National Park Service
U.S. Department of the Interior

A New Vision for a Great Urban National Park

Gateway National Recreation Area

Final General Management Plan Environmental Impact Statement April 2014



Front cover: Kayak instructional program at Great Kills Park

inside cover: Volunteers and park staff repair an osprey nest in Jamaica Bay



UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
FINAL GENERAL MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT
Gateway National Recreation Area, New Jersey and New York

Lead Agency: National Park Service, U.S. Department of the Interior

Cooperating Agency: The City of New York

Gateway National Recreation Area (Gateway) is an urban oasis. Located in the heart of the nation's largest metropolitan area, it is a close-to-home retreat for millions of people every year. When Congress established Gateway in 1972, it was intended to be a national park within easy reach of the urban residents in the New York and New Jersey metropolitan area. Forty years later, Gateway is in need of a new vision and general management plan (GMP) for the future.

This GMP/Final Environmental Impact Statement (GMP/EIS) describes the no-action alternative and two action alternatives for future management of Gateway, the environment that would be affected by the alternative management actions, and the environmental consequences of implementing the alternatives.

Alternative A is a continuation of current management and trends. The park's enabling legislation and current GMP (NPS 1979d) would continue to guide park management. Gateway would manage park resources and visitor use as it does today, with no major change in direction.

Alternative B is the National Park Service (NPS) Preferred Alternative. This alternative provides the widest range of activities and most recreation opportunities in dispersed locations throughout the park. New connections would be forged with park lands and communities adjacent to Gateway and nearby. This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment. More convenient and affordable park access is developed through trail connections, bicycle infrastructure, public transit, and waterborne transportation. This alternative prioritizes joint management and operations for visitor services, orientation, programs, and facilities with New York City and other partners.

Alternative C provides the most opportunities for independent exploration and "wild" experiences that immerse visitors into natural areas, historic sites, and landscapes. This alternative increases the visibility, enjoyment, and protection of coastal resources and focuses resource management on beach and dune ecosystems and coastal defense landscapes. New recreational programming emphasizes low-impact activities that highlight preservation efforts as part of interpretation and education activities and promotes hands-on learning and outdoor skills. This alternative maximizes sustainable operations and concentrates activities, access, and facilities in distinct locations.

Environmental impacts that would result from implementation of the alternatives are addressed in the GMP/EIS. Impact topics include soils and geology, air quality, water resources, wetlands and floodplains, marine resources, vegetation, wildlife, species of special concern, historic districts and historic structures, archeological resources, museum collections, visitor use and experience, the social and economic environment, transportation, park management, operations, and facilities, and sustainability.

This final GMP/EIS reports on the results of agency and public comments on the draft GMP/EIS, including any changes that may have been made as a result of agency and public comment. The text has been revised in several cases to reflect additions or changes suggested by agencies, organizations or other commenters during review of the public draft, or to update text from the draft GMP/EIS for completeness and accuracy. These changes are shown in the document as strikeouts for deletions and shaded gray for additions.

The final GMP/EIS will be released for a 30-day no-action period. The availability of the final GMP/EIS will be announced to agencies and the public and will be noticed in the *Federal Register.* No sooner than 30 days after the release of the final GMP/EIS, the Northeast Regional Director may sign a record of decision selecting an alternative for implementation as the approved GMP for Gateway. The availability of the signed record of decision will be noticed in the *Federal Register,* after which the NPS would proceed to implement the approved GMP contingent on available funding. By virtue of recording this selection in a record of decision, this alternative will become the park's new general management plan.



Executive Summary



Today, Gateway is at a crossroads and a new vision is necessary to shape the park's future.

It was a bold idea: bring national parks closer to people in cities. Forty years later, that bold idea continues to evolve at Gateway National Recreation Area (Gateway; the park), the country's first urban national recreation area. Gateway was established in 1972 with the dream of bringing a National Park Service (NPS) experience to the New York metropolitan area. In the 21st century, the needs and expectations for a national park experience have changed—and so must Gateway.

Today, Gateway is at a crossroads and a new vision is necessary to shape the park's future. This new vision is found in this ~~Draft~~ Final General Management Plan / Environmental Impact Statement (GMP/EIS). A GMP helps park managers focus on what is most important in carrying out a new 20-year vision for Gateway and the mission of the NPS.

Gateway's first GMP was finished in 1979. Almost 35 years later, the world is a different place, with constantly changing ideas and expectations for leisure services and information. New studies have led to a better understanding of the significance of Gateway's natural and cultural resources and current threats. In addition, the needs of visitors are very different today than they were a generation ago. The U.S. population is growing older and more diverse, children are spending less time outdoors, and technology is bringing rapid changes. ~~Recent events such as Hurricane Sandy have brought~~ The increasing body of scientific information regarding climate change and projections of sea level rise, coupled with recent events such as Hurricane Sandy describe a new reality and urgency to find ways to protect, improve, and sustain the park's natural and cultural resources while still providing a great place to relax and have fun. New opportunities to work cooperatively with New York City have emerged and the value of parks in urban areas to enhance quality of life is finally being recognized.

Gateway needs a new GMP now because new issues and ideas have emerged in recent years that the 1979 GMP does not address because they were not anticipated when the plan was prepared. Many of the 1979 GMP's recommendations were implemented, others are no longer appropriate because of changing conditions and circumstances, and some have not been implemented due to funding limitations. None of the recent NPS policies related to management and planning for all national park units are reflected in the 1979 GMP.

The Planning Area

Gateway covers more than 40 square miles in New York and New Jersey. That is an area nearly twice the size of the island of Manhattan. The park is split into three different areas in Monmouth County, New Jersey, and the New York City boroughs of Brooklyn, Queens, and Staten Island (see figure 1-1).

The legislative boundary for Gateway is 27,025 acres and extends into adjacent waters, including the Atlantic Ocean, Jamaica Bay, Raritan Bay, and Upper and Lower New York Bay. The park manages 21,680 acres of land and waters. An additional 5,345



The legislative boundary for Gateway is 27,025 acres and extends into adjacent waters, including the Atlantic Ocean, Jamaica Bay, Raritan Bay, and Upper and Lower New York Bay.

acres are managed by other federal agencies, owned by New York City, or privately held by entities such as Breezy Point Cooperative, Broad Channel, and Roxbury. The park has three administrative units: the Jamaica Bay Unit, Sandy Hook Unit, and Staten Island Unit. These three distinct geographic areas are linked together by similar types of resources and recreation uses, yet retain distinctive characteristics that make them special.

The Jamaica Bay Unit is the largest of the three units and is one of the largest expanses of open-space in the region, consisting of over 19,000 acres of land, bay and ocean waters within two boroughs of New York; Brooklyn and Queens. The unit includes: Plumb Beach, Floyd Bennett Field, Bergen Beach, Canarsie Pier, Pennsylvania Avenue and Fountain Avenue Parks, Frank Charles Memorial Park, Hamilton Beach, Spring Creek, Jacob Riis Park, Fort Tilden, Breezy Point Tip and the Jamaica Bay Wildlife Refuge in the center of the bay.

The Staten Island Unit encompasses bay waters, shoreline and four areas including Great Kills Park, World War Veterans Park at Miller Field, Fort Wadsworth and Swinburne Island and Hoffman Island in Staten Island, New York.

The Sandy Hook Unit ~~includes~~ encompasses the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District and natural areas and shorelines adjacent to the Atlantic Ocean and Sandy Hook Bay in Monmouth County, New Jersey.

Planning Challenges

General management planning offers a structured decision-making process that encourages and considers ideas and comments from many different people and groups. Throughout development of the GMP/EIS, the planning team used a variety of scoping techniques to identify the issues related to management of the park, the range of management alternatives that should be considered in the GMP/EIS to address those issues, and the range and nature of impacts that should be used to evaluate and compare alternative management actions. Scoping occurred internally with NPS staff and externally with other public agencies, partner organizations, and interested citizens. The planning challenges identified during the public and internal scoping and analysis stages include the following:

Responding to Climate Change and Sea-Level Rise

Climate change refers to changes occurring in the earth's atmospheric, hydrologic, and oceanic systems, which could alter the landscape, natural and cultural resources, and facilities of Gateway. The issues and potential future threats associated with a changing climate have been considered since the early stages of the GMP/EIS process. Gateway staff worked with academic partners to better understand these issues and how park management would need to adapt in the future. Gateway has been experiencing changes due to frequency and intensity of recent storm events, such as Hurricane Sandy. The majority of the park's natural

and cultural resources are adjacent to the ocean and other water bodies. Some of these places have already experienced increases in storm flooding. The GMP/EIS provides considerations for climate change, and proposes measures for adapting natural and cultural resources, recreation uses and infrastructure.

Preserving Gateway's Heritage



Gateway possesses more than 800 historic buildings, structures, landscapes, and archeological sites with hundreds of additional individual features that contribute to the character of these special places. When Gateway was established in 1972, the historical significance of its buildings, structures, and landscapes was not clearly understood. Many of these inherited buildings and structures were already in poor condition. Repairing, painting, and other maintenance today is a serious challenge given the resources' numbers and current condition as well as competing funding and staff priorities. Currently the museum collections are overcrowded in places that do not meet professional museum standards. This contributes to deterioration of the collections and does not allow for access by staff, students, and scholars for academic research. The GMP/EIS will set priorities for preserving and managing the park's cultural resources in a sustainable manner.

Addressing Marine Resources and Water Quality



Two-thirds of Gateway is covered by water—more than 17,500 acres of bay and oceanic waters that are part of larger systems influenced by land uses and activities taking place outside the park. Previous uses of park lands have left a legacy of impacts on the health and ecology of park natural resources. When the park was founded, saltmarshes had been filled, Jamaica Bay had been dredged, and native forests and vegetation had been covered in impervious surfaces. Despite many years of efforts to improve conditions, water quality is still threatened in all units, especially Jamaica Bay. Many activities in adjacent communities contribute to the problem. The beaches and bays are prime habitats for birds, shellfish, and plants as well as the most popular visitor areas for all types of water-based recreation. Degraded water quality hurts fish and wildlife and results in beach closures, shellfish consumption bans, and unsafe conditions for water activities.

Ocean resources, including natural marine resources and submerged cultural resources, are at risk due to a variety of threats. Natural sediment transport, which affects shoreline and beach dynamics, is affected by activities outside the park boundaries. Most of the park's ocean shoreline is affected by conditions updrift of the park's boundary and the effects of structures at or near the boundary. The presence of engineering structures, both within and external to Gateway, have produced positive and negative results, including erosion and impacts on habitat and navigation channels. The GMP/EIS will provide direction for preserving and managing the natural resources of the park in a sustainable manner and will provide direction for encouraging collaboration and stewardship.



The GMP/EIS will address visitor access to and within the park in order to improve visitor experiences and improve connections between park sites and between park sites and the larger community.

Engaging New Audiences

Gateway does not have a strong identity as a unit of the national park system. This makes it difficult to promote experiences consistent with other national parks, and the park is often confused with city and state facilities. Visitation at Gateway does not reflect the ethnic, racial, or socioeconomic diversity that now characterizes the U.S. population and the communities adjacent to the park. In addition, the boom of electronic technology, especially with children and teens, is changing expectations for the types of activities offered and how the park should provide information and deliver programs. The GMP/EIS will include strategies for promoting a national park experience and engaging new audiences.

Accessing the Park

Access to Gateway is predominantly automobile dependent. Several areas of the park are not conveniently accessible by public transit. This poses a challenge to many visitors, especially lower-income and transit-dependent populations. Visitors are interested in other options for reaching the park, but there are limited formal designated bike or water routes and few parking or docking facilities to support them. Connections from communities in the region to the park are not adequate. There is a need for improved, safe trail connections between park sites and between park sites and communities to provide seamless, safe, direct access alternatives. The GMP/EIS will address visitor access to and within the park in order to improve visitor experiences and improve connections between park sites and between park sites and the larger community.

Providing Appropriate Facilities

Park resources, visitor safety, and visitor experience have suffered because of the lack of adequate operational facilities in appropriate locations. Over the years, many visitors have expressed concerns about park infrastructure being in a state of decline and there is a park-wide demand for more user comforts—shade, playgrounds, benches, bike racks, picnic areas, water fountains, facilities for large family groups, and good food. Although there is a growing interest in water recreation opportunities, there are limited facilities and a need for designated water trails (blueways), lockers, boat rentals, and launch sites. Park maintenance and public safety functions are scattered throughout the park and are often located at sites and facilities that were not intended for such uses or are not in the optimal location. Gateway strives to be a leader in environmental sustainability. However, park day-to-day operations do not always reflect this value. The GMP/EIS will identify strategies for providing high-quality facilities for both visitors and park operations.

Management Alternatives

The GMP/EIS presents three alternatives, compares their impacts and costs, and identifies the preferred alternative. Data used to compare their impacts—or what would happen if each alternative was adopted—are summarized from the detailed environmental impact analysis presented in Chapter 4: Environmental Consequences.

The alternatives include a "no-action alternative" in the National Environmental Policy Act (NEPA), that assumes that no new actions would occur (i.e., the continuation of current management direction). This no-action alternative is alternative A. The GMP/EIS also describes and evaluates two action alternatives: alternatives B and C. Alternative A provides the baseline for comparing the impacts of implementing the action alternatives. A summary of the alternatives is provided below:



The GMP/EIS presents three alternatives, compares their impacts and costs, and identifies the preferred alternative.

Alternative A: No Action

Under alternative A, continuation of current management (no-action alternative), the NPS would continue to manage Gateway's resources and visitor use as it does today, with no major change in management direction. Decisions would be based on existing conditions and available information; there would be no comprehensive planning framework to addresses the full range of contemporary and potential future issues. The park's enabling legislation, the management direction established in the 1979 GMP, the Foundation Document, federal laws, NPS policies, and other approved plans and projects would continue to guide management of resources, visitor use, facilities, and operations.

Recreation and Visitor Experience

Under alternative A, visitor experience would remain segmented, with each of the three units independently serving local residents and visitors at specific locations. Efforts to reopen areas of the park that were damaged by Hurricane Sandy and to provide services and visitor facilities would continue. The ongoing structural assessments and recovery efforts may result in temporary shifts of current management and visitor access. Existing interpretive, educational, and management programs providing a range of services to visitors would continue, adjusting for Hurricane Sandy limitations. Visitors would continue to enjoy a variety of traditional beach-oriented and other recreational activities at open areas.

Gateway would continue to provide comfort stations, lifeguards, food and beverage service, camping, and ferry operations where those services currently exist. Improvements and expansions to trail systems and camping areas would continue under existing management guidelines. Funded projects for additional planning for trails and expanded camping opportunities would continue.

The visitor centers at Sandy Hook, Jamaica Bay Wildlife Refuge, and Floyd Bennett Field would continue to provide orientation, information, interpretive programs, and exhibits and serve as both destinations and points of departure for day visitors, tours, and school groups. Traditional ranger-led activities and curriculum-based educational programs would continue to be available. Current efforts to make more people aware of the presence of the park would continue. Gateway's informational website, exhibits, brochures, and other publications would also be available.

Resource Management

Natural resource management programs would continue, many in partnership with federal, state, and local agencies, academic institutions, and non-governmental organizations (NGOs).

Existing programs would focus on protecting special-status species, monitoring conditions, mitigating external threats, controlling nonnative species, and restoring habitats impacted by manmade structures or human activities.

Historic structures, cultural landscapes and archeological sites would continue to be managed through maintenance and repair where feasible and when funding becomes available. Existing programs providing basic protection to the park's cultural resources would continue to operate in a manner consistent with applicable federal and state laws and NPS policies. Vegetation would continue to be removed from some coastal defense fortifications on a limited basis, while others would continue to decay by natural processes. Many vacant buildings throughout Gateway would continue to deteriorate. The Sandy Hook Lighthouse, Battery Weed, and select fundamental coastal defense and maritime structures would be preserved. Museum collections and archives would continue to be moved from Sandy Hook and consolidated with collections currently maintained in their current location at Fort Wadsworth.

Access and Transportation

Existing operation and transportation infrastructure would be maintained at current locations. Maintenance functions, equipment, and facilities damaged as a result of Hurricane Sandy would continue to be evaluated and possible replacement and relocation explored. Gateway visitors would continue to be automobile dependent and people without cars would continue to be reliant on limited direct bus and ferry service.

Alternative B: Discovering Gateway - NPS Preferred Alternative

Concept

This alternative provides the widest range of activities and most recreation opportunities in dispersed locations throughout the park. New connections would be forged with park lands and communities adjacent and nearby Gateway. This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment. More convenient and affordable park access is developed through trail connections, bicycle infrastructure, public transit, and waterborne transportation. This alternative prioritizes joint management and operations for visitor services, orientation, programs, and facilities with New York City and other partners.

Jamaica Bay Unit

Recreation and Visitor Experience

The Jamaica Bay Unit would offer an unmatched variety of recreational opportunities. In partnership with New York City and other groups, the NPS would attract neighborhood,

regional and distant visitors with new and improved amenities and recreation facilities (e.g., trails, camp sites); more community-based recreation such as sports leagues and event spaces; and enhanced interpretive and environmental educational programming. With development of water trails, water skills programming, equipment rentals, and the expansion of beach access, the Jamaica Bay Unit would be established as a popular recreation destination for water-based activities. The combination of improved transportation infrastructure and widespread outreach and promotion, would ensure that these new opportunities for outdoor recreation, learning and skill building are accessible and popular among diverse audiences.

Under this alternative, the park lands would provide opportunities for youth and families to experience nature and to develop the skills and knowledge that will foster a lifelong stewardship and enjoyment of the outdoors. New facilities at Fort Tilden and Bergen Beach areas including trails, overlooks, viewing blinds, kayak launch sites, outdoor classrooms and campsites would provide more convenient access to natural areas and facilitate the exploration of Gateway's varied natural environments. These resource-based experiences would be complemented by opportunities to experience and learn about history and the park's significance through guided interpretive activities, interpretive media, and educational programming.

New multiple day experiences would be developed and promoted on NPS and New York City park lands throughout Jamaica Bay. A variety of camping options from special programs in unique locations to a variety of tent, structural and recreational vehicle (RV) sites would enhance the national park experience. Lodging accommodations in historic buildings and associated support areas would be explored.

Resource Management

Partners sharing the NPS vision for a healthy and restored Jamaica Bay are numerous. In both action alternatives, NPS would continue cultivating and leveraging partnerships to accomplish natural resource objectives. Improving water quality within Jamaica Bay would be prioritized along with restoring degraded stretches of coastal habitats. Natural resource protection and restoration efforts in the Jamaica Bay Unit would focus on softening hardened coastal edges, restoring wetland and coastal habitats, and creating additional freshwater wetlands. Increased use would be balanced with additional monitoring and management of wildlife and habitats. NPS would work closely with New York City and other landowners to build the resiliency of coastal habitat and to improve conditions along the entire Rockaway coastline. Together the agencies would produce a holistic shoreline management plan that would help guide recovery efforts and future uses and development.

Historic structures and landscapes would be stabilized, and preserved for recreation, visitor services, education, and sustainable energy. Creative solutions would be found to continue use and adapt to future flooding, storms and other climate change related events. Mobile technology and other innovative media would enrich communication about the park land's history and significance.



