline dynamics are some of the most significant drivers of geomorphological processes (relating to the characteristics, origin, and development of landforms) at Gateway. In addition, rainfall on the adjacent upland urban landscape flows in the park's estuarine waters of Raritan Bay, Lower New York Harbor, and Jamaica Bay. Together, these forces determine the conditions of the park's waters and influence terrestrial patterns involving nutrient flows, vegetation, and community dynamics.

During the past 1,000 years, increasing settlement and urban development of the lands that surround Gateway have reshaped regional patterns of water movement, with continuing effects on park resources. For example, the natural watersheds that began as brooks, merged into streams, and ultimately fed Jamaica

Bay or Raritan Bay, were largely covered and filled to accommodate agricultural uses and subsequent urbanization. Freshwater flows, originally merely diverted, were disrupted as the region was paved and stormwater shunted aside into sewer systems. Indirect results include subsiding ground water and increased lateral leaching of pollution.

On the ocean side, Gateway grapples with many of the same issues found at other parks composed of barrier islands. Sustained long-shore currents and storms that reshape shorelines have been met with massive stabilization efforts. Humans have built jetties, groins, and seawalls, and have even undertaken huge dredging projects to protect beaches and current shoreline configurations. Jetties and groins extend perpendicularly to beaches in order to trap moving sand, while seawalls and backfilling directly add to beachfronts in order to stabilize the shoreline. Efforts to control nature conflict with a shoreline that naturally shifts.

SALT MARSH—DYNAMIC COMMUNITY IN PERIL

Functional salt marshes, although historically widespread along the East Coast, are becoming rarer as shoreline development and hydrologic manipulation continue. According to analysis by the New York State Department of Environmental Conservation, Jamaica Bay salt marsh was lost at a rate of about 26 acres per year between 1924 and 1974. Analysis of losses between 1994 and 1999 are even more alarming: 220 acres of Jamaica Bay salt marsh were lost at a rate of 44 acres per year. Protecting and preserving salt marshes in the face of ongoing development, human disturbance, stormwater run-off, dredging, rising sea levels, and a host of other issues is a key concern for Gateway staff and other regional land managers.

Development and shoreline hardening for the purposes of stabilization, along with associated hydrologic alterations, continue to degrade

and destroy salt marshes along the eastern seaboard of North America. Preserving and enhancing salt marshes has become even more critical, especially since it has become clear that even protected areas like Gateway are vulnerable. Across Gateway—particularly in Jamaica Bay and along Sandy Hook—there are large swaths of salt marshes facing a variety of threats.

Salt marshes typically lose sand through erosion, which is offset by accretion as new sediments are transported into the estuary and deposited on the marshes during storm events and associated high tides. Salt marshes thus shift within an estuary and thrive through constant regeneration and rejuvenation. In Gateway and elsewhere along the coasts, however, this cycle has been significantly changed. Urbanization on adjacent lands has essentially eliminated the normal process of sediment and nutrient runoff from the uplands, a key element necessary to sustain marsh and island systems. Dredging to deepen bay waters for marine navigation has removed even more sediments from the estuarine system, and has strengthened coastal currents, increased erosion, and created new sediment traps where suspended particles settle before ever reaching the islands that depend on them.

While the salt marshes have been disappearing for a long time, the rising sea levels associated with global warming give new cause for alarm. Normally, when sediments are available and deposited on the surfaces of salt marshes, the marshes are able to accrete at rates that keep pace with rising sea levels. At Gateway, several major factors are combining to dramatically affect this process. First, with sediment input curtailed and dredge pits 'swallowing' what is left, the salt marshes cannot accrete fast enough to keep pace with rising waters. Second, upslope migration is not an option, as the surrounding edges of the bay have been hardened by urban development. Finally, floating debris and stormwaters polluted with chemicals are scarring the salt marshes and slowly poisoning them.

The threats and issues affecting salt marshes transcend park boundaries and National Park Service jurisdiction, just as the salt marshes that are affected occur both within Gateway and in the larger surrounding region. There are several campaigns and programs under way to study salt marsh decline, propose solutions, and restore key areas. Buffer the Bay, a campaign initiated in 1987 by the Trust for Public Land and the New York City Audubon Society, detailed all the available land on the littoral edge surrounding Jamaica Bay and built a campaign to procure and protect more than 13 important tracts. Since the study was prepared, New York City's Parks & Recreation and Environmental Protection Departments and New York State's Department of Environmental Conservation have successfully protected and set aside major portions of 12 of the 13 identified tracts; just one large section on Thurston Basin is being withheld by New York City for development.

In 1988, just after the Buffer the Bay campaign was initiated, the Environmental Protection Agency designated the New York/New Jersey harbor estuary an "Estuary of National Significance." In response, the New York/New Jersey Harbor Estuary Program (HEP) was launched as part of the National Estuary Program authorized by the EPA. HEP is a large collaborative partnership of federal, state, and local agencies, scientists, and various civic and environmental advocates. HEP's goal is to develop a plan to protect and restore the estuary. Meeting regularly during the year, HEP directs funds at key projects, serves as a forum for discussing ongoing issues, and otherwise acts as a clearinghouse on environmental matters affecting the harbor.

HEP's work appears to have led the way for a new effort, and in 1999, following authorization to move ahead with a \$1 billion dredging project for deepening New York Harbor, Congress directed the U.S. Army Corps of Engineers (USACE) to conduct an estuary-wide



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environmental restoration study. The Hudson-Raritan Estuary Ecosystem Restoration Study (HRE Study) is co-sponsored by USACE and the Port Authority of New York and New Jersey. The goal of the study is to develop a long-term comprehensive restoration plan of environmental improvements that would help restore the ecological value and richness of this nationally important resource, or as HEP says, make it "swimmable and fishable." Most important for Gateway, as part of the HRE study, a preliminary assessment of restoration opportunities was assembled for Jamaica Bay that identified eight sites owned by the National Park Service, City of New York, and the State of New York. Although efforts to ecologically restore these sites have been widely lauded by civic groups, public agencies, and environmental advocates, they have stalled because Congress has not appropriated the funds authorized for this work.

WATER QUALITY—HISTORIC AND CONTEMPORARY POLLUTION AFFECT PARK WATERS

The waters of the New York/New Jersey Harbor have a long history of contamination. Heavy metals were dumped into the water until regu-

JoCo Marsh in the Jamaica Bay Unit supports the state's only laughing gull colony, but external threats such as development, pollution, and rising sea levels put salt marsh habitat at risk.

lation began in the mid-1960s. Recent sediment cores have revealed that chromium, cadmium, iron, nickel, and lead persist in benthic sediments, and some of these contaminants are still being deposited. In the late 1990s, surveys of herring gull eggs at Jamaica Bay revealed the bioaccumulation of selenium, lead, cadmium, mercury, chromium, and manganese. Analysis shows that sewage effluents were carrying the largest quantities of nickel, zinc, copper, and cadmium; atmospheric fallout was the main source of lead; and that leaching from landfills is a smaller source of metals.

The estuarine waters surrounding Gateway and the waters of Raritan Bay, Lower New York Harbor, and Jamaica Bay are still inundated with treated and untreated sewage, industrial waste, toxic substances that leach out from landfills, and runoff from numerous commercial sites, including regional port facilities, John F. Kennedy International Airport, and thousands of other non-point sources. In the past three decades, however, there has been a significant improvement in water quality in the region, largely because municipal and industrial discharges have been abated, with available dissolved oxygen increasing and fecal coliform counts decreasing. Unfortunately, Jamaica Bay has been the slowest to improve, and still suffers deeply from the effects of that pollution. Wastewater effluent and stormwater runoff from street sewers are still major sources of pollution entering the bay. Sewage effluent, which contains treatment by-products such as chlorine and non-treated contaminants such as heavy metals, flows into Jamaica Bay at a rate of 240 to 340 million gallons each day, and the ongoing effects are demonstrated, in part, by the increasing turbidity of the bay, a trend unique in the harbor.

Fortunately, at the south end of Gateway, the oceanic waters offshore of the Staten Island and Sandy Hook Units are mixed with waters from the Hudson and Raritan Rivers. While the runoff draining into Raritan Bay around Sandy

Hook passes through large suburban, urban, and industrialized landscapes, its mixing with the oceanic waters helps regulate pH and salinity, and dilutes contaminants. With greater cycling and flushing of these waters, bacterial counts at the Staten Island and Sandy Hook Units are only occasionally above limits during the summer (bathing and monitoring seasons), and fecal coliform levels have decreased in the Lower Bay since the 1970s. While the most dramatic declines occurred from the 1970s to the early 1990s, levels have remained about the same since then. In 2003, the bathing beach at Great Kills had no elevated fecal bacteria counts, but incidents of elevated counts were reported at nearby Fort Wadsworth, New Dorp (Miller Field), and Oakwood Beach.

AIR QUALITY—PREVAILING WINDS MITIGATE SOME POLLUTION

Air quality is a concern throughout the United States, and national parks are not immune to pollution that drifts in from local and regional sources. Motor vehicle emissions and pollution from coal-fired power plants both contribute to reduced visibility, acid deposition, and dangerous ground level ozone, which are problems at many parks in the northeastern United States. At Gateway, major pollution sources are located across the upwind regions to the west. Local sources include port facilities, the New York/New Jersey Harbor's shipping traffic, and the great amount of vehicular traffic in the region, which is among the worst in the nation.