This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment.



The cultural landscape within the Fort Hancock area would be maintained. Areas within the cultural landscape would be rehabilitated to function as flexible open space areas for relaxation, gatherings, picnics, and community events.

Access and Transportation

Access to and within Jamaica Bay would be made more affordable and convenient through improved bike infrastructure, public transportation, ferry service and park shuttles. In partnership with its New York City partners, NPS would complete and expand the Jamaica Bay Greenway and trail network. The Jamaica Bay park lands and surrounding communities would also be connected via a system of land-based shuttles as well as water trails, water taxis and ferry service.

Sandy Hook Unit

Recreation and Visitor Experience

Sandy Hook would remain a popular beach recreation destination where visitors would find many opportunities to have fun and enjoy the natural environment. A variety of natural immersion experiences would be created to increase visitor awareness and enjoyment of the natural environments including nature study, wildlife viewing, camping, and instructional programming. New and expanded trails, boating launch sites, camping facilities and interpretive programs would facilitate the coastal experience. Connections with neighboring communities including orientation, land and water trail system, and linkages to related interpretive sites would provide for a richer experience at Sandy Hook. Fort Hancock would be transformed into a bustling center of activity and a popular overnight destination. In this alternative, NPS would consider the widest variety of potential adaptive reuses for the Fort Hancock buildings ~~ranging from~~ such as, but not limited to, lodging to restaurants, conference space and offices.

Resource Management

The cultural landscape within the Fort Hancock area would be maintained. Areas within the cultural landscape would be rehabilitated to function as flexible open space areas for relaxation, gatherings, picnics, and community events. The Nike Missile Launch and Radar Site would be stabilized and interpreted. New opportunities for guided and self-guided exploration of the area would be created. Batteries Potter, Gunnison, McCook and Reynolds (Mortar) would be preserved and interpreted through guided tours and/or interpretive media. Additional batteries within the Fort Hancock area would be stabilized, opened to visitor access and interpreted, including off site through digital media and/or exhibits. The Sandy Hook Lighthouse and Spermeceti Cove Life Saving Station would be preserved.

Habitat conditions of the forest, shrub, and wetland habitats would be improved. Current natural resource management practices would be maintained and protection, research, and monitoring of sensitive habitat areas like the beaches on the northern tip and the maritime forest would be increased. The mosaic of coastal habitats would provide unique opportunities for experiencing and learning about natural systems and native plant communities.

Access and Transportation

A variety of transportation systems would be developed to make Fort Hancock and the entire Sandy Hook peninsula more convenient to access. Ferry service would be expanded to include

summer weekdays, shoulder seasons and special events. Opportunities to provide private/transient water access and dockage at Sandy Hook would also be evaluated. Opportunities would be explored with partners to extend public transit service into Sandy Hook and initiate a shuttle system to connect adjacent communities. Bike access would be encouraged to/from and within Sandy Hook, with bike rental stations at parking facilities near the park entrance and within the park.



Staten Island Unit

Recreation and Visitor Experience

Improved trailheads and more miles of trail within and between the Staten Island sites as well as picnic areas, camping facilities, and interpreted historic sites would create many more recreation opportunities. Opportunities to access and experience Gateway waters would also be increased. Water trails, interpretive boat tours, launch sites, and expanded beach and fishing access would encourage exploration of the coastline and New York Bay. These water trails and guided tours would facilitate paddling from Fort Wadsworth out to Hoffman and Swinburne islands and/or down the coast to Miller Field and Great Kills Park. The NPS would evaluate the possibility of developing overnight accommodations and expand the locations and types of camping available throughout the Staten Island Unit. Comfort stations, interpretive programming and media related to the fundamental resources would be increased, allowing for a more in-depth and richer experience of the cultural defense resources and cultural landscapes.

Resource Management

Battery Weed and Fort Tompkins would be preserved and open to more regular visitor use. Public access to both forts would be increased and interpretive programming of these resources would be expanded. The Battery Weed seawall would be repaired and fortified to protect the resource from storm surges. Additional batteries would be stabilized and their unique features incorporated into the recreational and interpretive trail system. The character-defining features of Mont Sec and New York Avenue would be preserved and both avenues would be incorporated into the visitor experience of Fort Wadsworth through improved wayfinding signage and interpretation.

Current natural resource practices would be maintained including controlling invasives, planting trees and monitoring beach erosion. NPS would work with neighbors and partners to implement solutions for improving resiliency of beach/dune habitat along the Staten Island coastline. Natural resource protection of offshore habitats would be maintained. In cooperation with partners, NPS would take recommended measures to improve water quality within the bay. Hoffman and Swinburne islands would remain natural areas. The wildlife on the island and the islands' habitat value would be monitored and study.

Access and Transportation

Improved public transportation and an expanded greenway, as well as, shuttles between the sites would make access more convenient. Also, bike infrastructure would be developed throughout the unit including a bike-sharing system, maps, and convenient bike parking to



In areas throughout the Jamaica Bay Unit, visitors would find open, protected natural areas.

encourage more bike use at the parks and provide connections with other Staten Island trail systems. A shuttle system linking the Staten Island Unit park sites with the Ferry Terminal at Saint George would be considered as a means of promoting sustainable access and a first point of visitor orientation to the Staten Island Unit from those arriving via the Staten Island Ferry.

Alternative C: Experiencing Preserved Places

Concept

This alternative provides the most opportunities for independent exploration and "wild" experiences that immerse visitors into natural areas and historic sites and landscapes. This alternative increases the visibility, enjoyment, and protection of coastal resources and focuses resource management on beach and dune ecosystems and coastal defense landscapes. New recreational programming emphasizes low-impact activities that highlight preservation efforts as part of interpretation and education activities and promotes hands-on learning and outdoor skills. This alternative maximizes sustainable operations and concentrates activities, access, and facilities in distinct locations.

Jamaica Bay Unit

Recreation and Visitor Experience

In areas throughout the Jamaica Bay Unit, visitors would find open, protected natural areas. In these places visitors can retreat into natural environments; experience the sounds, smells, and views; and learn about healthy habitat remnants that are unique within the New York City metropolitan area. Clusters of recreation facility development throughout the unit's park lands including trail networks, campgrounds, and observation platforms would encourage independent discovery and facilitate outdoor recreation. All new facilities would be designed to be "light on the land" and minimize impacts on natural and cultural resources.

This alternative would focus on engaging visitors, communities, and partners in participatory science, education, and natural resource stewardship while creating opportunities for self-guided exploration of the area's natural environmental and historic settings. The NPS and partner stewardship programming would harness volunteer energy and work toward improving water quality and habitat conditions throughout Jamaica Bay.

Resource Management

Under alternative C, natural resource restoration projects would be widespread throughout the Jamaica Bay Unit. Ongoing restoration, research, and environmental protection projects would be broadened, expedited and strengthened by outside funding, and the involvement of additional partners and the broader scientific community. This more robust natural resource management would be complemented by expanded outreach, environmental education programming, citizen science, and volunteer stewardship projects. In addition, increased monitoring, research, volunteer programs, and collaboration with regional partners would continue to address water quality issues, habitat restoration, and stewardship.

In alternative C, the protection, preservation, and interpretation of the unit's coastal defense fortifications, aviation structures, and cultural landscapes would be substantially increased. The aviation history at Floyd Bennett Field would be preserved and showcased. On the Rockaway Peninsula, preservation and interpretation of Fort Tilden's cultural landscape, batteries, the Nike Missile site, and the Jacob Riis Bathhouse would round out the predominantly natural resource-based recreational experiences found throughout the unit and result in richer communication about the area's history. Preservation and interpretation projects at Fort Tilden's Battery Harris and the Nike Missile site would lead to improved access to the fundamental cultural resources and enriched communication about the site's coastal defense history.



In alternative C, the protection, preservation, and interpretation of the unit's coastal defense fortifications, aviation structures, and cultural landscapes would be substantially increased.

Access and Transportation

Similar to alternative B, but with less of an emphasis on waterborne transportation, management would make accessing the Jamaica Bay units more convenient by establishing an interconnected system of trails and greenways, introducing bike-sharing stations, improving shuttle services between park lands and linking to public transit stations. A transportation hub would be created at Floyd Bennett Field to improve access and circulation and to promote multi-modal options.

Sandy Hook Unit

Recreation and Visitor Experience

Sandy Hook's beaches, forests, wetlands, and waters would serve as living laboratories where visitors and volunteers would be engaged in participatory science, education and stewardship. These programs would nurture personal connections with the coastal environment and inspire greater appreciation for the park's historic significance. Recreational uses would be maintained along the beach and bay. With its lighthouse, lifesaving station, and long coastline, Sandy Hook would emerge as Gateway's focal point for maritime heritage interpretation. The preservation of these iconic structures along with expanded programming, activities, and interpretive media would engage visitors in the park's maritime story.

Resource Management

Protection and restoration of the beach dune community as well as forest, shrub and wetland habitats at Sandy Hook would be increased in this alternative. To reduce impacts on these sensitive and rare habitats, access would be tightly controlled and restricted in some cases. Aggressive control of invasive species, strengthening healthy communities and repairing beach erosion would be management priorities. Additionally, research and monitoring of the unit's habitats would be increased. Historic preservation efforts would be most widespread in this alternative with the largest number of projects to stabilize, preserve, and interpret both historic structures and cultural landscapes. At Sandy Hook, historic preservation training programs would be offered and people would find opportunities to engage in volunteer stewardship projects. Students, partners, and volunteers trained at Sandy Hook would be mobilized to participate in historic resource stewardship projects throughout Gateway.

Access and Transportation

Similar to alternative B, a variety of transportation systems would be developed to make Fort Hancock and the entire Sandy Hook peninsula more convenient to access. Ferry service would be expanded to include summer weekdays, shoulder seasons and special events. Opportunities to provide private/transient water access and dockage at Sandy Hook would also be evaluated. Opportunities would be explored with partners to extend public transit service into Sandy Hook and initiate a shuttle system to connect adjacent communities. Bike access would be encouraged to/from and within Sandy Hook, with bike rental stations at parking facilities near the park entrance and within the park.

Staten Island Unit

Recreation and Visitor Experience

The Staten Island Unit would provide opportunities to experience nature, explore Fort Wadsworth's coastal defense heritage, and recreate in historic and natural settings. Park managers would preserve historic structures and landscapes that tell the story of continuous military and civilian use of the fort and tie thematically with other parks and historic sites within New York Harbor. Recreational uses throughout the Staten Island unit would be maintained, and enriched by expanded interpretive and educational programming. Participatory cultural resource stewardship programming in which partners and volunteers would engage in the hands-on preservation of the coastal defense structures would be introduced at Fort Wadsworth. Likewise, Great Kills Park would offer new opportunities for nature study, environmental educational, and participatory natural stewardship programming.



Resource Management

Natural resource stewardship would be prioritized at the Staten Island sites. The NPS would focus resource protection efforts on improving beach/dune habitat at the unit and working with neighbors and partners to expand and care for the coastal stretch of protected wetlands and beach/dune habitat. Historic preservation at Fort Wadsworth would be a management priority and preservation trainings and workshops would enable volunteers and partners to contribute to the preservation of Fort Tompkins and select Endicott-era batteries. In this alternative, more of Fort Tompkins would be opened, preserved, and interpreted. Also, interpretation of Fort Tompkins, Battery Weed, and the Endicott/Taft-era batteries would be enhanced through a Coastal Defense Trail. The trail would wind through and among the historic structures offering excellent views and interpretive media along the route.

Access and Transportation

Similar to alternative B, improved public transportation and an expanded greenway, as well as, shuttles between the sites would make access more convenient. In addition, bike infrastructure would be developed throughout the unit, including a bike-sharing system, maps, and convenient bike parking, to encourage more bike use at the sites and provide convenient connections with other Staten Island trail systems.

Affected Environment and Environmental Consequences of the Alternatives



The environmental impact statement portion of this GMP describes the affected natural, cultural, scenic, and socioeconomic environment within and near the park and the anticipated impacts on the environment associated with the three GMP alternatives. Impact topics include soils and geology, air quality, water resources, wetlands and floodplains, marine resources, vegetation, wildlife, species of special concern, historic districts and historic structures, archeological resources, museum collections, visitor use and experience, the social and economic environment, transportation, park management, operations, and facilities, and sustainability. Climate change was analyzed as part of cumulative impacts for each topic.

Determining environmental consequences included identifying the regulations and polices applicable to each impact topic, defining the methods used to conduct the analysis, and defining relative terms to qualify impacts for each impact topic. Analysis were performed to evaluate impacts within the park and in nearby communities and on a more regional scale in terms of cumulative impacts. Analyses involved comparing conditions that would occur with changes in management (Alternatives B and C) to conditions that would occur if current management practices continued (Alternative A). The results are presented in Table 2-12 of the GMP/EIS and are summarized for selected impact topics below.

Soils and Geology

No impact on geology from any action in any alternative is expected. Current issues with park soils include the extensive use of artificial fill material to fill in marshes for development; contamination of some of these artificial soils and of benthic soils such as those in Jamaica Bay from pollutants and waste streams; reduced infiltration related to hardened trails, roads, parking lots, and facilities; and the interruption of natural offshore sediment transport processes that supply sand for park beaches. While both alternatives B and C would increase visitor and recreation facilities, those in alternative B are more permanent and therefore more likely to add adverse impacts by further reducing infiltration from hardened surfaces or loss of soils through excavating, grading and/or erosion. These impacts are small in scale and not considered significant, at least in part because soil itself is not named as a fundamental or unique resource at the park. Because soils are fills, fly ash and rubble at Floyd Bennett Field, the area where the most extensive development is planned, excavating, filling or paving over them would result in no adverse impacts to natural soils. Both action alternatives include provisions to discuss with neighboring landowners the option of removing groins, jetties, breakwaters and other impediments to natural sand transport at several park sites, including those along the Rockaway barrier spit (Jacob Riis Park, Fort Tilden, and Breezy Point) and the Staten Island coast (especially at Great Kills Park). If successful, this action has the potential for significant and widespread beneficial impacts to beach and dune systems, which are named as fundamental to the park purpose and significance, as well as intertidal areas, mudflats and

even more inland soils. Both alternatives also include creating 100+ acres of Floyd Bennett Field to natural conditions, including saltmarsh, freshwater marsh, and open water areas. Floyd Bennett Field was wetland and saltmarsh islands before it was filled; returning it to this state would offer substantial and potentially significant benefits for soils as an integral part of the natural area at this park site, named as a fundamental resource at Gateway.

Air Quality

The park is located in an air basin shared with a highly urbanized area. Of the pollutants regulated by the Clean Air Act, the basin is out of compliance for ozone and small particulates. The NPS also measures and assesses ozone, as well as acid deposition and visibility at parks, and has determined that air quality for these three factors at Gateway is not meeting recommended desired conditions. While park-related emissions come from both day-to-day operations and from mobile sources such as cars driven by visitors, the contributions are imperceptible compared to emissions from all mobile and stationary sources affecting the air basin. The park also currently plants trees and is making efforts to increase its energy efficiency, actions that reduce its greenhouse gas emissions. Both action alternatives would seek to reduce emissions from mobile sources by increasing alternative and public transportation options both to access the park and move between park sites, as well as by adopting measures such as purchase of renewable energy for day-to-day operations that would reduce greenhouse gas emissions. While this would be a substantial and widespread benefit compared to the no-action alternative, it is an imperceptible contributing benefit to the air basin and not likely to be significant. Additional benefits from both alternatives include the use of one or both of the former landfill sites at Pennsylvania Avenue and Fountain Avenue to ~~generate landfill sites to~~ generate renewable energy. In alternative C, a possible anaerobic digester or landfill methane recovery project could reduce emissions of greenhouse gases. Each of these does greatly reduce or offset emissions from sources at the park, although the overall the effect in the air basin is imperceptible. Because of the shared nature of the air basin and the relative inability to substantially influence air quality in it and because air quality is not a named fundamental resource at Gateway, benefits are not considered significant. Construction related to adding visitor amenities or restoring structures could result in some increases in some short-term emissions from heavy equipment with temporary adverse impacts to air quality in either alternative. Impacts would not be significant and would be less in alternative C than alternative B.

Water Resources

Groundwater and surface water in or feeding the park has been diverted and used for drinking water, commercial and industrial operations and historically for agriculture. Most freshwater sources in the watersheds surrounding the park have been filled, diverted into the storm sewer system, or altered by channelization. Hydrology in the surrounding marine or estuarine environments including Raritan Bay and Jamaica Bay has been altered by deep dredging and other engineering modifications. Water quality in Raritan and Sandy Hook bays is better than in Jamaica Bay because these areas receive freshwater from the Hudson and Raritan Rivers. Freshwater input to Jamaica Bay is nearly completely composed of

effluent from wastewater treatment plans and the combined stormwater/sewer overflow. Collaborative efforts by the NPS and the New York City Department of Environmental Protection (NYCDEP) to improve water quality and hydrology in Jamaica Bay have had substantial benefits that would continue in alternative A. However, in alternatives B and C, this collaboration is increased to include many new partners in collaborative research and stewardship of water resources. Efforts include shoreline protection and erosion control, restoration of wetlands and other natural habitats and holistic management of water resources and water quality. These actions would result in significant beneficial impacts to water resources, particularly those in Jamaica Bay, the waters (submerged areas) of which are a named fundamental resource at the park. Construction related to adding visitor amenities or restoring structures could result in some increases in erosion and turbidity, with short-term adverse impacts on water resources in either alternative.

Wetlands, Floodplains and Flooding

Saltmarsh, estuarine, and freshwater wetlands occur at the park. Although the area in which the park is located was once much more abundantly covered in wetlands, many have been filled and developed, their water supplies channelized, infested by non-native invasive species or polluted. At least 95 percent of freshwater wetlands have been lost. The park and other agencies, primarily the New York Department of Environmental Conservation (NYDEC), work together to restore saltmarsh habitat in Jamaica Bay and this effort has and would continue to have significant benefits for wetlands under the no-action alternative. Increasing this collaborative effort in alternatives B and C to include additional agency, non-governmental organizations, academia, and private partners and expanding its scope to include combined research on restoration and joint stewardship of Jamaica Bay marshes and water quality would result in significant additional benefits for wetlands at the park.



Continued efforts to remove *Phragmites*, an invasive form of the common reed, from wetland environments would also result in benefits under all alternatives, although these efforts would intensity with additional benefits under alternatives B and C. Both action alternatives also would result in the restoration of 100+ acres of saltmarsh, freshwater wetland, and open water habitat at Floyd Bennett Field, although alternative C proposes a larger area for this purpose than alternative B. Alternatives B and C also include holistic planning at the park to determine how best to restore the freshwater West Pond, which was breached during Hurricane Sandy, as well as how additional freshwater wetlands could be created at park sites. Both alternatives include discussions with neighboring landowners in an effort to remove impediments to natural sand transport. If successful, new wetland habitats could be created, this action would help reverse erosion of shorelines at several park sites. Each of these actions would be highly beneficial for wetlands and could provide significant positive impacts. Alternatives B and C differ in the degree to which they would protect fringing wetlands or remove invasive species in wetland environments at smaller park sites, with alternative C offering more intense efforts and greater benefits.