Gateway's seaside location supplies the park with coastal breezes that help clear out pollution, but brisk ocean breezes do not completely eliminate concerns. Overall, particulate, visibility, and ozone indices show air quality varies from good to impaired across timeframes ranging from days to seasons. According to the Park Service Air Resources Division and National Atmospheric Deposition Program, Gateway and the rest of the New York-New Jersey metropolitan region receive greater than average levels of

wet deposition of chloride ions, nitrates, and sulfates, as well as levels greater than the national average for particulates that reduce visibility and cause respiratory problems. Some of the particulates in the air include lead, cadmium, zinc, copper, nickel, vanadium, and antimony at levels that are 200 to 20,000 times their natural abundance. Depending, in part, on weather patterns that influence particulate movement, varying levels of these contaminants are deposited across parklands and waters.

NON-NATIVE SPECIES—CONTROL EFFORTS NEEDED TO PROTECT NATIVE SPECIES

Non-native species are common throughout Gateway. Between 36 and 94 percent of the species at Gateway are non-native, depending on location. The most critical species to address are new arrivals and those that threaten important communities, habitats, and rare or protected species. For example, endangered and protected species such as piping plover, diamond-back terrapin, and two species of rare daisies depend on coastal environments, making protection of these areas against non-native invaders a priority. The park is developing a management plan to address non-native, invasive plants and has been working with the Northeast Region's Exotic Plant Management Team to control and, in some cases, eradicate them. Some non-native species in the park became established as a result of disturbance from historic activities that disrupted native communities, others were planted as landscape decoration, and some such as Asiatic sand sedge (*Carex kobomugi*) arrived by accident. This species was used as a packing material on ships and likely washed ashore from wrecks.

Much of the Staten Island Unit is landscaped, and vast lawn areas consist of non-native species such as bluegrass (*Poa pratensis*). Some species such as Russian olive (*Elaeagnus angustifolia*), autumn olive (*E. umbellata*), red chokeberry (*Aronia arbutifolia*), purple choke-

berry (*A. prunifolia*), and buckthorn (*Rhamnus frangula*) were planted to supplement wildlife habitat, especially for migratory birds, but according to scientists, many of these species are reaching levels that disrupt community structure and function.

Rehabilitating or maintaining historic landscapes is most important in some areas, but ensuring the preservation and enhancement of critical natural habitat is paramount in others. Sometimes these two management goals can be pursued simultaneously, as in the grassland effort at Floyd Bennett Field, which is designed to provide habitat for grassland birds and approximate the historic landscape.

The grasslands at Floyd Bennett Field once provided nesting habitat to birds such as upland sandpipers, meadowlarks, and grasshopper sparrows.



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Under the shadow of the Verrazano Narrows Bridge, Battery Weed once guarded the entrance to New York Harbor: It is an impressive reminder of Gateway's military history, which spans three centuries.

CULTURAL RESOURCES—FUNDS, STAFF, AND RESEARCH NEEDED TO PRESERVE HISTORICAL RESOURCES

Gateway includes prehistoric and historic archaeological resources, varied cultural landscapes, museum collections, and ethnographic connections with regional ethnic and religious communities. Gateway is also home to an array of structures, many of which illustrate aspects of our nation's military and social history. Staffing and funding challenges make it difficult to complete needed plans, fully research all resources, and preserve the park's extensive cultural resources.

Gateway scored 46 out of 100 for overall

cultural resource conditions, which indicates 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 federal policies related to cultural and historic resources.

HISTORY— HISTORICAL BACKGROUND STUDY NEEDED

Gateway National Recreation Area is a large park spread over disconnected units throughout one of the largest and most complex urban environments in the United States. The recreation area was established in 1972 to preserve some of the

last open space around New York City's harbor, provide recreational opportunities, and bring the national park experience to urban America. As part of the National Park System, Gateway is also charged with "preservation of significant historic resources and important natural areas."

Gateway is home to a large collection of American history, and the park itself has an interesting history, but the park does not have a staff historian to conduct valuable research. A historical review and study of the park would provide managers with needed context, important for understanding previous management decisions. This type of study would explore larger issues such as the historical dimensions of today's complex management challenges and successes; the historical relationship among the various local, state, and federal agencies involved at Gateway; and the park's original goals and how well they have been met. Equally as important, such a study could examine the relationships among cultural resource stewardship, natural resource management, and the park's original recreation-focused mission. This would help the park move forward with a comprehensive vision for Gateway's future.

As a first step, a historic resource study focusing on Gateway's importance to national defense during the Cold War will likely receive funding soon; an effort is also needed to record the thoughts and experiences of veterans and civilians who worked at Floyd Bennett Field and Fort Hancock. These oral histories, which must be gathered before the opportunity is lost, would help enrich interpretation at the airfield and fort.