Because the park is both coastal and low in elevation, it is susceptible to flooding from summer and winter storms, including tropical systems, hurricanes, and nor'easter cyclones. Although these more extreme storms are better known, average storms are substantially more

Because the park is both coastal and low in elevation, it is susceptible to flooding from summer and winter storms, including tropical systems, hurricanes, and nor'easter cyclones.

common. In analyzing storm surge in the New York/northern New Jersey area over a nearly 50-year period (1959 to 2007), researchers found 253 data points for storms where the surge varied between 0.5 and 0.6 meter and only 4 where storm surge was greater than 1.5 meters. However, with the recent damaging Hurricanes Irene and Sandy and the possibility of greater frequency and intensity of storms as climate change accelerates, the focus of the analysis for flooding is on the impact of extreme storms. The park has many buildings, including important historic structures that lie very near the water and are relatively unprotected from wind and waves. Wider beaches, dunes, larger vegetation, or wave attenuation are examples of protection that is largely absent. In the absence of natural sand transport, the park does use beach nourishment at some sites, and is in the process of creating more permanent solutions at Plumb Beach and Sandy Hook to ensure that sand is available. As noted above, alternatives B and C include discussions with neighboring landowners to remove impediments to natural sand transport at several park locations. If successful, this could restore beaches and dunes, which could in turn stabilize over time as they become vegetated with native species. This could be a significant benefit in reducing the impact of strong coastal flooding. Both action alternatives also include plans to restore or rehabilitate some buildings and infrastructure as well as adding new facilities or amenities in the coastal zone, although alternative C relies on removable structures at Fort Tilden and Sandy Hook to add recreational opportunities at these sites. To the extent these efforts maintain fundamental or otherwise important park assets in an area where they are subject to repeated damage and loss from coastal flooding, impacts are adverse and potentially significant. Increasing protection efforts and reducing the permanence of developed facilities in alternative C would lower the risk and intensity of impact, although it could still be significant. The NPS would also evaluate the risk of making future investments in existing facilities or adding new infrastructure within coastal flood or storm surge zones and may choose not to go forward with these changes if it is too high, reducing the possibility of significant adverse impacts from flooding.

Marine Resources

Marine resources are defined in the GMP/EIS as including those in the oceans or brackish bays, as well as intertidal beaches and foredunes. The focus of this section is on marine systems, rather than individual elements such as vegetation, soils, or wildlife. The park has used borrow areas in New York Bay to provide sand for its nourishment efforts. Although dredging sand from the bottom of the bay does affect marine wildlife, environmental documents prepared for borrow efforts indicate the impacts are not significant. At the park, beach nourishment has had localized beneficial impacts on intertidal or beach wildlife and vegetation. Beach wildlife at the park includes several listed species, which have been and would continue to be protected by park management to close nesting sites or fence plant growing areas to visitors. Although these actions protect elements of the marine system, several components such as natural sediment supply or undisturbed and complete habitat are missing. For this reason, benefits to the marine systems are not considered significant under alternative A. Planned development in alternatives B and C at some park sites would have adverse impacts to components of these marine systems, particularly from increased visitor use. Monitoring and managing visitor use to avoid rare or integral components of the beach and dune communities would mitigate these impacts, which are not likely to be significant. Substantial and potentially significant localized benefits to mudflat or other intertidal

marine systems would come from the increased coordination and application of research to Jamaica Bay common to both action alternatives, and to beach and foredune communities from efforts to holistically manage park sites along the Rockaway Peninsula to improve the resiliency of coastal resources, and primarily from the possible return of natural sand transport processes to several park sites. add after sites. Coordinated interagency planning to protect bay shorelines from erosion and sensitive marine aquatic life from overuse by visitors on foot or in boats would also be beneficial. Localized benefits relative to alternative C from increasing monitoring and protection of dunes at Sandy Hook could be substantial for beach or dune resources.



Vegetation

Issues for vegetation under current management include trampling by visitors, such as from off-trail use at more inland sites and of dune, wetland, and beach vegetation along the coasts. Conversely, park management includes keeping some areas closed to maintain them in a relatively undisturbed condition. These sites include Breezy Point Tip and northern Sandy Hook, the sites of several rare vegetation associations. Gateway also conducts invasive species removal and native species planting at several park sites, with benefits to all treated vegetative communities. Pollution of saltmarsh vegetation at Jamaica Bay is described in the wetlands and water sections and impacts on beach and dune vegetation from the interruption of natural offshore sediment processes analyzed under marine resources. Increasing the scope and array of partners to jointly research and restore saltmarsh at Jamaica Bay, creating freshwater wetlands and saltmarsh habitat at Floyd Bennett Field, and holistically planning to create freshwater wetlands where West Pond once stood and across the park all have the potential for significant beneficial impacts on wetland vegetation at the park in either alternative B or C. Efforts to remove impediments to natural sand transport would have substantial localized benefits for dune and beach vegetation if they are successful. Development of new facilities in several park sites could adversely affect vegetation, and in particular imperiled vegetation associations such as those at Fort Tilden or the bay side of Sandy Hook in alternative B. These impacts would be minimized both by a lesser degree of development with fewer anticipated visitors and by the park's commitment to controlling erosion and additional efforts to restore beach, dune, and upland associations at several park sites in alternative C. Additionally, all alternatives include restricted access to the vast majority of the northern part of Sandy Hook, seasonal restrictions on any beach camping and application of the protective Sensitive Resource subzone on the shoreline of Spermaceti Cove on the bay side of the Hook. ~~Additional restrictions to areas where rare or sensitive species or associations grow would also provide benefits to a greater degree in alternative C than A or B.~~



Adverse effects for wildlife under current management include human disturbance and the removal of habitat for park operations or facilities.

Wildlife

Adverse effects for wildlife under current management include human disturbance and the removal of habitat for park operations or facilities. Benefits include closures and restrictions on access where sensitive species nest and maintenance of large habitats such as through beach nourishment or mowing of a 140-acre grassland at Floyd Bennett Field. These efforts provide substantial benefits for many species of wildlife, particularly those that nest on saltmarsh and wooded islands in Jamaica Bay (closed to the public), listed shorebirds, and

associated beach wildlife and grassland nesting birds. Because freshwater wetlands were once an integral part of the ecosystem in the region but are now ~~not~~ quite rare, holistic planning to create freshwater wetlands at several park sites, including West Pond, as well as the creation of built freshwater wetlands at Floyd Bennett Field as part of the wetlands center in both alternatives B and C could result in significant localized benefits for freshwater-dependent wildlife species. Saltmarsh-dependent wildlife would likely experience similar significant benefits from creating saltmarsh at Floyd Bennett Field and the expanded and intensified collaborative research and management of Jamaica Bay habitats in either action alternative. Additional localized benefits from continuing to manage existing natural areas at Great Kills Park, northern Sandy Hook, and Breezy Point Tip, and from the possible restoration of natural sand transport processes at Rockaway Peninsula and Staten Island park sites are also common to both action alternatives. Substantial facility development and increased visitor use in Floyd Bennett Field and Fort Tilden in alternative B, as well as at Sandy Hook and at the newly planted Pennsylvania Avenue and Fountain Avenue parks in the Jamaica Bay Unit, would have the potential for adverse localized impacts on wildlife. This is also true of allowing visitors under alternative B at Canarsie Pol, Big Egg Island, and Hoffman Island, where nesting birds or other wildlife could be disturbed by visitors in boats or on foot, with possible substantial localized adverse impacts on energy reserves or nesting success. The development of facilities and amenities at Sandy Hook under alternative B could adversely affect wildlife by removing habitat and bringing additional visitors and human disturbance. This is true of planned changes on both the bay and ocean side; those on the ocean side could particularly affect feeding or nesting rare shorebirds. Following public comment and consultation under Section 7 of the Endangered Species Act, the park has now broadened the area protected by the Sensitive Resources Subzone to include the Jamaica Bay islands, Hoffman Island and the vast majority of the north end of Sandy Hook and the shoreline of Spermaceti Cove under alternative B. This action would continue existing benefits to wildlife in these areas and reduce impacts from access so that they are comparable to alternative C. While alternative C also proposes development at park sites including Fort Tilden and Floyd Bennett Field ~~Sandy Hook,~~ it is far less extensive and permanent than in alternative B and impacts on wildlife would be less severe.

Species of Special Concern

Known nesting areas or other habitats used by listed species or species of management concern are protected through closures, fences, buffers, and other means. These efforts have likely had substantial or even significant benefits for these species, and evidenced by the presence of breeding populations of piping plovers, least terns, common terns, osprey, terrapins and horseshoe crabs and healthy reproducing seabeach amaranth, seabeach knotweed, seabeach evening-primrose, and other plants of special concern. Beneficial impacts to listed species or species of management concern from actions common to alternatives B and C would come from restoring natural sand transport processes, creating wetland or open water habitat, working with partners to research and apply results to create saltmarsh habitat and restore water quality, maintaining West Pond as a saltmarsh environment, mowing to maintain an existing large grassland, and continuing restrictions and protection of listed species through fencing, buffers, and closures. Restoring habitat and protecting listed species from disturbance or direct loss would have significant benefits. Continuing visitor use in any alternative could in some cases be preventing use of otherwise suitable habitat, and

visitors not respecting closures could reduce nesting success, trample nesting sites or listed plants or otherwise cause substantial localized adverse impacts. Adding visitor amenities and programming would increase the potential for this kind of adverse impact in both action alternatives, although to a lesser extent in C than B. Opening marsh and select wooded islands in Jamaica Bay ~~and at Hoffman Island~~ to public use as proposed in alternative B would have the potential for substantial adverse impacts to state-listed nesting herons and other rare wildlife.

Cultural Resources – Historic Districts and Structures

With limited resources and no decisions regarding which historic structures or districts to prioritize, continuing current management is likely to result in the widespread degradation and loss of fundamental contributing resources and structures, with significant adverse impacts on both historic structures and districts. Both action alternatives would change this by prioritizing historic structures and districts for restoration and rehabilitation, and allowing non-prioritized structures and districts to deteriorate over time as part of a designated Ruins Subzone. This approach would reduce adverse impacts of the no-action alternative. Both action alternatives include measures to mitigate impacts ongoing to fundamental resources now, such as removing invasive vegetation, stabilization of some, rehabilitation and reuse of others, and protection of some structures from the threat of future storm surges. Under the action alternatives, decisions regarding the treatment of cultural resources will be guided by climate change strategies including minimizing major investments along coastal flood and storm surge zones and the implementation of risk evaluations (cost/benefit) for cultural resources within flood zones categories. Where districts in the Ruins Subzone will lose fundamental contributing resources, an adverse, significant, and permanent impact would occur. The loss of individual historic structures in the Ruins Subzone would be substantial, adverse, and permanent, but would not be significant. Many historic structures in the Ruins Subzone share physical and historical commonalities with other associated historic structures which will be maintained, stabilized and preserved, thus retaining the park's ability to impart important themes. Although both alternative B and alternative C would result in significant adverse impacts from these losses, they would be less extensive and severe than under the no-action alternative. Both action alternatives would preserve fundamental historic resources located in Fort Wadsworth Historic District (Battery Weed, Fort Tompkins, coastal batteries), Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District (coastal batteries, Sandy Hook Lighthouse, Spermaceti Cove Life Saving Station, parade ground), and Fort Tilden Historic District (parade ground). Alternative B would also stabilize important resources at Miller Army Airfield Historic District, Breezy Point Surf Club Historic District, and Silver Gull Beach Club Historic District, where alternative C would preserve the cultural landscape at Floyd Bennett Field and stabilize Hangar 38 and the Elm Tree Light (Miller Field), as well as the cabanas at Breezy Point Surf Club. When compared to alternative B, alternative C provides for additional and enhanced cultural resource preservation treatment for historic districts, structures, and landscapes (e.g., Fort Hancock, Fort Wadsworth, Floyd Bennett Field, Jacob Riis Park).

Alternatives B and C both anticipate finding a suitable and sufficient archival facility that meets standards and guidelines for housing the entire Gateway museum collection, a potentially significant beneficial impact.

Both action alternatives would improve access to Gateway and between park sites by increasing bike lanes and pedestrian walkways, as well as hubs that offer public transportation options. This combined with increased facilities and recreation options would increase visitor use, with associated social and economic benefits in access, spending, and employment.

Cultural Resources – Archeological Resources

Adverse impacts on archeological resources come from walking, grading, or excavating for new buildings or infrastructure and other ground-disturbing activities such as invasive species removal or planting trees. Removing impervious surfaces, re-building structures lost/damaged in Hurricane Sandy, allowing historic structures to decay/deteriorate naturally, and landscape modifications to protect some historic structures from further storm threats can also result in impacts to buried resources. To the extent that visitor use is permitted at park sites, adverse impacts on archeological resources are possible. Both action alternatives would increase access and recreational activities by adding trails, programming, and development such as pads for camping or concessions. Although grading and excavating could uncover archeological resources, an adverse impact, mitigation (such as stopping work until the site is surveyed and preserving any artifacts discovered) could help the park expand its knowledge about cultural resources in the area. Impacts from both action alternatives would be similar.

Cultural Resources – Museum Collections

The museum collection for the park is housed at both Fort Wadsworth and Fort Hancock. The collection at Fort Hancock was judged to be at risk during Hurricane Sandy and moved to Fort Wadsworth; crowding has exacerbated an already substandard situation at Fort Wadsworth as a result. Continuing to house both collections without improvements could result in substantial or even significant adverse impacts in the long term. Alternatives B and C both anticipate finding a suitable and sufficient facility that meets standards and guidelines for housing the entire Gateway museum collection, a potentially significant beneficial impact.

Visitor Use and Experience

Current management offers visitors a variety of resource-dependent visitor opportunities and experiences, including extensive beaches and recreational options. Under both action alternatives, the visitor experience would be improved and the amount and variety of recreational opportunities expanded, with possible significant benefits for Gateway visitors. Adverse impacts common to both alternatives, such as increased human noise and night lighting, would only affect a small number of users and are not considered significant. The variety of recreational opportunities proposed specific to alternative B, along with new and enhanced recreation facilities and visitor spaces and the purposeful effort to engage a more diverse audience, would have additional benefits for the visitor experience at Gateway beyond those common to both action alternatives. Programming and other experiences would also be directed at increasing visitor understanding of the park and its resources and would be a significant benefit. The same types of benefits are true of alternative C. However, alternative C offers fewer recreation facilities and a less expansive mix of experiences than alternative B. Because it does greatly expand visitors' understanding of the park and its resources, considered a fundamental value of Gateway, the beneficial impacts of alternative C would be considered significant.

Social and Economic Environment

Continued management of the park as it is now would provide social benefits for those who use the park and spending by visitors in the surrounding community. The park and concessioners also benefit the socioeconomic environment through employment. Both action alternatives would improve access to Gateway and between park sites by increasing bike lanes and pedestrian walkways, as well as hubs that offer public transportation options. This combined with increased facilities and recreation options would increase visitor use, with associated social and economic benefits in access, spending, and employment. Because alternative B is estimated to increase visitor use by a greater amount than alternative C, benefits related to it would be greater. However, both alternatives would result in potentially significant social and economic benefits.

Transportation

Adverse transportation related impacts from current management include dependence by visitors on accessing the park by car and inadequate parking space to accommodate them during certain times of the week, day, or season. In the Sandy Hook Unit, insufficient parking capacity to meet demand means the unit is closed during peak visitation and traffic is reversed and redirected over the only access bridge to the site. Both alternatives B and C would increase public transportation options and provide a suite of alternative transportation options such as new and improvement bike paths, greenways, blueways, hiking trails, and pedestrian paths. Alternatives would also include additional wayfinding options for visitors to travel between park sites and new and redesigned parking areas. Taken together, these benefits for transportation under either action alternative would be significant.

Park Management, Operations, and Facilities

A chronic lack of adequate funding, particularly for facility maintenance, has led to deterioration of many park buildings and other assets, a condition that would continue under alternative A, with significant adverse impacts on operations and facilities. Park managers have also made efforts to adopt energy-efficient building standards, adaptively reuse structures, and increase the fuel efficiency of fleet vehicles, with substantial benefits for park operations. Both action alternatives would continue the current "banding" effort to determine which structures, infrastructure, and other facilities it should prioritize for rehabilitation and preservation, leaving some (including historic structures considered fundamental in some cases) to deteriorate. This focus will allow the park to better direct its staff and budget toward maintaining and rehabilitating remaining assets, with substantial benefits. Both alternatives would also partner with others including New York City to co-manage sites, combining programming and other functions to avoid overlap and increase operational efficiency. In addition, both alternatives would substantially improve the sustainability of park operations, building practices, and energy utilization. The benefits of each of these actions would be considered significant. With preservation as a higher management priority and the more aggressive pursuit of public–private partnerships for reuse of historic structures, alternative C would result in substantial and significant benefits for park operations. Alternative C would also include a greater emphasis on sustainable facilities and park operations than alternative B, as it includes an anaerobic digester. This is a benefit for both energy-efficiency goals for the park as well as park budgets.



Next Steps and Plan Implementation

~~The GMP/EIS will be made available for a 60-day review and comment period to federal, state, and local agencies and all other interested parties, including organizations, businesses, interested individuals and stakeholders, and the general public. Comments will be accepted electronically through the NPS PEPC website or in the form of written letters that must be post-marked by the due date shown on the PEPC website. During the review period, the NPS will hold public meetings where the public will have additional opportunities to provide comments on the management alternatives and impact analysis presented in the draft GMP/EIS. Once the comment period has closed, the NPS will evaluate all comments received, after which a final GMP/EIS will be prepared.~~ The final GMP/EIS will report on the results of agency and public comments on the draft GMP/EIS, including any changes that may have been made as a result of agency and public comment. The final GMP/EIS will be released for a 30-day no-action period. The availability of the final GMP/EIS will be announced to agencies and the public and will be noticed in the Federal Register. No sooner than 30 days after the release of the final GMP/EIS, the Northeast Regional Director may sign a record of decision selecting an alternative for implementation as the approved GMP for Gateway. The availability of the signed record of decision will be noticed in the Federal Register, after which the NPS would proceed to implement the approved GMP contingent on available funding. By virtue of recording this selection in a record of decision, this alternative will become the park's new general management plan.

How to Read This Plan

This plan is divided into six ~~five~~ chapters:

Chapter 1: Foundation for Planning describes reasons why the general management plan is being prepared. Chapter 1 presents the park's purpose and significance statements and describes the fundamental and other important resources and values that are critical to achieving the park's purpose and maintaining its significance. This section also describes the planning process and issues addressed in the plan.

Chapter 2: Management Alternatives describes a new vision for Gateway and evaluates, and compares the no-action alternative and two action alternatives. The no-action alternative provides a baseline from which the two action alternatives can be evaluated. Desired resource conditions, opportunities for visitor experience, as well as levels of development intensity necessary to accomplish each alternative are presented.

Chapter 3: Affected Environment describes the existing natural, cultural, and socioeconomic resources that could be potentially affected by implementing either one of the alternatives.

Chapter 4: Environmental Consequences describes the potential impacts on the park's resource values that could result from implementing any of the alternatives.