Military and aviation history are the dominant historical themes in most of Gateway. Historic studies of Jacob Riis Park and the Sandy Hook Lighthouse would help expand the park's messages. New research at Hoffman and Swinburne Islands and locations around Jamaica Bay would enhance a multi-disciplinary approach to cultural resource stewardship and support future archaeological projects.

ARCHAEOLOGY—RESEARCH, VISITOR EDUCATION, AND LAW ENFORCEMENT NEEDED

Gateway's archaeological resources have the potential to teach us much about our American heritage. The park is full of sites related to colonial history, the Revolutionary War and War of 1812, maritime history, and 18th- and 19th century community and social history. Land adjacent to the Sandy Hook Lighthouse may have once been home to Revolutionary War-era Loyalists and free African-American communities; Gateway's Fort Hancock, Fort Tompkins, and Fort Wadsworth protected America's coasts during times of war; and Hoffman and Swinburne Islands off the coast of Staten Island were used during the late-19th century to the 1930s to quarantine Ellis Island immigrants thought to have contagious diseases.

In spite of this wealth of archaeological resources, fewer than ten archaeological sites were listed in the Park Service's Archaeological Sites Management Information System (ASMIS) as of 2005, though about 100 were added in 2006 as the lists from Sandy Hook were updated, and the park will continue to add more. Just one site is listed in the National Register of Historic Places.

There is a great potential for additional archaeological work at Gateway, which could contribute to the historic and prehistoric record of the region, but gaining additional knowledge has been difficult, in part, because the park has not had an archaeologist on staff since 2003. Archaeological surveys have been completed for Floyd Bennett Field, Fort Tilden, Riis Park, Miller Field, and Battery Weed, but some critical baseline information is still lacking, and no park unit has a finalized archaeological overview and assessment. Sandy Hook received an initial archaeological overview and assessment, but it has not been finalized, while a draft overview and assessment of Fort Wadsworth may not meet current Park Service standards.

A full documentation of the park's archaeo-

The buff brick buildings along Officers Row once housed the families of military officers stationed at Fort Hancock on Sandy Hook. The exteriors of the buildings still look much as they did when they were built at the turn of the 20th century.



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logical resources is needed, especially as coastal erosion and rising sea levels threaten to wash away some sites. Cove House, built in 1849 as one of the first life-saving stations in the United States, contained the surfboat and rescue equipment that early volunteers needed to save those trapped on ships that had run aground on offshore sandbars. Park staff sandbagged the house in the past to stave off erosion, but this solution was temporary, and the house is in imminent danger of being lost. Other shoreline archaeological sites that could provide insight into how area residents used the bay's abundant natural resources may also exist; the park would be in a better position to explore this potential with the return of a staff archaeologist.

Looting and illegal access also threaten archaeological sites. Amateur 'archaeologists' have long plagued American Indian sites in the region, and while the exact numbers are not known, scuba divers visit shipwrecks and other submerged resources within park boundaries

and remove items. Metal detectors are also occasionally observed in the park, though they are mostly used on public beaches to find recently lost items. Some park visitors may not know that these kinds of activities are illegal, which underscores the importance of educating visitors about Gateway's cultural resources and how to treat them. Park staff understand this need and strive to reach as many visitors as possible, but a limited number of rangers makes it impossible to engage users in all areas.

HISTORIC STRUCTURES—HUNDREDS OF STRUCTURES PRESENT MANAGEMENT CHALLENGES

Gateway National Recreation Area is home to more structures than all other parks in the Northeast Region combined. Nearly 400 buildings are on the park's list of classified structures, and many of these structures bring the park's history to life. The conditions of these structures range from good to poor. Fort Hancock, a

former military community composed of a collection of buff brick buildings, externally still looks much as it did when it was built at the turn of the 20th century. Particularly impressive are the 18 similarly styled homes along Officers Row, where officers lived with their families. Mostly empty, the buildings' exteriors are relatively well preserved, though windows are covered with plywood.

The control tower at Floyd Bennett Field gives visitors a bird's eye view of runways that stretch across the airfield, where famous aviators such as Howard Hughes once set speed and distance records. An overlook at Fort Wadsworth frames an expansive view of the Civil War-era fortification, Battery Weed, with gray granite walls looming against the backdrop of Manhattan.

In addition to these historic structures, the park also houses many former storage and utility buildings. Many of these were listed in poor condition on the park's 2005 list of classi-

fied structures. As is common with abandoned defense bases and airports, most of the buildings and structures were not being maintained or repaired before the Park Service inherited them. Over the years since their acquisition, small holes in roofs became bigger holes, and decades of rain and snow then ruined walls and floors below.



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Hundreds of structures throughout Gateway, such as the Officers Club at Fort Hancock, are in serious need of major repair or in some cases removal. With insufficient funds for preservation and interpretation, the park plans to lease some structures, though not all will be saved through this alternative.