Chapter 5: Consultation and Coordination describes the public involvement and agency coordination process that occurred during the GMP planning process. Required compliance mandates are also summarized.

Chapter 6: Comments and Responses to Comments on Draft Plan describes the public comment review process and addresses substantive comments.

References and legal citations are cited from which background and supporting documentation was obtained.

A **Glossary** of environmental terms used in this document is provided.

An **Index** of key terms is provided for easy cross referencing.

Appendices provide additional supporting technical data and relevant background material cited throughout the plan.



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Chapter 1: Foundation for Planning



A park, however splendid, has little appeal to a family that cannot reach it . . . The new conservation is built on a new promise—to bring parks closer to the people.

—President Lyndon B. Johnson, 1968





Purpose of and Need for the Plan

Imagining a New Gateway

It was a bold idea: bring national parks closer to people in cities. Forty years later, that bold idea continues to evolve at Gateway National Recreation Area (Gateway; the park), the country's first urban national recreation area. Gateway was established in 1972 with the dream of bringing a National Park Service (NPS) experience to the New York metropolitan area. In the 21st century, the needs and expectations for a national park experience have changed—and so must Gateway.

Today, Gateway is at a crossroads and a new vision is necessary to shape the park's future. This new vision is found in this ~~Draft~~ Final General Management Plan / Environmental Impact Statement (GMP/EIS). Like businesses, schools, and community groups, national park managers make choices each day about where to focus time and money. Often there are competing priorities that make these choices difficult. Is fixing a roof, protecting a beach, or giving a school group tour more important that day? A park's GMP helps guide managers and staff as they balance these choices. It helps park managers focus on what is most important in carrying out a new 20-year vision for Gateway and the mission of the NPS.

Gateway's first GMP was finished in 1979. Almost 35 years later, the world is a different place, with constantly changing ideas and expectations for leisure services and information. New studies have led to a better understanding of the significance of Gateway's natural and cultural resources and current threats. In addition, the needs of visitors are very different today than they were a generation ago. The U.S. population is growing older and more diverse, children are spending less time outdoors, and technology is bringing rapid changes. ~~Recent events such as Hurricane Sandy have brought~~ The increasing body of scientific information regarding climate change and projections of sea level rise, coupled with recent events such as Hurricane Sandy describe a new reality and urgency to find ways to protect, improve, and sustain our natural and cultural resources while still providing a great place to relax and have fun. New opportunities to work cooperatively with New York City have emerged and the value of parks in urban areas to enhance quality of life is finally being recognized.

Gateway needs a new GMP now because new issues and ideas have emerged in recent years that the 1979 GMP does not address because they were not anticipated when the plan was prepared. Many of the 1979 GMP's recommendations were implemented, others are no longer appropriate because of changing conditions and circumstances, and some have not been implemented due to funding limitations. None of the recent NPS policies related to management and planning for all national park units are reflected in the 1979 GMP.

A Special Place at the Urban Edge

Contrast the beauty, simplicity, and grandeur of nature at the edge of the most densely populated place in the nation, the greater New York and New Jersey metropolitan area. See an osprey swoop down to catch a fish for dinner. Enjoy a peaceful boat ride among thousands of acres of islands and open water. Play on miles of beautiful beaches. View the

What is a national park experience?

National parks are here for everyone, and the diversity in the national park system reflects the diversity of who we are as a nation. Visitors who come to national parks find places that represent the country's most significant events, people and natural environments. They find experiences that bring enjoyment, inspiration and a sense of connection to those places through interaction with the natural and historical landscapes, and the associated stories and meanings relevant to our lives today.

oldest operating lighthouse in the nation. Tour the former harbor defense system, which dates back to the 19th century. Walk a historic runway built in 1930. Imagine what it was like to pilot a simple aircraft like the ones used by Amelia Earhart or Howard Hughes. Bike, hike, breathe, reflect, and recreate. These experiences are what the United States Congress had in mind when it created Gateway.

Gateway was established "in order to preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features." The park's establishing legislation was signed into law in October of 1972 and signified the culmination of many years of effort by citizens, planners, activists, the NPS, and members of Congress. The park was created a full century after the establishment of Yellowstone, the nation's first national park. The national recreation area was a reflection of an ongoing evolution of the national park concept, from a system of parks preserving the natural wonders and scenic masterpieces in relatively remote and secluded areas, to a system that included the development of several urban-edge parks that balanced natural and cultural resources with recreational opportunities. The political climate of the 1960s recognized that a majority of the nation was living in urban areas, where many outdoor recreation opportunities were too distant for regular use. The ability to bring "parks to people" was assisted by a shift in federal policy allowing for federal money to acquire shoreline area for park designation.

Congress envisioned Gateway as a ring of green space and shoreline around the New York Outer Harbor for a water-based outdoor recreation area. The majority of recreation opportunities would focus on beach activities, primarily sunbathing and swimming. The park was created from public lands including U.S. Army and United States Navy installations, New York City parks, and New Jersey state lands.

Park access via public transportation was an important element in the formation of the park, and it was estimated that 10 percent of the U.S. population lived within a 2-hour drive from a Gateway site. The original vision for Gateway included ferry service that would link the park sites, with affordable rates to ensure that the parks are accessible to low-income residents of the region and attractive to large numbers of visitors. Some of the public transportation and water access goals have yet to be realized.

Today, Gateway is composed of 27,025 acres of open bays, ocean, marsh islands, shoreline, dunes, maritime and successional forests, grasslands, mudflats, and open spaces. It includes marinas, greenways, campgrounds, trails, beaches, and picnic grounds within historic landscapes, the remains of important coastal defense works, rare structures from our aviation history, and the oldest continuously operating lighthouse in the United States. Each year millions come to experience the recreational, natural, and cultural opportunities that stretch throughout the coastline of three New York City boroughs and into northern New Jersey.

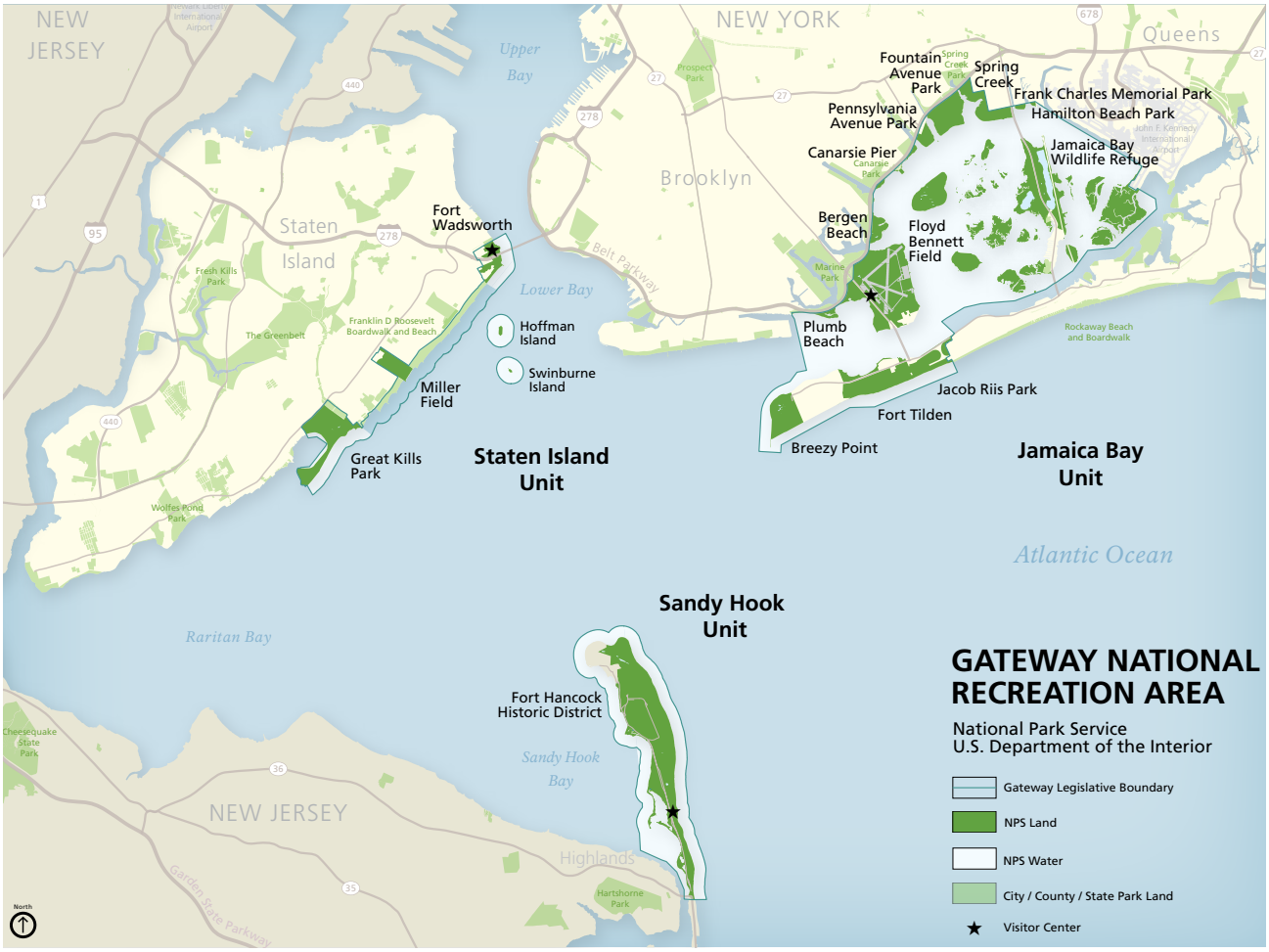


Figure 1-1. Gateway National Recreation Area.

The Planning Area

Gateway covers more than 40 square miles in New York and New Jersey. That is an area nearly twice the size of the island of Manhattan. The park is split into three different areas in Monmouth County, New Jersey, and the New York City boroughs of Brooklyn, Queens, and Staten Island (see figure 1-1).

The legislative boundary for Gateway is 27,025 acres and extends into adjacent waters, including the Atlantic Ocean, Jamaica Bay, Raritan Bay, and Upper and Lower New York Bay. The park manages 21,680 acres of land and waters. An additional 5,345 acres are managed by other federal agencies, owned by New York City, or privately held by entities such as Breezy Point Cooperative, Broad Channel, and Roxbury. The park has three administrative units: the Jamaica Bay Unit, Sandy Hook Unit, and Staten Island Unit. These three distinct geographic areas are linked together by similar types of resources and recreation uses, yet retain distinctive characteristics that make them special.

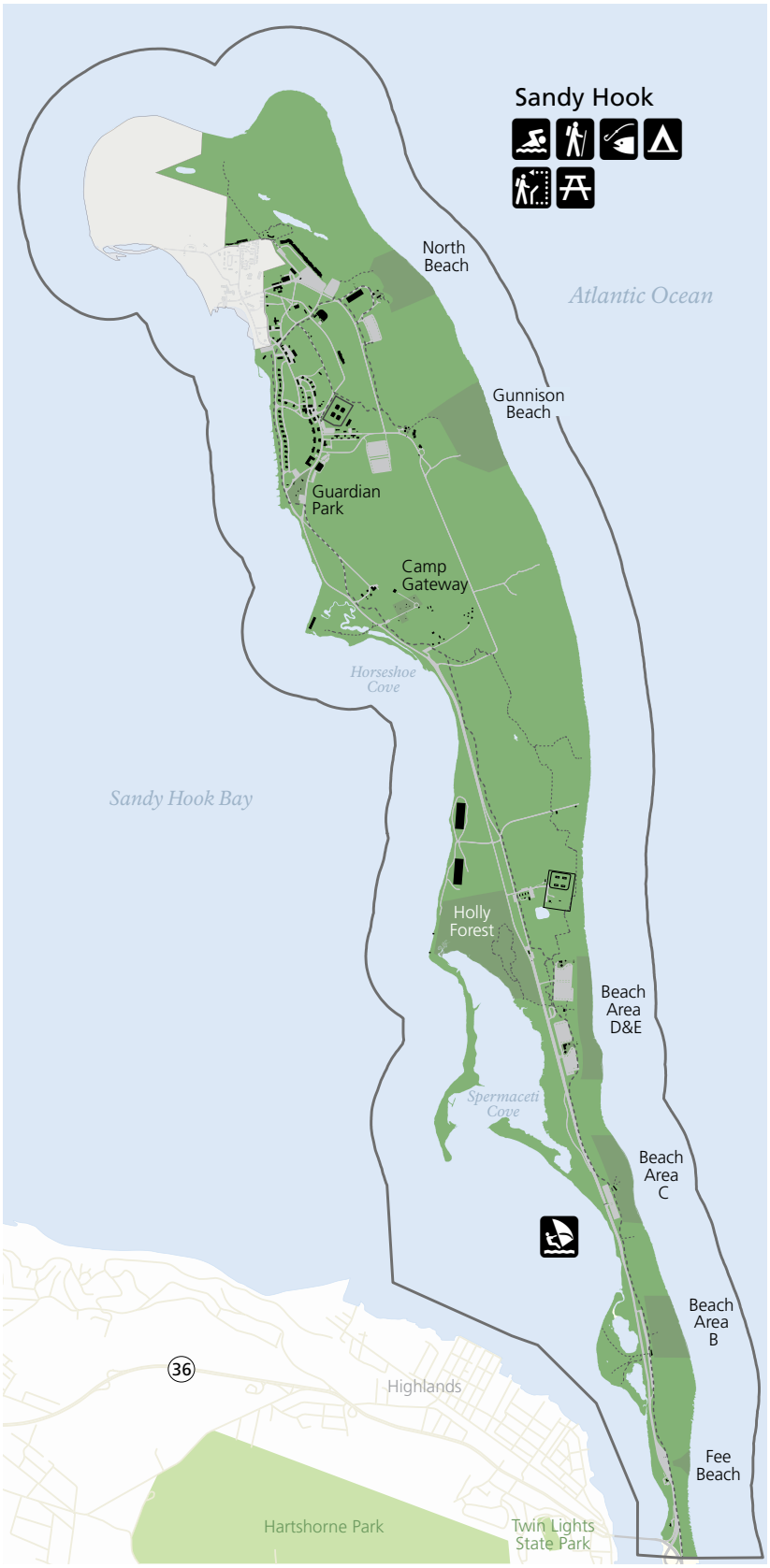


Figure 1-2. Sandy Hook Unit.

Sandy Hook Unit

The Sandy Hook Unit is 4,688 acres of land, bay, and ocean waters in Monmouth County, New Jersey (see figure 1-2). Surrounding communities include the boroughs of Atlantic Highlands, Highlands, Monmouth Beach, and Sea Bright along Route 36. Both the NPS and the United States Coast Guard manage areas of the peninsula.

The unit encompasses ~~includes~~ the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District and natural areas and shorelines adjacent to the Atlantic Ocean and Sandy Hook Bay:

- Fort Hancock and Sandy Hook Providing Ground National Historic Landmark District (Fort Hancock) encompasses the entire Sandy Hook peninsula. Fort Hancock is a former U.S. Army fort that provided coastal defense for New York Harbor from 1895 until 1974. ~~Between 1874 and 1919, Fort Hancock was operated in conjunction with the army's Sandy Hook Proving Ground.~~ Today, over 100 buildings and fortifications remain from this long-term military installation. ~~Historic~~ Coastal defense features include multiple historic batteries and the Nike Missile Radar and Launch Sites. The unit is also the site of the historic Spermaceti Cove Life Saving Station and the Sandy Hook Light National Historic Landmark District ~~Lighthouse~~, which is the nation's oldest continuously operated lighthouse and has guided ships into New York Harbor since 1764.

- The Sandy Hook peninsula includes miles of beaches and trails, a rare maritime forest, saltmarshes, and opportunities for swimming, fishing, biking, windsurfing, observing wildlife, and other educational and recreational activities.

Jamaica Bay Unit

The Jamaica Bay Unit is one of the largest expanses of open space in the region, consisting of over 19,000 acres of land, bay and ocean waters within two boroughs of New York City: Brooklyn and Queens (see figure 1-3).

The unit is divided into the following areas:

- Plumb Beach is a stretch of shoreline, tidal mudflats, low saltmarsh areas, a tidal lagoon, a dune system, and woodland thickets at the entrance to Gerritsen Creek adjacent to the Belt Parkway. This area is a great location for wind-related activities such as windsurfing and kiteboarding and provides important habitat for horseshoe crabs.

- Floyd Bennett Field was New York City's first municipal airport; later it became a World War II naval air station. Today this area includes over 1,300 acres of grassland, saltmarshes, tidal mudflats, a marina, and the former airfield, including a control tower and terminal that is now the William Fitts Ryan Visitor Center (Ryan Visitor Center). Many recreational opportunities are available, including camping, biking, archery, gardening, ice skating, hockey, and gymnastics and other indoor sports.

- Canarsie Pier includes a ~~historic~~ pier used for fishing, picnicking, and community events. The adjacent natural area provides access to the bay for kayaking and boating.

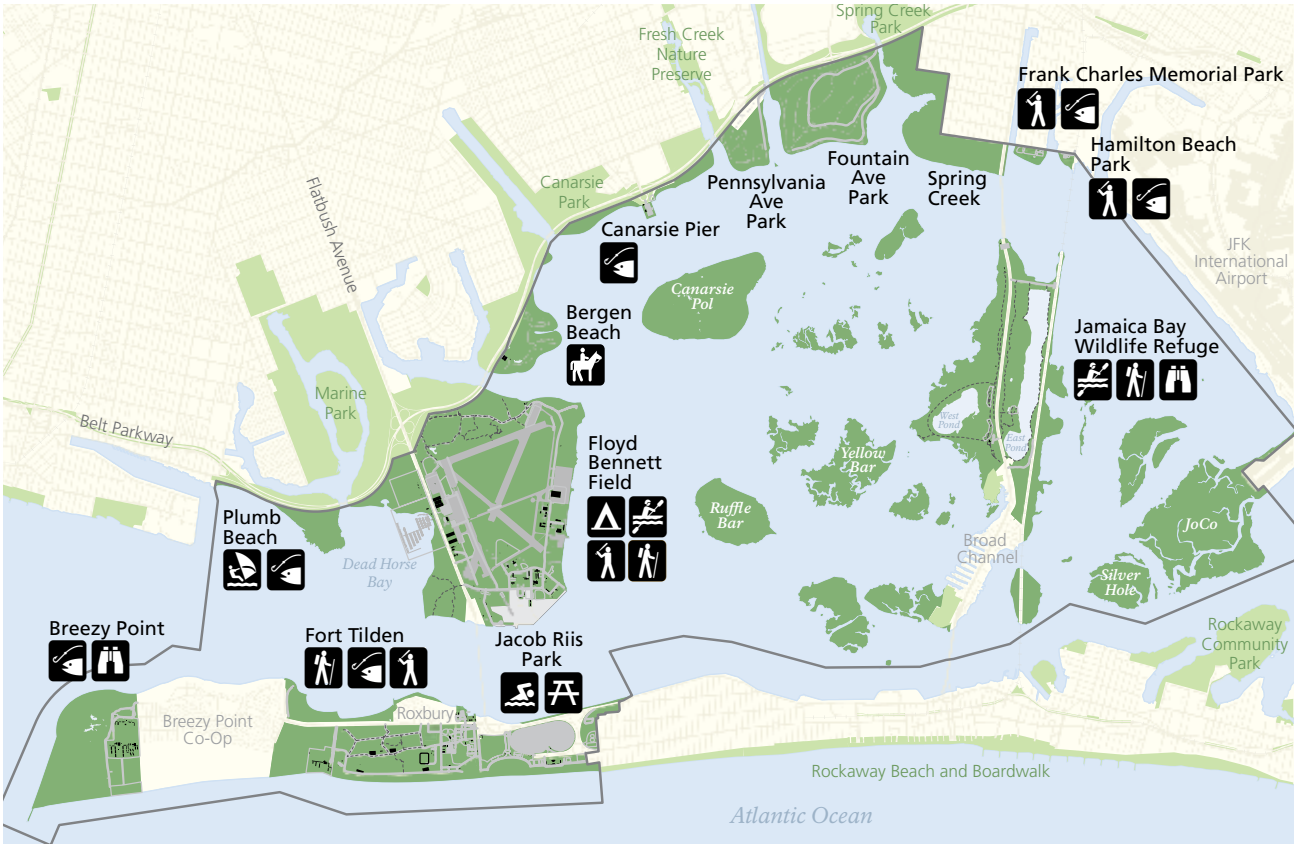


Figure 1-3. Jamaica Bay Unit.

- Bergen Beach is a rich natural area and an equestrian area for riding and boarding horses.

- The Pennsylvania Avenue and Fountain Avenue Parks are capped and sealed landfills that are undergoing transformation into natural areas.

- Spring Creek is an undeveloped wetland and marsh area.

- The Jamaica Bay Wildlife Refuge includes over 12,600 acres of water, saltmarshes, freshwater and brackish water ponds, upland fields and woods, and open bay and islands. It is one of the largest bird habitats in the northeastern United States and is a great place to observe the seasonal bird migration as well as resident species.

- Frank Charles Memorial Park and Hamilton Beach were originally created as municipal parks and include playgrounds and ball fields along with shoreline access for fishing, as well as some sensitive marshlands.

- Jacob Riis Park is a cultural landscape that includes beaches for swimming and sunbathing, basketball courts, paddle tennis, playgrounds, a golf course, a historic bathhouse, and a mile-long cement boardwalk.

- Fort Tilden is a former military site that overlooks the approach to New York Harbor and today includes athletic fields, hiking trails, an arts center, a theater, and an observatory deck on a historic battery offering spectacular views of Jamaica Bay, New York Harbor, and the Manhattan skyline. Dunes, a maritime forest, freshwater ponds, and coastal defense resources including Battery Harris and the Nike Missile Launch Site are also found here.

- The Breezy Point Tip area includes sand dunes, saltmarshes, brackish marshes, and grasslands that offer habitat for many threatened and endangered bird species and also offer excellent fishing opportunities.

Staten Island Unit

The Staten Island Unit encompasses almost 2,974 acres of land and bay waters and four areas, including Fort Wadsworth, Great Kills Park, Miller Field, and Swinburne Island and Hoffman Island, in Staten Island, New York (see figure 1-4):

- Fort Wadsworth includes one of the oldest military sites in the nation, which has controlled the entrance to New York Harbor since the Revolutionary War. Coastal defense resources include Battery Weed, Endicott-era batteries, Fort Tompkins, and the Torpedo-storage Building.

- Great Kills Park includes saltmarshes, beaches, nature trails, a marina, a boat launch, and trails. Visitors to the park enjoy activities including jogging, in-line skating, cycling, boating, beach activities, and birdwatching.



Figure 1-4. Staten Island Unit.

- World War Veterans Park at Miller Field (Miller Field) was built after World War I as a military aircraft field and today includes athletic fields, picnic areas, a community gardens, and the swamp white oak forest.

- Swinburne Island and Hoffman Island are islands off the Staten Island coast and function today as bird nesting areas, with no public access.

Foundation for the Future

A first step in a general management planning effort is confirming the park purpose, its significance, fundamental resources and values, and interpretive themes. The purpose and significance statements are used to guide planning and management decisions to ensure that the resources and values that Congress and the president wanted preserved are the first priority. The following foundation document is grounded in the park's legislation and provides a shared understanding of what is most important about the park.

Park Purpose

The park purpose is a specific reason why Congress established Gateway as a unit of the national park system. The purpose statement provides the most fundamental criteria against



which the appropriateness of all planning recommendations, operational decisions, and actions are tested. The park's purpose is based on interpretation of its authorizing legislation and legislative history.

Park Purpose: Gateway National Recreation Area provides a national park experience in the country's largest metropolitan area. The park preserves a mosaic of coastal ecosystems and natural areas interwoven with historic coastal defense and maritime sites around New York's Outer Harbor. Beaches, marshes, waters, scenic views, and open space offer resource-based recreational opportunities to a diverse public, recognizing the importance to preserve these special places for future generations.

Park Significance

Statements of significance define what makes the park unique—why it is important enough to our cultural heritage to warrant national park designation and how it differs from other parts of the country. These statements are tools for setting resource protection priorities and for identifying appropriate experiences. Each area of the park contains many significant resources, but not all these resources contribute to why the park was designated.

Fundamental Resources and Values

Fundamental resources and values are the park's attributes—its features, systems, processes, experiences, stories, scenes, sounds, smells, opportunities for visitor enjoyment, or others—that are critical to achieving the park's purpose and to maintaining its significance. These fundamental resources and values provide Gateway managers and staff with a focus on what is truly most important about this park. They help focus efforts and funding on the resources and experiences that matter most.

Interpretive Themes

The most important ideas or concepts about Gateway are communicated through the park's interpretive themes. These themes are based on the park's purpose and significance and connect resources to relevant ideas, meanings, beliefs, and values. They describe the key stories and concepts on which the park's educational and interpretive programs are based. Park managers consider these themes when setting priorities for events and activities. The themes also provide direction for planners and designers of the park's exhibits, publications, and audiovisual programs.

Coastal Defense Fortifications and Military Areas



Significance Statement

Forts Hancock, Tilden, and Wadsworth compose one of the largest sets of military installations and distinctive fortifications in the country, dating from pre-Civil War through the 20th century. These installations represent a long period of military presence and served as the defense of New York City, America's largest city.

Fundamental Resources and Values

- Coastal defense resources, including earthworks, associated structures, museum collections, and archeological sites, for the following:
  - **Fort Hancock**
    - Endicott/Taft-era batteries
    - Parade Ground, including Officers' Row, barracks, and cultural landscape
    - Nike Missile Launch and Radar Sites
  - **Fort Tilden**
    - Battery Harris
    - Battery Kessler
    - Construction Battery 220
    - Nike Missile Launch Site
  - **Fort Wadsworth**
    - Battery Weed
    - Endicott-era batteries
    - Fort Tompkins
    - Torpedo-storage Building
- Connections to national defense history

Interpretive Theme

Two Centuries of National Defense. For over 200 years, places in Gateway were critical to the defense of New York Harbor and played a significant role in the development of the military technologies and strategies used to protect our nation. The changing nature of our national defense reveals stories of triumph, struggle, and everyday life as well as the contrast of innovation and obsolescence. Today, the remaining fortifications, structures, and historic landscapes are a visible reminder of the importance of preparedness and defense then and now.

The most important ideas or concepts about Gateway are communicated through the park's interpretive themes.

Coastal Systems and Natural Areas

Significance Statement

Gateway contains an assemblage of coastal ecosystems formed by natural features, both physical and biological, that include barrier peninsulas, estuaries, oceans, and maritime



Gateway contains an assemblage of coastal ecosystems formed by natural features, both physical and biological, that include barrier peninsulas, estuaries, oceans, and maritime uplands.

uplands. The habitats that compose these ecosystems, so rare in such highly developed areas, support a rich biota that includes migratory birds, marine finfish and shellfish, plant communities, and rare, threatened, and endangered species. These features provide opportunities to restore, study, enhance, and experience coastal habitats and ecosystem processes.

Fundamental Resources and Values

- Beaches/dune system at Bergen Beach, Breezy Point Tip, Fort Tilden, Great Kills, Jacob Riis Park, Plumb Beach, and Sandy Hook
- Natural Areas at Breezy Point Tip, Crooke's Point, Floyd Bennett Field, Fort Tilden, Great Kills, Hoffman and Swinburne Islands, Jamaica Bay Wildlife Refuge, and Sandy Hook
- Jamaica Bay waters, including inlets, submerged lands, and Dead Horse Bay
- Sandy Hook maritime forest
- Beach experience, including access to ocean surf
- Direct sensory experience with natural elements
- Public access to bay and ocean shorelines
- Darkness and night sky

Interpretive Theme

The Natural Wonders, Dynamics, and Challenges of an Urban Estuary. The natural resources of Gateway are remarkably diverse given their location in the nation's most densely populated urban area. The mosaic of coastal habitats is a refuge for both rich and rare plant and animal life intrinsically governed by the rhythms, processes, and cycles of nature, yet also continually shaped by people and the surrounding built environment. These resources provide unique and surprising opportunities for experiencing the wildness of the natural world while within the city's limits, and a model for studying, managing, and restoring urban ecosystems.

Maritime Resources

Significance Statement

The maritime resources of Gateway include the oldest continuously operating lighthouse in the United States and one of the first federally sponsored lifesaving station in the country. These resources served to protect ocean commerce and enhance the safety of the busiest American seaport.

Fundamental Resources

- Sandy Hook Lighthouse
- Spermaceti Cove Life Saving Station

Interpretive Theme

Maritime Heritage. Since the days of European exploration and colonization, Sandy Hook has played an important role in facilitating navigation and commerce in and out of New York Harbor. Its maritime resources illustrate the evolution of navigation aids and coastal rescue, in part via the oldest lighthouse in the United States, one of the original lifesaving stations built by the federal government, historic United States Coast Guard structures, and a relatively safe natural harbor that has provided refuge to generations of mariners. Dedicated and heroic individuals ensured that the Sandy Hook Lighthouse served to guide ships in all seasons and under all conditions.



Since the days of European exploration and colonization, Sandy Hook has played an important role in facilitating navigation and commerce in and out of New York Harbor.

Diverse Recreation Opportunities

Significance

The vast and diverse park resources at the gateway to the most densely populated region of the United States provide an abundance of outstanding recreational and educational opportunities.

Fundamental Resources and Values

- Feelings associated with open space in a high-density area
- Views of New York Outer Harbor
- Recreation experiences including the following:
  - Nature observation such as bird watching, contemplation of physical environment, quiet, astronomy
  - Water-based activities such as surfing, boating, fishing, and swimming
  - Walking/hiking, biking, and horseback riding on trails
  - Picnicking
  - Visiting historic sites

Interpretive Theme

Recreation and Education: Quality of Urban Life for All Visitors. The human need for recreation and renewal has resulted in an evolving history of traditional and innovative uses of the park's lands and waters to improve the quality of urban life. Intrinsically connected to the diverse population of the New York metropolitan area, Gateway's resources provide unique opportunities for outdoor recreation and rejuvenation in a densely populated and largely impacted metropolitan area. It is an outdoor laboratory for learning and discovery, where academic facts and knowledge can be observed in real settings. The park's open spaces and wide horizons offer opportunities for resource-based recreation as well as contemplation and reflection.



The human need for recreation and renewal has resulted in an evolving history of traditional and innovative uses of the park's lands and waters to improve the quality of urban life.

Other Important Resources and Values

Many resources and values are determined to be important in their own right even though they are not related to the park's purpose and significance. These resources are particularly important to park management and planning and will be considered during the general management planning process.

- Civil and military aviation history resources at Floyd Bennett Field and Miller Field
- Historic landscape at Jacob Riis Park, including the beaches, boardwalk, and bathhouse
- Pre-contact archeological sites; historic archeological sites related to domestic and Military occupations of park lands, and submerged resources

Planning Challenges

General management planning offers a structured decision-making process that encourages and considers ideas and comments from many different people and groups. Throughout development of the GMP/EIS, the planning team used a variety of scoping techniques to identify the issues related to management of the park, the range of management alternatives that should be considered in the GMP/EIS to address those issues, and the range and nature of impacts that should be used to evaluate and compare alternative management actions. Scoping occurred internally with NPS staff and externally with other public agencies, partner organizations, and interested citizens.

External scoping included public involvement activities that began early and continued throughout the general management planning process. Some of these activities and events include the following:

- The NPS made newsletters and announcements of upcoming events available electronically on the NPS Planning, Environment, and Public Comment (PEPC) website (http://parkplanning.nps.gov/gate), which provided opportunities to review the planning team's findings and submit comments electronically through the PEPC system.

- In July of 2009, the NPS hosted five outdoor open houses at the Great Kills Beach Center (Staten Island, New York), Bay 9 at Riis Park (Queens, New York), Sandy Hook Lot D Beach Center (Sandy Hook, New Jersey), Aviator Sports at Floyd Bennett Field (Brooklyn, New York), and the Fort Wadsworth Visitor Center (Staten Island, New York) where visitors could learn about the GMP/EIS planning process and opportunities to participate, including an invitation to attend future public open house workshops.

- In September of 2009, the NPS hosted another six public open houses at the Gateway Marina (Brooklyn, New York), World War Veterans Park at Miller Field (Staten Island, New York), Fort Hancock Chapel (Sandy Hook, New Jersey), Jamaica Bay Wildlife Refuge Visitor Center (Queens, New York), Ranger Station at Floyd Bennett Field (Brooklyn, New York), and the Fort Wadsworth Visitor Center (Staten Island, New York) to provide information about the GMP/EIS planning process and to gather public comments.

- In November 2010, the NPS hosted nine public open houses at Federal Hall National Memorial (New York, New York), Starrett City Brooklyn Sports Club (Brooklyn, New York), Monmouth University (West Long Branch, New Jersey), Brookdale Community College (Lincroft, New Jersey), Kingsborough Community College (Brooklyn, New York), Oakwood Heights Community Church (Staten Island, New York), Monmouth Beach Cultural Center (Monmouth Beach, New Jersey), Jamaica Bay Wildlife Refuge (Queens, New York), and Fort Wadsworth Visitor Center (Staten Island, New York) to gather public comment on a range of preliminary alternative concepts for future management of the park.

- In summer 2012, the NPS hosted six outdoor information sessions and three public open house meetings at Great Kills Beach Center and Education Center (Staten Island, New York), Riis Park Bathhouse (Queens, New York), Sandy Hook Lot D Beach Center and Fort Hancock Chapel (Sandy Hook, New Jersey), and Ryan Visitor Center at Floyd Bennett Field (Brooklyn, New York) to gather comments on four draft management alternatives.

- Press releases for public open house meetings were sent to local newspapers.

- Thousands of newsletters in English, Spanish, Chinese, and Russian were mailed to interested parties and distributed at informational sessions and open house meetings.

- Gateway posted and maintained announcements regarding the status of the GMP/EIS on the park's website and Facebook page.

The types of planning challenges raised through the scoping process varied significantly. Exploring different ways to address the issues was the basis for developing the range of management concepts and the creation of the different management alternatives. The planning challenges are summarized below.

Exploring different ways to address the issues was the basis for developing the range of management concepts and the creation of the different management alternatives.

Responding to Climate Change and Sea-level Rise

Climate change refers to changes occurring in the earth's atmospheric, hydrologic, and oceanic systems, which could alter the landscape, natural and cultural resources, and facilities of Gateway. The issues and potential future threats associated with a changing climate have been considered since the early stages of the GMP/EIS process. Gateway staff worked with academic partners to better understand these issues and how Gateway management would need to adapt in the future. *Gateway National Recreation Area: Long-term Resource Management under a Changing Climate (Columbia University 2009)* and *Coastal Geomorphology of the Ocean Shoreline: Natural Evolution and Cultural Modifications, a Synthesis* (Psuty et al. 2009) were developed to inform the GMP/EIS process and acknowledged that Gateway has been experiencing changes due to frequency and intensity of recent storm events.

At least four climate change impacts may significantly affect Gateway: sea level rise, precipitation changes, temperature changes and changes in extreme weather events' frequency or intensity. These four, primary impacts will exert many secondary effects on Gateway, including coastal erosion, damage to park assets, saltwater intrusion, species range





shifts and interruptions between species migrations and their food sources. These secondary effects will overlap and interact, resulting in ~~three~~ combined impacts throughout the park~~:~~, including species composition changes, habitat loss and cultural resource damage and loss. Biodiversity loss and recreational infrastructure damage resulting from these combined effects would diminish Gateway's ability to fulfill its mandate to preserve and protect its resources.

The majority of the park's well-known and significant historic buildings, such as the Jacob Riis Park Bath House in Jamaica Bay, Officers' Row at Sandy Hook, and Battery Weed at Fort Wadsworth, are adjacent to the ocean and other water bodies and are vulnerable to sea level rise and coastal storms. Some of these places have already experienced increases in storm flooding. Greater levels of shoreline and dune erosion have been occurring due to human influences and natural forces. Roads, trails, paved paths, and wildlife habitat have already been impacted.

Hurricane Sandy came ashore on October 29, 2012, and caused significant damage to many areas of Gateway bordering the Atlantic Ocean and bays, forcing the closure of the entire park. Hurricane Sandy was the largest Atlantic hurricane on record and produced heavy winds, tidal surge, and rain that resulted in severe flooding and extensive damage in New York City and the Jersey Shore communities. Popular park areas at Jacob Riis Park, Fort Tilden, Jamaica Bay Wildlife Refuge, Great Kills Park, and Sandy Hook received high levels of damage. Park infrastructure elements such as water and sewer systems, telecommunications, electricity, roads, and trails were destroyed. Beaches, snack bars, athletic fields, boating areas, and other popular recreation sites were also damaged. Today, the park is in the recovery phase.

The GMP/EIS provides considerations for climate change, and proposes measures for adapting natural and cultural resources, recreation uses and infrastructure:

- What are the best approaches for managing the potential impacts of sea-level rise and other climate-related changes, including loss of habitats, wetlands, shorelines, historic buildings, and infrastructure?

- How can Gateway serve as a model for ~~sustainability, environmental innovation, and resiliency?~~ adaptation to climate change, including sustainability through innovative facility designs and practices?

Preserving Gateway's Heritage

Gateway possesses more than 800 historic buildings, structures, landscapes, and archeological sites with hundreds of additional individual features that contribute to the character of these special places. When Gateway was established in 1972, the historical significance of its buildings, structures, and landscapes was not clearly understood. Many of these inherited buildings and structures were already in poor condition. Repairing, painting, and other maintenance today is a serious challenge given the resources' numbers and current condition as well as competing funding and staff priorities. From 1982–1995, the park undertook various planning initiatives to focus on the long-term use and preservation

of these resources, but it has not received the funding necessary to implement these plans. The stories of the people and events that are part of Gateway's rich history are represented in the park's museum collections. Museum holdings include over 660,000 objects associated with local military, aviation, and maritime history; pre-contact artifacts dating back to the Woodland Period; archive and manuscript collections (NPS management records, rare books); and natural history collections. Currently the collections are overcrowded in places that do not meet professional museum standards. This contributes to deterioration of the collections and does not allow for access by staff, students, and scholars for academic research.