In a climate of limited funds and competing priorities, resource managers and administrators face incredible challenges managing park structures that have been deemed historically significant. At Floyd Bennett Field, a single historic hangar costs thousands of dollars each month simply to heat. In the absence of adequate funds, many structures will continue to deteriorate. Federal law mandates the Park Service to identify, manage, and protect historic properties that are under its jurisdiction, yet chronic under-funding has not only prevented the Park Service from maintaining or restoring all these structures, but also prevented park staff from being able to perform basic research and evaluations to determine their historical context and structural conditions. Park managers are in a difficult position because understanding the significance and relationships among all of the park's resources—including the various structures and their relevance to Gateway as a whole—is important in guiding management decisions.

Recently, through the park asset management plan (PAMP) process, Gateway staff have begun to evaluate the importance of various structures within the park both with respect to their needs as well as with respect to the Park Service's mission. The PAMP process will help park managers focus limited fiscal resources on the park's most important cultural and natural resources, and help managers decide which structures need to be preserved and which ought to be removed.

Finding ways to provide for the long-term preservation of those structures that have been determined to be most significant to the park is one of the most challenging questions facing Gateway's managers. The park must compete for discretionary funds with all other parks in the system through an annual call for project proposals. In addition, the Park Service has certain authorities to leverage outside funds for this purpose, such as the Concessions Franchise Fee and leasing programs. And, to a limited

extent, park partner organizations seek grant funds on behalf of the park.

On Sandy Hook, the Park Service has entered into a lease with Sandy Hook Partners, LLC, for the rehabilitation and adaptive use of 35 historic structures within the Fort Hancock and Sandy Hook Proving Ground Historic District. The Park Service also has leases and use agreements with the National Oceanic & Atmospheric Administration (NOAA), American Littoral Society, New Jersey Audubon Society, Rutgers University, and other academic institutions. At Floyd Bennett Field, one huge hangar is leased to the non-profit Historic Aircraft Restoration Project (HARP). As has occurred at Golden Gate National Recreation Area, as well as other state and municipal parks across the nation, leasing programs will undoubtedly expand in the future to ensure the preservation of historic structures in the face of limited federal funds and competing priorities.

CULTURAL LANDSCAPES—LIMITED RESEARCH UNDER WAY

Cultural landscapes tell the stories of how humans have shaped and been shaped by their surroundings. The lands within Gateway have long histories of human use. While the park has no cultural landscapes listed in the National Park Service Cultural Landscape Inventory—the official list of recognized cultural landscapes—park staff manage nine as cultural landscapes: Battery Weed, Breezy Point, Floyd Bennett Field, Fort Hancock, Fort Tilden, Fort Wadsworth, Great Kills, Jacob Riis Park, and Miller Field.

When Gateway was authorized, Congress particularly directed the Park Service in the Sandy Hook and Staten Island Units to "inventory and evaluate all sites and structures having present and potential historical, cultural, or architectural significance and shall provide for appropriate programs for preservation, restoration, interpretation, and utilization of them." Thus, the cultural landscape of Fort Hancock



and the associated proving grounds within the Sandy Hook Unit have received the most study. Work has included a historic landscape assessment (1994), landscape preservation maintenance plan (1997), cultural landscape reports (1999), and a cultural landscape treatment plan (due for completion). The *Fort Hancock Rehabilitation Guidelines* (1999) offer direction for managing and maintaining the Fort Hancock landscape, and, in 2006, the park completed a cultural landscape treatment plan for the fort.

At the Jamaica Bay Unit, a cultural landscape report for Jacob Riis Park was completed in 1989, but a 2002 draft landscape treatment plan has not yet been finalized. At Fort Wadsworth, the park requested funds for a cultural landscape report, but funds were provided only to address

Battery Weed. Cultural landscape reports are under way at Floyd Bennett Field and Fort Tilden.

MUSEUM COLLECTION AND ARCHIVES—COASTAL ENVIRONMENT PRESENTS STORAGE CHALLENGES

Gateway is home to a large collection composed of archaeological and historical artifacts such as military uniforms, architectural drawings, and thousands of historic photographs. This collection, which includes more than 143,000 items, is predominantly stored and exhibited at Fort Wadsworth and Sandy Hook, with some storage at Floyd Bennett Field.

The park's *Checklist for Preservation and Protection for Museum Collections* is up-to-date, and the collection is well secured, but storage facilities are antiquated. Gateway's coastal envi-

A cultural landscape report is under way at historic Floyd Bennett Field. It will guide treatment and use of the landscape, and will help inform interpretation.

ronment and location at sea level pose a variety of challenges, and flooding is always a possibility.