The GMP/EIS will set priorities for preserving and managing the park's cultural resources in a sustainable manner. The GMP/EIS will consider the following questions:

- What are the best ways to manage the park's cultural resources and landscapes to ensure their preservation?

- How can Gateway identify priorities for addressing the deferred maintenance of cultural resources?

- What partnerships can the park leverage to encourage the long-term protection of Gateway's heritage assets?

- What additional baseline research and documentation of historic structures, cultural landscapes, and archeological inventories is required?

- What are the best approaches to ensure that the park's collections are properly stored and provide access for research, interpretive, and educational opportunities?



Gateway possesses more than 800 historic buildings, structures, landscapes, and archeological sites with hundreds of additional individual features that contribute to the character of these special places.

Addressing Marine Resources and Water Quality

Two-thirds of Gateway is covered by water—more than 17,500 acres of bay and oceanic waters that are part of larger systems influenced by land uses and activities taking place outside the park. Previous uses of park lands have left a legacy of impacts on the health and ecology of park natural resources. When the park was founded, saltmarshes had been filled, Jamaica Bay had been dredged, and native forests and vegetation had been covered in impervious surfaces. The beaches and bays are prime habitats for birds, shellfish, and plants as well as the most popular visitor areas for all types of water-based recreation. Despite many years of efforts to improve conditions, water quality is still threatened in all units, especially Jamaica Bay. Many activities in adjacent communities contribute to the problem and result in contaminated runoff from streets and sewers, shoreline development, vessel traffic, oil spills, and contaminants exposed during dredging. Degraded water quality hurts fish and wildlife and results in beach closures, shellfish consumption bans, and unsafe conditions for water activities.

Gateway includes 75 ~~acres~~ miles of shoreline with 31 miles of ocean beaches, dunes, and water that support habitat and nesting areas for birds, plants, fish, and crabs. The park is required by federal law to protect beach areas for threatened and endangered nesting bird populations. These areas are also favorite sunbathing beaches and places for fishing, surfing,



The beaches and bays are prime habitats for birds, shellfish, and plants as well as the most popular visitor areas for all types of water-based recreation. Despite many years of efforts to improve conditions, water quality is still threatened in all units, especially Jamaica Bay.

and boating. Ocean resources, including natural marine resources and submerged cultural resources, are at risk due to a variety of threats. Natural sediment transport, which affects shoreline and beach dynamics, is affected by activities outside the park boundaries. Most of the park's ocean shoreline is affected by conditions updrift of the park's boundary and the effects of structures at or near the boundary. The presence of engineering structures, both within and external to Gateway, have produced positive and negative results, including erosion and impacts on habitat and navigation channels.

The GMP/EIS will provide direction for preserving and managing the natural resources of the park in a sustainable manner and will provide direction for encouraging collaboration and stewardship. The GMP/EIS will consider the following questions:

- What should be the NPS's role in the restoration of Jamaica Bay, given the complexity of the issues and the interests of other agencies and partners?

- How should Gateway staff work with its partners to improve shoreline and ecological conditions and reduce the persistent threats and influences from adjacent urban development?

- As the fragility of natural resources becomes better understood, what are the best management approaches to ensure the long-term viability of the park's fundamental natural resources?

- How should habitats disturbed by historic land uses and management practices be restored?

Engaging New Audiences

Gateway does not have a strong identity as a unit of the national park system. This makes it difficult to promote experiences consistent with other national parks, and the park is often confused with city and state facilities. Visitors are sometimes unaware of all that Gateway encompasses—that it involves multiple units across two states, that it is an NPS site, and that it contains a collection of unique natural and historic resources. Visitation at Gateway does not reflect the ethnic, racial, or socioeconomic diversity that now characterizes the U.S. population and the communities adjacent to the park. The boom of electronic technology, especially with children and teens, is changing expectations for how the park should provide information and deliver programs. The GMP/EIS will include strategies for promoting a national park experience and engaging new audiences. The GMP/EIS will consider the following questions:

- How should the NPS shape a "national park experience" at Gateway in the midst of the country's largest metropolitan area that engages local, national, and global audiences?

- How can Gateway attract visitors that better represent the diversity of the U.S. population, New York City, and surrounding communities?

- What are the best ways to provide excellent interpretive experiences for all visitors, recognizing a dynamic and changing technological world?



Accessing the Park

Access to Gateway is predominantly automobile dependent. Several areas of the park are not conveniently accessible by public transit. This poses a challenge to many visitors, especially lower-income and transit-dependent populations. Visitors are interested in other options for reaching the park, but there are limited formal designated bike or water routes and few parking or docking facilities to support them. Connections from communities in the region to the park are not adequate. There is a need for improved, safe trail connections between park sites and between park sites and communities to provide seamless, safe, direct access ~~alternatives~~. The GMP/EIS will address visitor access to and within the park in order to improve visitor experiences and improve connections between park sites and between park sites and the larger community. The GMP/EIS will consider the following questions:

- Given multiple park units and many entrance points, how should visitors be oriented to the entire park?

- What are the most affordable and efficient ways to move and direct visitors to and throughout the park?

- How can Gateway enable and promote existing alternative modes of transportation in order to meet the needs of visitors, make the park more accessible, and reduce greenhouse gas emissions?

- What is the park's role with partners to extend public transportation services, enhance greenway connections, and assist in the promotion of alternative modes to and within Gateway?

Providing Appropriate Facilities

Park resources, visitor safety, and visitor experience have suffered because of the lack of adequate operational facilities in appropriate locations. Over the years, many visitors have expressed concerns about park infrastructure being in a state of decline and inadequate areas for bathrooms, showers, and food service. There is a parkwide demand for more user comforts—shade, playgrounds, benches, bike racks, picnic areas, water fountains, facilities for large family groups, and good food. Although there is a growing interest in water recreation opportunities, there are limited facilities and a need for designated water trails (blueways), lockers, boat rentals, and launch sites.

Park maintenance and public safety functions are scattered throughout the park and are often located at sites and facilities that were not intended for such uses or are not in the optimal location. These operations have been forced to adapt to conditions that do not adequately meet their space, size, function, mobility, and security requirements.



Additionally, Gateway includes hundreds of buildings, both historic and modern, some of which are unused and in poor condition. The upkeep of these structures is a challenge and can be a visual blight on the park's landscape. Gateway strives to be a leader in environmental sustainability. However, park day-to-day operations do not always reflect this value. The GMP/EIS will identify strategies for providing high-quality facilities for both visitors and park operations. The GMP/EIS will consider the following questions:

- What levels and kinds of visitor and operational facilities are appropriate and feasible for the NPS and others to manage?
- How should the park provide better visitor services and experiences?
- Are there unused structures in poor condition or vulnerable to climate change that can be removed from the park?
- How can Gateway be a leader in energy efficiency and sustainability in park operations?

Plan Development

The NPS GMP planning team prepared the GMP/EIS. The GMP planning team generally followed NPS planning program standards presented in the *General Management Planning Dynamic Sourcebook* (NPS 2008b). The GMP/EIS was prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and its implementing regulations (43 CFR 1500–1508); the Department of the Interior's NEPA regulations (40 CFR part 46); and NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2011e), and accompanying Handbook (NPS 2001). A range of reasonable alternatives or approaches to meeting the goals and responding to the planning challenges identified above was developed and analyzed for possible environmental costs and benefits. A general agreement established the City of New York as a cooperating agency in the process of preparing the GMP/EIS. Cooperating agency participation is intended to enable effective communication among government entities and provide relevant information to be used in the forthcoming NPS decision.

New Partners, New Vision

When Gateway was created in the 1970s, the majority of the park land to establish this new unit of the national park system was donated from city and state parks and a transfer of management from other federal agencies. In New York City, road systems like the Belt Parkway created a physical boundary between neighborhoods, city parks, and incredible Gateway resources such as Jamaica Bay. Gateway and New York City have been individually managing thousands of acres of open space, wetlands, shoreline, water, and community recreation areas, with most of these spaces adjacent to each other. As a result, habitat restoration projects, protecting wildlife corridors, and providing recreation services have

been happening independent of each other, without a unified vision for these areas. In 2010, President Obama launched the America's Great Outdoors Initiative and challenged federal agencies to be a great partner with communities to reconnect all Americans to our great outdoors. With more than 60 percent of the American population living in urban areas, urban parks are critical to this effort. As part of this initiative, Secretary of the Interior Ken Salazar challenged the National Parks of New York Harbor and Gateway to become a model for the America's Great Outdoors goal of establishing "a new generation of Great Urban Parks and community green spaces." Secretary Salazar recognized that with its unsurpassed wealth of national, state, and local parks; national historic landmarks; and a working, historical waterfront, New York Harbor offers an opportunity for federal, state, and local partners to work together toward a shared vision for open spaces, historic preservation, environmental restoration, and outdoor education.



As part of this initiative, Secretary of the Interior Ken Salazar challenged the National Parks of New York Harbor and Gateway to become a model for the America's Great Outdoors goal of establishing "a new generation of Great Urban Parks and community green spaces."

In order to achieve these goals in the New York City metropolitan area, greater collaborative efforts among federal agencies, the City of New York, other municipalities, the states of New York and New Jersey, and local partners would be needed. In June 2011, Secretary Salazar and Mayor Michael Bloomberg brought together a group of over 70 public agency and private organization leaders to explore opportunities for greater collaboration and potential strategies to build a stronger urban park experience. From this summit, a bold new idea emerged to begin this new collaboration in Jamaica Bay.

Over the last few years, Gateway and New York City staff members have been exploring ways to break down both the physical and administrative boundaries that separate these park lands around Jamaica Bay. As part of this greater collaboration, this new vision has been integrated into the GMP/EIS and will include ways to achieve the following goals:

- Create a seamless and interconnected network of natural and recreation spaces, including integrated land and water trail systems, community activity areas, and wildlife habitats

- Coordinate habitat restoration, research, and resource management within Jamaica Bay and surrounding parklands ~~in the bay~~

- Ensure that public transportation and access to and within Jamaica Bay strongly supports existing and new experiential activities, including public transit, pedestrian, bicycle, and ferry access

- Provide unified signs, maps, and marketing wherever possible

- Integrate business practices for maintenance and management as well as public programming and visitor services

- Develop new revenue generation sources and philanthropic support to enable the redevelopment and support the ongoing operations of the federal and city parks without regard to underlying ownership

Special Mandates and Administrative Commitments

Special mandates and administrative commitments can support, in many cases, a network of partnerships that help fulfill the objectives of the park and facilitate working relationships with other organizations.

Many of the management decisions for a park unit are directed or influenced by special mandates and administrative commitments with other federal agencies, state and local governments, utility companies, partnering organizations, and other entities. Special mandates are requirements specific to a park that must be fulfilled. Mandates can be expressed in enabling legislation, in separate legislation following the establishment of the park, or through a judicial process. They may expand on park purpose or introduce elements unrelated to the purpose of the park. Administrative commitments are, in general, agreements that have been reached through formal, documented processes, often through memoranda of agreement. Special mandates and administrative commitments can support, in many cases, a network of partnerships that help fulfill the objectives of the park and facilitate working relationships with other organizations. They are an essential component of managing and planning for the park.

The enabling legislation for the park and a list of administrative commitments is provided in Appendix A. Key provisions among the special mandates contained in the park's enabling legislation are presented below.

Conservation and management of wildlife and natural resources in the Jamaica Bay Unit

The Secretary shall administer and protect the islands and waters within the Jamaica Bay Unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area which is incompatible with this purpose.

Hunting, fishing, and trapping

The Secretary shall permit hunting, fishing, shellfishing, trapping, and the taking of specimens on the lands and waters under his jurisdiction within the Gateway National Recreation Area in accordance with the applicable laws of the United States and the laws of the States of New York and New Jersey and political subdivisions thereof, except that the Secretary may designate zones where and establish periods when these activities may not be permitted, for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment.

Programs for preservation, restoration, interpretation, and utilization of sites and structures in the Sandy Hook and Staten Island Units

In the Sandy Hook and Staten Island Units, the Secretary shall inventory and evaluate all sites and structures having present and potential historical, cultural, or architectural significance and shall provide for appropriate programs for the preservation, restoration, interpretation, and utilization of them.

Servicewide Laws and Policies

Many park management directives are specified in laws and policies guiding the National Park Service. For example, there are laws and policies about managing environmental quality such as the Clean Air Act, Endangered Species Act, and Executive Order 11990, "Protection of Wetlands"; laws governing the preservation of cultural resources such as the National Historic Preservation Act of 1966, as amended (NHPA), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA); and laws about providing public services such as the Americans with Disabilities Act of 1990, as amended (ADA)—to name only a few. In other words, a general management plan is not needed to decide that it is appropriate to protect endangered species, control invasive nonnative species, protect historic and archeological sites, conserve artifacts, or provide for access for persons with disabilities. Laws and policies have already decided those and many other things for Gateway. Although attaining some conditions set forth in these laws and policies may have been temporarily deferred in the park because of funding or staffing limitations, the NPS will continue to strive to implement these requirements with or without a new general management plan. The general management plan is critical in providing guidance on how we comply with laws and policies.

There are other laws and executive orders that are applicable solely or primarily to units of the national park system. These include the 1916 Organic Act that created the National Park Service, the General Authorities Act of 1970, the Redwoods Act of 1978 (relating to the management of the national park system), and the National Park Service Concessions Management Improvement Act of 1998.

The NPS Organic Act (16 *United States Code* [USC], section 1) provides the fundamental management direction for all units of the national park system "[P]romote and regulate the use of the Federal areas known as national parks, monuments, and reservations . . . by such means and measure as conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

The National Park System General Authorities Act (16 USC section 1a-1 et seq.) affirms that while all national park system units remain "distinct in character," they are "united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national heritage." The act makes it clear that the NPS Organic Act and other protective mandates apply equally to all units of the national park system. Further, amendments state that NPS management of park units should not "derogat[e] . . . the purposes and values for which these various areas have been established."

The Redwoods Act of 1978 reasserted the systemwide standard of protection established by Congress in the original Organic Act. It stated "Congress further reaffirms, declares, and directs the promotion and regulation of the various areas of the National Park System . . . shall be consistent with and founded in the purpose established by the first section of



the Act of August 25, 1916, to the common benefit of all the people of the United States. The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

The National Park Service Concessions Management Improvement Act of 1998, together with NPS regulations promulgated thereunder, governs the provision of commercial visitor services, called concessions, in the national parks. This law replaced the original National Park System Concessions Policy Act of 1965. The 1998 act, like the 1965 act before it, states that, as a matter of policy, concessions are to be limited to those that are "necessary and appropriate for public use and enjoyment" and are "consistent to the highest practicable degree with the preservation and conservation of the resources and values" of the park. Among other provisions, the new law governs NPS contracting for concession services in the parks, payments from concessioners to the National Park Service in return for the privilege to do business within a unit of the national park system, and the transfer of concessions contracts or permits.

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

Impact Topics

Understanding the consequences of making one management decision versus another is important to evaluating the GMP alternatives. As a result, NPS GMPs are typically accompanied by an EIS that identifies and analyzes the anticipated impacts of alternative management actions on resources and on park visitors and neighbors. This GMP/EIS includes an analysis of the potential impacts of two action alternatives and the "no-action alternative," which is a continuation of current management. The alternatives are described in chapter 2.

To focus the environmental analysis, the issues identified during scoping were used to derive a number of impact topics to be analyzed in the GMP/EIS. Impact topics are the park resources and values that could be affected, either beneficially or adversely, by implementing any of the alternatives under consideration. Not all potential impact topics are relevant to the park or to the proposed management actions included in the alternatives. As a result, impact topics are divided into two groups—those that are retained for further analysis in the GMP/EIS and those that are dismissed from further analysis.

Impact Topics Retained for Further Analysis



Consideration of federal laws, regulations, executive orders, NPS *Management Policies* 2006 (NPS 2006a), NPS staff knowledge of the park, and the issues and concerns expressed by the public and other agencies during the GMP/EIS scoping process provided the basis for identifying the topics to be retained. Chapter 3: Affected Environment contains a thorough description of the resources and values related to each topic retained for analysis. Chapter 4: Environmental Consequences provides for each topic an analysis of the impacts associated with the three alternatives under consideration.

The impact topics retained for further analysis include soils and geology, air quality, water resources, wetlands and floodplains, marine resources, vegetation, wildlife, species of special concern, cultural resources (historic districts and historic structures, archeological resources, and museum collections), visitor use and experience, the social and economic environment, transportation, park management, operations, and facilities, and sustainability. They are summarized below.

Soils and Geology

Proposed development in some alternatives could result in excavation, grading, and loss of soils, although much of the development would occur on fills with no impacts on natural soils. Stockpiled soils during construction would be subject to erosion and loss. Natural sediment-transport processes have been altered by groins, jetties, and other obstructions; efforts to find joint solutions with neighboring landowners to restore these processes would resupply beaches and dunes along many park sites. Creating wetlands and restoring saltmarsh in Jamaica Bay would add to the supply of natural soils at the park; improving water quality in the bay would also improve the quality of benthic or submerged soils.

Air Quality

Emissions from mobile sources at the park come primarily from individual cars; alternatives include a focus on providing additional alternative transportation and linkages between park sites that is likely to substitute for some of this car traffic and reduce emissions. Additional park amenities could bring additional visitors, and with them, emissions from mobile sources. Construction of amenities and facilities would produce temporary emissions. Use of facilities, including the possibility of an anaerobic digester, could result in emissions from the generation of power or operation of facilities.

Water Resources

Construction of facilities or amenities could result in some erosion of stockpiled soils with short-term increases in turbidity. Increasing collaboration for research and application of findings to include additional agency, academic, private, and non-governmental organization (NGO) partners in improving water quality throughout Gateway ~~in Jamaica Bay~~ would have the potential for dramatic improvements in the quality of water resources.



Wetlands, Floodplains and Flooding

Strong coastal storms would continue to damage park facilities and resources and rebuilding in the coastal zone following Hurricane Sandy would contribute to these economic losses. Adding sand or restoring natural sediment-transport processes would provide some protection and buffering from the damage. Coordinated restoration of saltmarsh habitat in Jamaica Bay would increase wetland habitat and improve its quality; this is expected to increase further if additional partnerships and joint decision making are added. Creating saltmarsh at Floyd Bennett Field in association with the wetlands center or by leaving West Pond breached would benefit brackish or saltwater wetlands. Creating freshwater wetlands or holistically planning for freshwater wetlands throughout park sites would benefit plants and animals that require this habitat.

Marine Resources

Marine and coastal ecosystems are missing some essential elements such as sediment, natural vegetation, and undisturbed wildlife habitat. Restoration of natural transport would improve beach and dune systems, and even beach nourishment would add habitat for marine or intertidal species. Impacts on marine resources at the borrow site include loss of sediment, changed hydrology, and loss of marine life. Creating open-water marine habitat at Floyd Bennett Field would add slightly to available intact habitat. Development of camping or recreational use facilities or amenities in the marine environment or along the shore could displace marine wildlife or require removal of vegetation. Coordinated research and joint decision making to restore Jamaica Bay would improve the marine or brackish habitat in park sites.