Through funding from the Park Service, Gateway plans to improve some collection storage facilities. At Sandy Hook, the park plans to rehabilitate the Fort Hancock Barracks and Mess Hall into a consolidated administration and visitor facility, with work beginning during 2007. The park needs to prioritize the collections so that the most important and vulnerable items are stored at the new facility. Collections at Fort Wadsworth and Floyd Bennett Field remain at risk, and funds are needed for temperature and humidity controls for these areas.

Gateway's curator is responsible for caring for the park's growing collections, but current funding and staffing levels will make future management difficult. Seventy percent of the park's museum objects have not been cataloged, and this figure will increase as the park continues to acquire new items. A museum technician would be a valuable addition to Gateway, as would a park archivist. The collection and archives are stored at various

Gateway's museum collection includes many artifacts related to the area's military history.

locations throughout the park. Reorganizing the collection would ensure easier access to items and would facilitate an administrative history. At this time, only researchers who have made appointments with the curator can view the collection.

ETHNOGRAPHY (PEOPLES AND CULTURES)—SOME PROJECTS COMPLETE, WHILE OTHERS NEEDED
 Many different groups of people have long used the lands within Gateway. The park's 1995 ethnographic needs assessment identifies a diverse list of tribal and traditionally associated groups that includes the Delaware Nation and the Stockbridge Muncie Delaware community, as well as diverse ethnic communities (African American, Korean, Caribbean, and more) and religious groups (Christian, Buddhist, and others).

The assessment also identifies four ethnographic projects needed for the Jamaica Bay Unit: a rapid ethnographic assessment procedure for Jacob Riis Park, an ethnographic overview and assessment for Floyd Bennett Field, a traditional use study of non-sport fishermen and fishing practices, and a traditional use study of religious practices. The park completed the rapid ethnographic assessment for Jacob Riis Park as well as an ethnostudy of the Gateway Gardens at Miller Field and Floyd Bennett Field, and funds are promised for an ethnographic overview and assessment and a cultural affiliation study for Jamaica Bay. Although ethnographic projects within Jamaica Bay have been funded, no known ethnographic work has been proposed or undertaken for the Sandy Hook and Staten Island units.

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STEWARDSHIP CAPACITY

FUNDING AND STAFFING—COMPETITION FOR SCARCE DOLLARS

Gateway has an annual base budget of about \$21 million. Although this may seem like a great deal of money, it is inadequate to properly manage the park. This budget has not increased for several years despite rising utility costs and mandated salary increases. In fact, fixed costs and salaries account for about 95 percent of the budget, leaving only 5 percent for discretionary spending. As a result, cultural and natural resource management activities, like all other

park programs, must compete for increasingly scarce funds. Attrition among permanent staff is a serious problem because permanent positions can be paid for only with base funds.

Two additional and fairly unique aspects of staffing affect Gateway. It is a challenge to communicate the Park Service's mission to a very diverse visitor population of different ethnicities and socio-economic backgrounds with a limited staff; and since September 11, 2001, Gateway's law enforcement rangers have shifted their efforts to other national park sites within New York City.

Gateway is the first national park experience

A ranger teaches visitors about park resources at Sandy Hook. Gateway needs additional funds for interpretation, outreach, and resource protection.

PROJECT HARP KEEPS HISTORY ALIVE

Hangar B at Floyd Bennett Field has a humble exterior that gives little hint of the treasures found within it. Visitors who venture inside are rewarded with a motley assortment of vintage aircraft that represent the gamut of our nation's aviation history. There is constant activity as volunteers from the Historic Aircraft Restoration Project (HARP) undertake the painstaking work of restoring a significant collection of aircraft. With help from families and friends, a dedicated group of volunteers (whose members average about 75 years of age), work on such restored aircraft as a C-47 Gooney Bird, C-45 Expediter, Grumman Goose, and HH-3 Pelican Coast Guard helicopter. Currently the group is engaged in building an all-wood replica of the Winnie Mae, the Lockheed Vega plane that aviator Wiley Post flew around the world in eight days, starting and finishing at Floyd Bennett Field. Visitors are welcome to watch the progress. Work slows during the winter, as temperatures in the unheated hangar drop uncomfortably low. At any time during the year, however, these dedicated volunteers are always willing to set aside their power tools to tell visitors about each plane.

Hangar B is tucked a bit out of the way for casual Floyd Bennett Field visitors, but it is well worth finding. And, if the park is able to find support to restore a better positioned hanger, the aircraft will eventually be moved to a more prominent location.

Dedicated volunteers from the Historic Aircraft Restoration Project work to restore a variety of planes kept in Hangar B at Floyd Bennett Field. Visitors can watch the progress and learn about the park's aviation history.



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for many visitors, not surprising given New York City's role as the nation's melting pot. This means that many visitors do not immediately understand the significance of their surroundings and may not be familiar with the rules and regulations and expected behavioral norms of the National Park System. Thus, a significantly larger budget allocation for signs, publications, educational outreach, and publicity campaigns would help the park further fulfill its role as a "gateway" to the National Park System. Education coupled with enforcement of resource protection laws is needed to ensure Gateway's unique natural and historical attributes are preserved and protected for future generations.