Vegetation

Visitor use, including from people on foot, horses, or in oversand vehicles, has the potential for impacts on vegetation from trampling plants or habitat where plants would otherwise grow. Closures or restrictions to protect rare vegetation associations help minimize this damage. Continued efforts to remove invasive species also improve habitat conditions for vegetation. Efforts to control erosion at bay and beach sites, including from beach nourishment or restoring sand transport, would provide additional habitat for some coastal vegetative communities. Creating wetlands at Floyd Bennett Field or Jamaica Bay Wildlife Refuge or restoring saltmarsh islands in Jamaica Bay would provide new habitat for vegetative communities that are an important part of the park's ecosystems.

Wildlife

Visitors disturb wildlife by coming close to individuals, by walking with pets, through boating close to nesting colonies, and in some case simply by being present in the vicinity. Structures and facilities also remove habitat and keep wildlife away through noise, night lighting, and other indicators of human presence. Park management to keep some areas relatively undisturbed allows wildlife to use these areas as habitat; because the area is quite developed, this undisturbed habitat is particularly important. Increasing facilities such as campgrounds in park sites or opening sites now closed to visitors would increase disturbance.

Mowing grasslands, restoring saltmarsh islands, reconnecting potential saltmarsh areas to Jamaica Bay, holistically planning for and building freshwater wetlands, and restoring sand transport would provide substantial new habitat for wildlife at the park.

Species of Special Concern

Visitor use can result in trampling and loss of individual listed plants or keep them from growing in an otherwise suitable habitat. Similarly, listed wildlife is often particularly sensitive to human presence and will only use sites that are in relatively undisturbed condition. Maintaining some park sites in an undisturbed state has resulted in use and breeding by listed shorebirds, terrapins, and wading birds. Opening these sites to more development or visitation would likely eliminate use by some species, and continuing to allow visitation in other sites likely keeps some species from using them. Maintaining grassland habitat and efforts to add to beach or dune habitat through restoration of natural sediment transport would benefit these rare species. The same is true for saltmarsh and freshwater wetland restoration efforts.

Cultural Resources

Alternatives have the potential to affect cultural resources—historic districts and historic structures, archeological resources, museum collections—in both beneficial and adverse ways. Preservation efforts—stabilization, rehabilitation, etc.—for historic districts and structures would result in long-term protection of these resources. However, funding of these preservation efforts is uncertain; if they do not take place, historic resources could be partially or totally lost over time. Additionally, even the provision of funding may not ensure the preservation of these resources. By virtue of proximity to eroding shorelines, over time the effects of sea level rise and storm events may limit or eliminate the ability to restore or maintain many historic structures. Ground disturbance related to development could result in damage or permanent loss of archeological resources. Potential loss of the integrity of historic districts, historic structures, and archeological resources may be decreased in intensity by the implementation of mitigation measures. Museum collections stored in improper environmental conditions and inadequate space could result in a loss of the resource over time.

Visitor Use and Experience

The variety of new and expanded recreational opportunities proposed under the action alternatives, along with enhanced recreation facilities and more interpretive and educational programming, would change the amount of visitor use at Gateway and the type of visitors the park would attract. New and expanded recreational facilities and programming would create more overnight use; increase exposure and enjoyment of the park's natural environments and historic settings, including its coastlines and waters; and create new opportunities to experience the park's natural soundscapes and night skies. Expanded trail networks, overlooks, and access would create more opportunities for scenic viewing and impact the park's visual quality. By encouraging greater use and offering increased opportunities for recreation and exercise, the action alternatives would contribute to the physical health of visitors and to community wellness. Finally, increased visitor use and expanded recreational opportunities could impact visitor safety.



...restoring saltmarsh islands, reconnecting potential saltmarsh areas to Jamaica Bay, holistically planning for and building freshwater wetlands, and restoring sand transport would provide substantial new habitat for wildlife at the park.



Proposed improvements in linkages between communities and the park and between park sites would help visitors arrive and move between areas of Gateway.

Social and Economic Environment

Proposed increases in and improvements to visitor facilities, transportation, and amenities would increase use and spending by visitors in the retail and recreational sectors. This increased spending could result in additional jobs from increased business opportunities created in the park by concessioners and nonprofit partners, as well as outside the park to service the increased level of visitation. Increases in operations, concessions, construction, and development could create employment opportunities in the park. State and local governments would collect additional sales tax from increased visitor spending.

Transportation

Proposed improvements in linkages between communities and the park and between park sites would help visitors arrive and move between areas of Gateway. In addition, alternative modes of transportation including bikes, public transit, waterborne transportation, and shuttles would make accessing Gateway and moving through its park lands more convenient. Wayfinding from local transit stops to parks and within parks would be improved throughout Gateway. Transportation information would be incorporated into outreach materials to make reaching the park clearer and more convenient. Bike infrastructure, including bike rentals, bike parking, and bike route mapping, would also be included in all action alternatives. Different types of facilities and media (e.g., kiosks, social media, signs, contact stations) would be employed to create a more welcoming sense of arrival, orient visitors, and increase the visibility of NPS and Gateway resources and recreational opportunities.

Park Management, Operations, and Facilities

Proposed improvements and additions to visitor facilities, amenities, and infrastructure would both directly strain existing staffing and budgets at the park as well as indirectly requiring additional management as visitor use numbers increase. Partnering with New York City to jointly manage several park sites would improve efficiencies and somewhat offset the demand on park staff and budget. Overall management and operational efficiency would also be improved through implementation of sustainable business, energy, and waste management practices. Prioritizing cultural resources that will be maintained, restored, or rehabilitated would free up staff from monitoring and managing those resources that are not fundamental, with improvements in operations as a result. Rehabilitating historic space for administrative, visitor, and partner use would improve operations through both operations and budgets. Consolidating maintenance areas would also improve operations efficiency. Seeking additional collaborative partnerships would improve operations and funding.

Impact Topics Dismissed from Analysis

Impact topics were dismissed from detailed analysis if they were found to be not relevant to the evaluation of GMP/EIS alternatives because either (1) implementing the alternatives would have no effect or a negligible effect on the resource or condition or (2) the resource

or condition does not occur in the park. The impact topics dismissed from detailed analysis in this GMP/EIS include ethnographic resources, environmental justice, prime and unique agricultural lands, wild and scenic rivers, sole or principal drinking water aquifer, sacred sites, and Indian Trust resources.



No changes to ethnographic resources would result from implementing the alternatives, and no adverse impacts on minority or low-income populations (the focus of the analysis under environmental justice) would occur. Benefits in the form of additional access and transportation options would take place, and are analyzed generally for neighboring populations in the "Social and Economic Environment" sections of the GMP/EIS. No sacred sites or Indian Trust resources, prime or unique agricultural lands, wild and scenic rivers, or sole or principal drinking water aquifers exist in the park. Public health and safety is discussed as part of the "Visitor Use and Experience" section.

Related Plans

The NPS has also completed reports and plans for a number of areas within the park and for management of park resources. Various public agencies and governmental bodies have recently completed plans that directly relate to Gateway. The plans that are most important to know about as they relate to this GMP/EIS are discussed in this section.

National Park Service Plans

A Synthesis of Existing Visitor Data and Demographic Trends for the Gateway National Recreation Area. This document by Mowen, Graefe, and Graefe (2009) provides a synthesis of past visitor studies and an analysis of areawide demographic characteristics and projected trends. Several key findings from this document informed the GMP/EIS process, particularly the findings on population growth and characteristics, visitation trends, and outdoor recreation preferences.

Long-term Resource Management Under a Changing Climate. This report by Kichoff and Stokes (2009) provides information on potential climate change impacts that may significantly affect Gateway. The conclusions and recommendations outlined in this report informed options to protect Gateway's resources include integrating long-term planning into park operations, monitoring climate sensitive species, implementing adaptive restoration and documenting resources.

Coastal Geomorphology of the Ocean Shoreline, Gateway National Recreation Area: Natural Evolution and Cultural Modifications, a Synthesis. This study by Psuty et al. (2009) provides a synthesis of the scientific literature pertaining to the geomorphological evolution of the ocean shoreline of the units of Gateway. Additionally, it provides geomorphological data and describes the shoreline conditions as they relate to erosion and cultural manipulation of sediment supply. This document informed the GMP/EIS process, both in its identification of geomorphological issues and analysis of site-specific areas and, in particular, its recommendation for a system-wide approach to sediment management.

A Vision for the Jamaica Bay Estuary: Desired Future Conditions of Natural Resources. This document provides an overview of Jamaica Bay's current condition, identifies seven major resource areas, provides a framework of desired conditions for each major resource area, and describes potential strategies on how to achieve the desired conditions (NPS 2010b). Many of the recommendations from this document informed natural resource management decisions during the GMP/EIS planning process.

Significant Natural Resources of Gateway National Recreation Area. Lawrence, Roman, and Frame (2010) identify and describe Gateway's most significant natural resources in this document, which helped inform the GMP/EIS process and decision making by providing an understanding of Gateway's significant natural resources and the issues that impact their ecological integrity.

The Shoreside Species of Concern Conservation Plan. (NPS 2007a) provides specific management goals and performance indicators for each of the Sandy Hook Special Status Species, activities to reduce impacts to natural resources from human disturbance (such as through the use of symbolic rope fencing with posts and signs around bird nesting areas), prohibition of certain recreation activities during nesting season (kite flying, kite surfing, fireworks), an updated Integrated Predation Management Program, habitat enhancement opportunities, and an updated biological monitoring program.

Recreation Supply and Demand Analysis. This document (NPS 2011f) provides an analysis of the recreation market supply and demand within and surrounding Gateway. The data and analysis informed the GMP/EIS process and decision making related to recreational planning.

Final Collection Management Plan, Gateway National Recreation Area. The Collection Management Plan (NPS 2009b) provides the park with a tool to assist park managers in prioritizing the needs of its curatorial program. Recommendations are provided related to collection documentation, archives and manuscript collections, archeological collections, collections storage, museum environment, security and fire protection, staffing, and programming and funding sources. The plan indicates that the park's collections should be housed in one facility at Fort Wadsworth. The plan also outlines steps the park can take to improve its curatorial program. One of the highest priorities named in the plan is to accept and manage only collections that have been identified as those within the park's period of significance.

Gateway National Recreation Area, Jamaica Bay Transportation Studies, Development Concept Plan / Environmental Assessment/Assessment of Effect. The Jamaica Bay Transportation Studies (FHWA 2006) proposes improvements to transportation and circulation within the park sites of the Jamaica Bay Unit. At Floyd Bennett Field, suggested vehicular circulation improvements include establishing access at the main visitor entry at what is now the Ryan Visitor Center. Pedestrian and bicycle circulation improvements include establishing a multi-use bicycle connection from Jacob Riis Park to Rockaway Beach Boulevard and improvements to the pedestrian crossing at Riis Landing.

New York Harbor Transportation Strategy, Building Connections to National Parks and other Destinations. The New York Harbor Transportation Strategy (NPNH 2008) recommends a number of connections to link harborwide destinations through transportation improvements and enhancement of programs. Recommendations for the Jamaica Bay Unit include seasonal shuttle bus connections between mass transit stations/stops and park sites; improved wayfinding, pedestrian, and bicycle signs; and providing guided kayak/canoe tours. It recommends further study and evaluation of Gateway Marina at Floyd Bennett Field for waterborne commuter and visitor access.

Jamaica Bay Greenway Missing Links Study. The Jamaica Bay Greenway Missing Links Study (NPS 2010g) assesses the feasibility of creating a continuous greenway around Jamaica Bay. It identifies the areas where there are gaps in the greenway, provides conceptual planning for potential bicycle routes, and identifies improved connections between park sites and MTA subway stations in Broad Channel and Rockaway.

Other Agency Plans

PlaNYC 2030. PlaNYC (NYCOLTPS 2011) establishes a vision and bold agenda to meet New York City's challenges, prepare for 1 million more residents, strengthen its economy, combat climate change, and enhance the quality of life for all New Yorkers by working toward the vision of a greener, greater New York. PlaNYC complements the GMP/EIS effort in a number of critical areas, particularly in its goals for increasing public space and improving existing parks, improving waterfront access and increasing water-based recreation opportunities, restoring coastal ecosystems and waterways, improving resiliency, and expanding sustainable transportation options.

Vision 2020: New York City's Comprehensive Waterfront Plan. Vision 2020 (NYCDCP 2011) sets the stage for expanded use of New York City's waterfront for parks, housing, and economic development, and its waterways for transportation, recreation, and natural habitats. The 10-year plan lays out a vision for the future with new citywide policies and site-specific recommendations. It provides strategies for implementing many of the long-term goals of PlaNYC, such as improving the quality of the city's waterways, increasing access to the waterfront, and restoring coastal ecosystems. Vision 2020 is accompanied by the New York City Waterfront Action Agenda (NYCEDC n.d.), which outlines a number of specific, high-priority projects to be initiated within three years. The Action Agenda organizes each project under one of the eight goals of Vision 2020. Several sites within and surrounding Gateway at both the Staten Island and Jamaica Bay Units are specifically identified as potential sites for habitat restoration, improved water quality, and increased waterfront access.

Hudson–Raritan Estuary Comprehensive Restoration Plan. This restoration plan (USACE and PA 2009) sets forth a vision and strategy for future ecosystem restoration in the New York/New Jersey Harbor. It was developed in collaboration with federal, state, municipal, NGOs, and other regional stakeholders.

By virtue of recording this selection in a record of decision, this alternative will become the park's new general management plan.

Planning for Jamaica Bay's Future: Final Recommendations on the Jamaica Bay Watershed Protection Plan. The Jamaica Bay Watershed Protection Plan (JBWPP) (NYCDEP 2007) resulted from a bill requiring the New York City Department of Environmental Protection (NYCDEP) to create a watershed protection plan and stewardship strategy for Jamaica Bay. The JBWPP provides an evaluation of the current and future threats to the bay to ensure that environmental remediation and protection efforts are coordinated in a focused and cost-effective manner. The JBWPP contains two volumes: Volume 1, "Jamaica Bay Watershed Regional Profile," a comprehensive reference document for Jamaica Bay, provides information about the Jamaica Bay watershed, water quality, and current ecological status; Volume 2, "Jamaica Bay Watershed Protection Plan," contains the vision for the bay and the issues that need to be overcome to achieve the vision. For each of the issues, objectives for the bay were developed and, for each objective, strategies or actions are identified to address the objective. A number of the objectives identified in the JBWPP directly relate to the GMP/EIS planning effort for the Jamaica Bay Unit, particularly ecological restoration and protection of the saltmarsh islands and other natural areas, increasing public access where appropriate, and educating the public on the importance of the Jamaica Bay watershed.

Next Steps and Plan Implementation

~~The GMP/EIS will be made available for a 60-day review and comment period to federal, state, and local agencies and all other interested parties, including organizations, businesses, interested individuals and stakeholders, and the general public. Comments will be accepted electronically through the NPS PEPC website or in the form of written letters that must be post-marked by the due date shown on the PEPC website. During the review period, the NPS will hold public meetings where the public will have additional opportunities to provide comments on the management alternatives and impact analysis presented in the draft GMP/EIS.~~

~~Once the comment period has closed, the NPS will evaluate all comments received, after which a final GMP/EIS will be prepared.~~ The final GMP/EIS ~~will report~~ reports on the results of agency and public comments on the draft GMP/EIS, including any changes that may have been made as a result of agency and public comment. The final GMP/EIS will be released for a 30-day no-action period. The availability of the final GMP/EIS will be announced to agencies and the public and will be noticed in the *Federal Register.* No sooner than 30 days after the release of the final GMP/EIS, the Northeast Regional Director may sign a record of decision selecting an alternative for implementation as the approved GMP for Gateway. The availability of the signed record of decision will be noticed in the *Federal Register,* after which the NPS would proceed to implement the approved GMP contingent on available funding. By virtue of recording this selection in a record of decision, this alternative will become the park's new general management plan.

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Chapter 2: Management Alternatives







Introduction



This chapter of the GMP/EIS presents three alternatives, compares their impacts and costs, and identifies the preferred alternative.

There are many different ways to protect natural areas at Gateway, preserve its historic buildings, and provide fun and educational activities. In a GMP/EIS, these different options to fulfill the park's purpose and achieve a new vision are called management alternatives. Alternatives provide a different focus for the park and emphasize different priorities. All the alternatives meet the park's purpose, laws, and policies—they just do it in different ways.

These alternatives represent the combined planning efforts of NPS staff and the contributions of academic institutions, other government agencies, stakeholder groups, local residents, park users, and interested individuals. Not all ideas and suggestions will be reflected in the alternatives; many are specific actions that could happen as part of implementation of the final GMP/EIS.

This chapter of the GMP/EIS presents three alternatives, compares their impacts and costs, and identifies the preferred alternative. Data used to compare their impacts—or what would happen if each alternative was adopted—are summarized from the detailed environmental impact analysis presented in Chapter 4: Environmental Consequences.

The alternatives include a "no-action alternative" in the National Environmental Policy Act (NEPA) that assumes that no new actions would occur (i.e., the continuation of current management direction). This no-action alternative is alternative A. The GMP/EIS also describes and evaluates two action alternatives: alternatives B and C. Each action alternative is comprised of three parts: management zoning; elements common to both action alternatives; and unit-specific descriptions. Alternative A provides the baseline for comparing the impacts of implementing the action alternatives.

Gateway would continue to follow the applicable laws, policies, and special mandates regardless of the alternatives considered in this GMP/EIS. These laws, policies, and mandates are not repeated in this chapter. However, other aspects of management would differ among the alternatives, and those aspects are the focus of this chapter. The alternatives do not include many details on resource management or visitor use management. More details on how to achieve the desired future would be determined in follow-up implementation plans once it has been decided what those conditions should be.

Developing the Alternatives

As part of the evolutionary process associated with creating alternatives for the GMP/EIS, many concepts have been given serious consideration. Like fitting pieces of a large puzzle together, many ideas have been considered, modified, rejected, or accepted. The reasons for ultimately accepting or rejecting a concept are varied and sometimes very complex.

Following identification of GMP/EIS issues during scoping in summer 2009, the planning team began to consider different and creative ways to address the issues Gateway faces. This exercise resulted in a set of preliminary management concepts that would eventually be shaped into alternatives. These preliminary concepts were presented in fall of 2010



The park will continue working with agencies and landowners to resolve the boundary issues on a case-by-case basis through various legal authorizations. This plan does not preclude future consideration of boundary adjustments should needs or conditions change.

by newsletter and at a series of open houses. With input from interested individuals and stakeholders, and through an iterative process of planning and reviews, the planning team worked to strengthen the preliminary concepts and developed four alternatives. Each alternative expressed a different management scenario and future for Gateway.

In summer 2012, the planning team presented the four alternatives in a GMP/EIS newsletter, hosted a series of open houses, briefed elected officials and convened a number of stakeholder meetings in order to share the alternatives with local residents, the public, and partners. The planning team used public comments and partner feedback to refine the alternatives. At this stage in the process, the team dismissed alternative D and narrowed the planning effort to the no-action alternative (alternative A) and the two action alternatives (alternatives B and C).