Although Gateway's law enforcement rangers patrol parts of the park, since September 11, 2001, they have concentrated their efforts around Federal Hall, Statue of Liberty, and Ellis Island. In addition, the officers now spend a greater portion of their time on crowd control and other general duties. Overall, the estimate of the annual burden of increased Homeland Security duties placed on the Park Service system-wide are \$40 million, and Gateway bears a large portion of this.

PLANNING—SEVERAL MANAGEMENT PLANS NEEDED

Gateway is a complex park that was established to provide recreational opportunities as well as to preserve and protect natural and cultural resources. To most effectively meet these various goals, the park needs one overall general management plan (GMP), and should also have in place a variety of management plans for its individual units to guide daily and long-term activities.

Gateway's existing GMP is outdated (1979), and general management plans for each of the park's three units do not adequately address natural resource management needs and concerns. Specific natural resource plans are lacking, there is no resource management plan



Education programs at Jamaica Bay's Ecology Village give area schoolchildren opportunities to experience park resources and learn how their lives are tied to ecological processes.

that includes cultural resources, and some baseline cultural resources information has not been collected. Additional plans and studies such as a resource stewardship plan to guide natural and cultural resource management and an updated general management plan that provides a unified vision are needed to direct park staff in their efforts to provide the best protection for park resources.

RESOURCE EDUCATION—RANGERS AND PARTNERS PROVIDE AN ARRAY OF OPPORTUNITIES

Take a walk with a park ranger to see migrating seals at Sandy Hook Bay; celebrate Black History Month with a presentation about the Tuskegee Airmen of World War II; learn nature photography techniques from a professional photographer at Jamaica Bay; and explore Fort Wadsworth by night with a ranger-led lantern tour. These are just a small sample of the interpretive programs at Gateway that teach partici-

pants about the many facets of the park's natural and cultural history.

Gateway's location in the midst of millions of urban residents and countless schools and colleges places the park in the enviable position of being able to reach a great number of children and adults. The true ability to reach the public is limited, however, as Gateway has just 15 permanent interpretive rangers who are responsible for creating and presenting programs in Gateway, and access to the park via public transportation is limited. In spite of these challenges, the park offers educational programs that range from a couple of hours to those that extend through the course of a year. Staff aim to teach students about ocean dynamics, biological community functions, and how their lives and activities at home relate to the larger surrounding ecosystems.

In 2006, 3,640 students participated in environmental education programs at Floyd Bennett Field's Ecology Village Program. At Sandy Hook,

PARK PARTNERS AND VOLUNTEERS ENHANCE LEARNING OPPORTUNITIES

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Volunteers and additional funds from the Sandy Hook Foundation and New Jersey Lighthouse Society enabled the park to refurbish the Sandy Hook Lighthouse, install exhibits, and help interpret the structure.

Gateway is fortunate to have a host of partner organizations and volunteers that supplement the park's limited program offerings and help provide additional educational opportunities for visitors. Some programs are free, while others are provided for a charge. The New Jersey Lighthouse Society leads weekend tours of the Sandy Hook Lighthouse, the Ocean Institute offers a variety of grade school programs, the Linnaean Society of New York and the Audubon Society offer numerous bird tours, the American Littoral Society sponsors tours, beach clean-ups, and horseshoe crab counts, and the Sandy Hook Foundation offers tours and a free concert series throughout the summer. Some organizations like HARP and New Jersey Audubon

contribute twice; not only do they provide programs, they roll their revenue over into leasing historic buildings in the park. This makes their activities more accessible to visitors, and it helps fund upkeep of buildings.

In addition to non-profit groups, volunteers and students are also critical to the success of Gateway's interpretive programs. Student Conservation Association (SCA) interns do a lot of work at Sandy Hook, which has just three staff interpreters to organize public programs. At Jamaica Bay, volunteers and partner organizations lead about 90 percent of the interpretive tours. Some of the historic buildings that are open to the public are also staffed by volunteers, SCA interns, and various partner groups.

Further, undergraduate and graduate students from Rutgers University, Columbia University, New York University, Fordham University, and Queens College undertake field work and research projects that contribute to the fundamental base of information about Gateway. Professors and students from these institutions and others have long led core research programs examining ecological, historical, and sociological issues.

Gateway's location provides ready opportunities for partnership and volunteerism that are not present at remote national parks such as Grand Canyon. Managing relationships with a host of partners and volunteers, however, is time-consuming. Recruiting and training additional groups and individuals would further benefit park resources and visitor education efforts, but funds and staff are not always available. Gateway would be in a better position to fully leverage these sources of support with the addition of staff and funds directed specifically to these efforts.

a total of 32,231 students participated in both formal programs (2,354 programs) and in numerous self-guided trips, while at the National Parks of New York Harbor Education Center, 2,923 students and 884 educators participated in 118 programs. With more than one million children in the New York City school system, however, the park needs more resources for outreach and education.

EXTERNAL SUPPORT—PARTNERSHIPS BENEFIT PARK RESOURCES

The lands and waters within Gateway National Recreation Area are important to a wide spectrum of stakeholders. A host of national and regional organizations and agencies are active in the conservation and preservation of lands and waters within Gateway and the surrounding region. Within Jamaica Bay alone, more than 25 public agencies have jurisdiction over various activities, in addition to research and conservation organizations and institutes that focus on the health of park and regional resources. Information sharing and research coordination among all of these various entities is key to ensuring the best management of the shared resources of the bay.

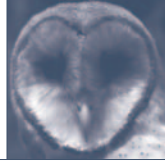
Much research effort has been focused on Jamaica Bay. The Jamaica Bay Task Force, Jamaica Bay Institute, Jamaica Bay Research and Restoration Team, and Jamaica Bay Research and Management Information Network are all large collaborations composed of different agencies, non-profit organizations, and academic partners. All exist to collect, coordinate, and disseminate information on conditions of Jamaica Bay. In addition, Jamaica Bay has long been a focus of the EPA's Harbor Estuary Program, another partnership involving several hundred non-profit groups and government agencies to protect, conserve, and restore the estuarine waters from Raritan to Jamaica Bay and about 30 miles up the Hudson River to the Tappan Zee Bridge. At Sandy Hook, the Park Service provides space to partners such as the

Audubon Society and the American Littoral Society, as well as research facilities for Brookdale Community College, Monmouth County School District, New Jersey Marine Sciences Consortium, Howard Marine Sciences Laboratory, Sandy Hook Ocean Institute, Rutgers University Institute of Marine and Coastal Sciences, and the National Oceanic and Atmospheric Administration.

Partnerships are not all focused on the park's natural resources. Without sufficient funding to rehabilitate the hangars at Floyd Bennett Field for either historical interpretation or some other end, the Park Service took the innovative step of coupling a commercial restoration project with a key objective of Gateway's original mission: recreation. In 2006, through a commercial lease, Aviator Sports and Recreation, LLC, assumed control of four historic hangars. After extensive planning, the rehabilitated hangars now house two ice rinks, a gymnastics facility, rock climbing wall, snack bar, and more.

WHAT YOU CAN DO TO HELP

- **Join NPCA** (www.npca.org/support_npca) and support our efforts to raise awareness about Gateway and all other national parks.
- **Support local organizations** such as the Jamaica Bay Guardian (www.alsync.org), the Sandy Hook Foundation (www.sandyhookfoundationnj.org), the Friends of Gateway (www.treebranch.org), and others listed above that aim to directly support the park.
- **Volunteer in the parks.** Volunteers are needed to work on trails, clean up beaches, install bird boxes, act as docents, and help park staff accomplish dozens of other tasks. To learn about opportunities at Gateway and other parks in the northeast, contact NPCA's volunteer coordinator at 212.617.2771.
- **Become an NPCA activist.** 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.



APPENDIX: METHODOLOGY

To determine the condition of known natural and cultural resources at Gateway National Recreation Area and other national parks, the National Parks Conservation Association developed a resource assessment and ratings process. The assessment methodology can be found online at NPCA's Center for State of the Parks® website (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 includes discussion of funding and staffing levels, park planning documents, resource education, and external support.



A former SCA intern examines a rare orchid growing at Gateway.

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and was also reviewed by staff at Gateway National Recreation Area.

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 program's methods are welcome.

ACKNOWLEDGMENTS

For more information about the **Center for State of the Parks®** and this and other program reports, contact:

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Fort Laramie National Historic Site (WY)

Fort Necessity National Battlefield (PA)

Fort Union Trading Post National Historic Site (ND)

Frederick Douglass National Historic Site (DC)

Great Smoky Mountains National Park (TN/NC)

Hopewell Furnace National Historic Site (PA)

Joshua Tree National Park (CA)

Knife River Indian Villages National Historic Site (ND)

Lewis and Clark National Historical Park (OR)

Lewis and Clark National Historic Trail (various)

Little Bighorn Battlefield National Monument (MT)

Longfellow National Historic Site (MA)

Missouri National Recreational River (NE)

Mojave National Preserve (CA)

Nez Perce National Historical Park (WA, ID, MT, OR)

Olympic National Park (WA)

Point Reyes National Seashore (CA)

Rocky Mountain National Park (CO)

Shenandoah National Park (VA)

Saint-Gaudens National Historic Site (NH)

Waterton-Glacier International Peace Park (MT-Alberta)

Zion National Park (UT)

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