In October 2012, Hurricane Sandy struck Gateway and caused damage to many areas of the park. Following months of recovery efforts and initial damage assessment, the planning team, in conjunction with NPS senior leadership, evaluated the alternatives to determine whether changes were necessary. The group concluded that the vision for each alternative remained intact and Hurricane Sandy recovery efforts would be guided by the new GMP framework.

Potential for Boundary Adjustments

The National Parks and Recreation Act of 1978 requires GMPs to address whether boundary modifications should be made to park units. Boundary adjustments may be recommended if modifying the boundaries would fulfill any of the following goals:

- To include significant resources or opportunities for public enjoyment related to the purposes of the park
- To address operational and management issues such as access and boundary identification by topographic or other natural features or roads
- To protect park resources critical to fulfilling park purposes

Issues related to the current boundary and related park operations were explored and evaluated for each area of Gateway. The park was created from public lands including U.S. Army and United States Navy installations, New York City parks and New Jersey State lands. Most of the boundaries between the park lands and residential and commercial properties are not clearly marked.

Specific minor boundary adjustments were identified as being needed to correct operational inconsistencies resulting from the park's legislation and encroachments on park lands; however, none of the alternatives in this GMP/EIS propose major changes to the park boundary. The park will continue working with agencies and landowners to resolve the boundary issues on a case-by-case basis through various legal authorizations. This plan does not preclude future consideration of boundary adjustments should needs or conditions change.

Management Concepts for Each Alternative

Each alternative is framed by a management concept, a general theme that directs how management would be focused across the park. Gateway's enabling legislation, the park's resources and recreation opportunities, and the issues and needs that were identified early in the planning process all helped to shape the following management concepts.

Alternative A: No Action

A no-action alternative is required by the implementing regulation of NEPA and serves as the baseline for evaluating and comparing the other proposed alternatives. Under alternative A, park resources and visitor use would be managed as they are today, with no major change in direction. Decisions would be based on existing conditions and available information, but would continue to lack a comprehensive planning framework that addresses the full range of contemporary and potential future issues. The park's enabling legislation, the management direction established in the 1979 GMP, the Foundation Document and other implementation plans would continue to guide management decision making.

Alternative B: Discovering Gateway – NPS Preferred Alternative

This alternative provides the widest range of activities and most recreational opportunities in dispersed locations throughout the park. New connections would be forged with park lands and communities adjacent to Gateway and nearby. This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment. Under alternative B, more convenient and affordable park access would be developed through trail connections, bicycle infrastructure, public transit, and waterborne transportation. This alternative prioritizes joint management and operations for visitor services, orientation, programs, and facilities with New York City and other partners.

Alternative C: Experiencing Preserved Places

This alternative provides the most opportunities for independent exploration and "wild" experiences that immerse visitors into natural areas and historic sites and landscapes. This alternative increases the visibility, enjoyment, and protection of coastal resources and focuses resource management on beach and dune ecosystems and coastal defense landscapes. New recreational programming emphasizes low-impact activities that highlight preservation efforts as part of interpretation and education activities and promotes hands-on learning and outdoor skills. This alternative maximizes sustainable operations and concentrates activities, access, and facilities in distinct locations.



Alternative A: No Action

Under alternative A, continuation of current management direction (no-action alternative), the NPS would continue to manage Gateway's resources and visitor use as it does today, with no major change in management direction. Decisions would be based on existing conditions and available information; there would be no comprehensive planning framework to address the full range of contemporary and potential future issues. The park's enabling legislation, the management direction established in the 1979, federal laws, NPS policies, the Foundation Document and other approved plans and projects would continue to guide management of resources, visitor use, facilities, and operations.

Recreation and Visitor Experience

Under alternative A, the visitor experience would remain segmented, with each of the three units independently serving local residents and visitors at specific locations. Efforts to reopen areas of the park that were damaged by Hurricane Sandy and to provide services and visitor facilities would continue. The ongoing structural assessments and recovery efforts may result in temporary shifts of current management and visitor access. Existing

interpretive, educational, and management programs providing a range of services to visitors would continue, adjusting for Hurricane Sandy limitations. Visitors would continue to enjoy a variety of traditional beach-oriented and other recreational activities at open areas. Gateway would continue to provide comfort stations, lifeguards, food and beverage service, camping, and ferry operations where those services currently exist. Funded planning projects to improve and expand trail systems and camping areas would continue. Existing campsites would remain in their current locations.

The visitor centers at Sandy Hook, Jamaica Bay Wildlife Refuge, and Floyd Bennett Field would continue to provide orientation, information, interpretive programs, and exhibits and serve as both destinations and points of departure for day visitors, tours, and school groups. Traditional ranger-led activities and curriculum-based educational programs would continue to be available. Current efforts to make more people aware of the presence of the park would continue. Gateway's informational website, exhibits, brochures, and other publications would also be available.



Featuring a diversity of districts that range in character from popular beaches to small community parks to an urban wildlife refuge, the Jamaica Bay Unit would continue to offer a wide range of visitor experiences.

Jamaica Bay Unit

Featuring a diversity of sites that range in character from popular beaches to small community parks to an urban wildlife refuge, the Jamaica Bay Unit would continue to offer a wide range of visitor experiences. Learning opportunities would continue to be characterized by guided and self-guided tours, publications, wayside exhibits, a Junior Ranger program, nature trails, and special programs.

Floyd Bennett Field would continue to provide a large variety of recreational activities, including shoreline fishing, community gardening, archery, hand-propelled watercraft launch/landing, overnight tent and recreational vehicle (RV) camping, biking, cross-country skiing, and birding. At Ecology Village, the NPS would continue to offer day visit and curriculum-based overnight camping programs for school groups, teacher training, and guided trail programs. Concession operations include the marina, a golf driving range, and an athletic center.

The trails at Dead Horse Bay, the North Forty, and Ecology Village would remain open for hiking and nature observation. A portion of the Jamaica Bay Greenway, a 19-mile greenway circumnavigating Jamaica Bay, runs along the east side of Flatbush Avenue and adjacent to the park boundary and provides connections to the rest of the Jamaica Bay Greenway and other New York City greenway systems. Biking would continue along the greenway and historic runways.

The newly renovated William Fitts Ryan Visitor Center (Ryan Visitor Center) in the former control tower /administration building would continue to be open year-round and provide exhibits and a bookstore. The Historic Aircraft Restoration Project (HARP) would continue to be accessible to visitors at Hangar B. The exteriors of Hangars 3 and 4 continue to be featured in interpretive programs. Plumb Beach would continue to be a site for sailboarding, kite sailing, and hand-propelled watercraft (e.g., canoes, kayaks). Other beach uses include sunbathing, beachcombing and wading would continue. No trails would be maintained at the site and visitors would continue to travel along social trails through the dunes.



Canarsie Pier would continue to be used as a fishing pier and promenade. The pier would remain a popular break area for cyclists using the adjacent Jamaica Bay Greenway.

The existing structure would be shared with New York City and serves as maintenance storage. Kayak and bike rental concessions slated to be implemented in the summer of 2013 would be maintained.

Bergen Beach would continue to have horse-related activities provided by a concession-run equestrian center. A number of trails would continue to offer horseback-riding opportunities. Limited equestrian programming would be offered and the facilities would continue to accommodate horse boarding.

Canarsie Pier would continue to be used as a fishing pier and promenade. The pier would remain a popular break area for cyclists using the adjacent Jamaica Bay Greenway. Picnicking and grilling on a first-come basis would continue in the designated area. Hand-propelled watercraft launch/landing sites would continue to be maintained. Demonstration programs for canoes/kayaks would continue at designated launch/landing sites. Special events would continue to be considered on an as-requested basis.

Frank Charles Memorial Park would continue to be managed as an active recreation area for tennis, baseball/softball, and children's play. Access to shoreline areas would continue to be limited to below the high-tide line for the purposes of fishing only to protect remaining marsh areas.

Hamilton Beach Park would continue to be managed as an active recreation area for children's play and baseball. Shoreline access would continue to be limited to below the high-tide line for the purposes of fishing only to protect remaining marsh areas.

Jacob Riis Park would continue to be managed as a popular beach destination and recreation area. Visitor uses and recreation facilities would be maintained, including a surf-guarded beach in season (Memorial Day to Labor Day) for sunbathing, swimming, and wading. Seasonal NPS evening campfire programs would continue, as would occasional NPS-guided tours and interpretive programming. Other recreational uses would continue, including pitch 'n' putt golf, surf fishing, beachcombing, strolling, cycling on the boardwalk, picnicking, basketball, and hard court sports.

Fort Tilden would continue to provide visitors access to the historic "back fort" area to view the exterior of Battery Harris, the maritime forest, and access to the freshwater pond trail. Biking would continue to be allowed along paved trails. Outdoor recreation opportunities would include fishing, birding, beachcombing, sunbathing, and strolling. The Rockaway Little League would continue to manage and maintain the playing fields, field house, and associated facilities leased to them by the NPS. The Rockaway Artists Alliance would also maintain its gallery and studio operations. The Rockaway Theater Company would operate out of the former post theater, which includes ticketed performances of live productions. The picnic area would continue to provide group picnicking through permits. Outdoor concerts, picnics/cookouts, and sports tournaments would continue to be managed on a per-event basis.



Recreational activities maintained at Breezy Point Tip would include surf fishing, beach walks, and wildlife viewing. Off-road permits would continue to be offered for beach access for the purpose of fishing during the shorebird nesting off-season. The beach club concessions would continue to provide beach access, pools, and associated amenities to members and day-fee visitors, including fast-food / casual food services, cabanas of various sizes and expenses, and opportunities for catered events.

Sandy Hook Unit

The Atlantic Coast of Sandy Hook would continue to be a draw for millions of visitors for swimming, sunbathing, strolling, beachcombing, and fishing. The popular multi-use path would provide opportunities for walking and biking. Visitors would also continue to take advantage of the open space and natural surroundings for hiking and wildlife observation. Visitor services would be retained to provide orientation at visitor contact stations, food, beverages, and other items. Recreation would be maintained along the bayside, including hand-propelled boating, sailboarding, and windsurfing as well as fishing and birding.

The NPS and its partners would continue to offer free, guided programs that feature Sandy Hook's natural resources and historic maritime and coastal defense structures. Educational and living history programs, wayside exhibits, publications, and a Junior Ranger program would round out learning opportunities at the park unit.

The historic setting around Fort Hancock would continue to be preserved and visitors would continue to have access to the lighthouse and a few coastal defense structures. Guardian Park would remain an area for picnicking. Concerts would continue to be considered on an as-requested basis, as would other special events by permit. Public camping by reservation would continue at the established campground.



Recreational uses at Great Kills would continue to be complemented by educational programming offered at the Great Kills Education Field Station.

Staten Island Unit

Natural and coastal defense resources within the Staten Island Unit would continue to be interpreted and experienced by visitors through guided and self-guided tours, living history programs, Fort Wadsworth's Mont Sec House tours, classes/workshops, wayside exhibits and publications, and educational programming at Great Kills Education Field Station and ~~the Education Center~~ education facilities at Fort Wadsworth. Additionally, visitors would continue to experience the Staten Island parks through recreation, including walking and biking on trails and greenways, fishing, kayaking, and field sports.

At Fort Wadsworth, coastal defense touring would continue via scheduled guided programs, living history programs, and self-guided walking tours. The park would remain a stopping point, destination, and starting point for bicycling and cycling groups. The overlook remains open and inviting for vista viewing and interpretation. Local residents would continue to use the park for walking, exercise, and fishing. Public camping by reservation would also be available in its existing location at Camp Hudson.

Miller Field would continue to be managed to accommodate field sports and sports leagues. The NPS would retain and manage the sports fields. Sports leagues would continue to use the sports fields by permit or as otherwise legally authorized. The trail through the swamp white oak forest would remain open to visitors. The bike path would continue to provide connections to Fort Wadsworth and New York City parks along the eastern shore. The picnic area would continue to be available for use on a permit basis. Fishing, community gardening, basketball, and the playground area would continue to provide additional recreational opportunities.

Many recreational activities, such as walking/jogging, cycling, swimming, hiking nature trails, kayaking, and motorboating, would continue at Great Kills Park. Local residents and formal and informal groups would continue to use the park for walking, exercise routines, wildlife observation, fishing, and astronomy programming. The Great Kills Park swimming beach areas would be available during the summer months. Boating use at the marina would continue with temporary facilities. Recreational uses at Great Kills Park would continue to be complemented by educational programming offered at the Great Kills Education Field Station. Some areas of the park would remain closed until remediation efforts are completed.

Natural Resource Management

Natural resource management programs would continue, many in partnership with federal, state, and local agencies, academic institutions, and non-governmental organizations (NGOs). Existing programs would focus on protecting special-status species, monitoring conditions, mitigating external threats, controlling nonnative species, and restoring habitats impacted by manmade structures or human activities.

Jamaica Bay Unit



The Plumb Beach western shoreline would continue to be monitored for severe erosion resulting from increased storm surges. Gateway would continue to actively work with the New York City Department of Parks and Recreation (NYCDPR) and the U.S. Army Corps of Engineers (USACE) to mitigate erosion and its impact on the infrastructure. Sediment management of the shoreline would also continue. The Plumb Beach dune system would continue to be minimally managed. Horseshoe crab populations would continue to be monitored.

The habitat restoration project at Bergen Beach that was established as part of a New York City Department of Transportation (NYCDOT) mitigation agreement would continue.

The Floyd Bennett Field North Forty would continue to be managed as a natural area with pedestrian access only along established trails. Invasive species would be controlled and native species reestablished when staff and funding become available. Gateway would also continue to work with New York City to reestablish native species as part of the MillionTreesNYC program. Similarly, the grassland area of Floyd Bennett Field would continue to be maintained and mowed in order to provide habitat for migratory and residential birds and small mammals. Natural succession of woody vegetation would continue in other areas of Floyd Bennett Field.

The Jamaica Bay Wildlife Refuge would continue to be managed as an important stopover for migrating birds and an "Important Bird Area of Global Significance." The freshwater East Pond at the refuge would continue to be managed by natural resource management staff as an artificial landscape with the water levels controlled through locks. Gateway would continue to work cooperatively with federal, state, and local agencies to limit the impact to its natural resources within Jamaica Bay. The freshwater West Pond would remain breached, and future repair options would be studied.

The habitat restoration project at Bergen Beach that was established as part of a New York City Department of Transportation (NYCDOT) mitigation agreement would continue.

Saltmarsh restoration projects would continue, and the park would continue to provide scientific data and monitoring of water quality and sediment contamination.

The Fort Tilden beach and dune system and upland forest would be managed to allow natural processes to occur. This habitat would be preserved and protected by allowing access only in designated areas and along established trails. Restoration of coastal vegetation would continue where practical and when funding is available. Invasive species would be removed and native species reestablished when staff and funding are available.

Sandy Hook Unit

The northern beach and dune system of Sandy Hook would continue to be managed as a natural area with visitor access only along established trails. The piping plover protection would be maintained. The holly forest would be managed as a protected and preserved area, with visitor access limited to ranger-guided trail walks. The maritime forest within Sandy Hook's interior would continue to follow natural succession and be managed as a

natural area, with access allowed along established trails only. The recreational swimming beaches would continue to be actively managed for beach recreation while protecting and maintaining the beach and dune habitat would remain a priority.

Staten Island Unit

The Fort Wadsworth beach and shoreline continues to be managed to allow natural processes to occur. Offshore, Hoffman and Swinburne Islands would remain off limits to visitor access and would continue to be managed as bird and wildlife habitat.

The dune system at Miller Field would continue to be managed with native coastal vegetation planting when funding is available. Crooke's Point would continue to be managed as a natural area with access allowed along established trails. Invasive species would continue to be removed and native species reestablished when staff and funding are available. The NPS would continue to work with New York City to reestablish native species as part of the MillionTreesNYC program. Monitoring and beach erosion control on the northern Great Kills Park shoreline would continue.

Museum collections and archives would continue to be moved from Sandy Hook and consolidated with collections currently maintained in their current location at Fort Wadsworth.

Cultural Resource Management

Historic structures and cultural landscapes would continue to be managed through maintenance and repair where feasible and when funding becomes available. Existing programs providing basic protection to the park's cultural resources would continue to operate in a manner consistent with applicable federal and state laws and NPS policies. Vegetation would continue to be removed from some coastal defense fortifications on a limited basis, while others would continue to decay by natural processes. Many vacant buildings throughout Gateway would continue to deteriorate. The Sandy Hook Lighthouse, Battery Weed, and select fundamental coastal defense and maritime structures would be preserved. Museum collections and archives would continue to be moved from Sandy Hook and consolidated with collections currently maintained in their current location at Fort Wadsworth.

Jamaica Bay Unit

Select historic structures and landscapes at Jacob Riis Park, Floyd Bennett Field, Riis Landing and Fort Tilden would continue to be maintained for visitor services and park operations. Battery Kessler, Battery Harris, and Construction Battery 220 would continue to become overgrown with vegetation. The Nike Missile Launch Site would remain a maintenance yard. These and other coastal defense resources would not be interpreted on site.

Sandy Hook Unit

The NPS would continue to explore the most appropriate methods for the maintenance, stabilization, and restoration of the buildings at Officers' Row. The Fort Hancock 21st Century Advisory Commission would continue to provide advice on the development of a reuse plan and on matters relating to future uses of the Fort Hancock Historic District.

The History House, part of Officers' Row, would remain open to the public. Similarly, the unit's fundamental maritime resource, the Sandy Hook Lighthouse, would continue to be maintained in good condition. Battery Potter, Battery Gunnison, and Mortar Battery would continue to be maintained, stabilized, and interpreted as funding is available. However, Batteries Morris, Urmston, and Peck, Nine-Gun Battery, and Batteries Arrowsmith, Kingman, and Mills would continue to decay in place. Maintenance of the Nike Missile Launch and Radar Sites would occur as funding is available. The Sandy Hook Proving Ground would continue to be maintained through mowing and shrub removal.



Staten Island Unit

Batteries Duane and Weed and Fort Tompkins would continue to be stabilized and preserved as funding becomes available. Batteries Catlin, Bacon, Turnbull, Barbour, Hudson, Mills, Dix, Upton, Barry, Richmond, and Ayres would be left unmanaged. Vegetation removal by goats would continue on select batteries and landscapes.



Transportation and Operations

Existing operation and transportation infrastructure would be maintained at current locations. Maintenance functions, equipment, and facilities damaged as a result of Hurricane Sandy would continue to be evaluated and possible replacement and relocation explored. Gateway visitors would continue to be automobile dependent and people without cars would continue to be reliant on limited direct bus and ferry service.



Jamaica Bay Unit

Floyd Bennett Field would remain accessible by automobile from Flatbush Avenue, by New York City Metropolitan Transportation Authority (MTA) bus, by boat at the marina, at the landing by hand-propelled craft by permit, and by non-motorized means via the adjacent Jamaica Bay Greenway. The refuge trails and visitor center would remain accessible by car, the Jamaica Bay Greenway, the MTA buses, and the nearby elevated train station at Broad Channel. Fort Tilden would remain accessible by automobile and bicycle via New York City right-of-way (Rockaway Point Boulevard) and one MTA bus route. The NPS would also maintain ferry access to Riis Landing.

Maintenance facilities would remain at current locations: the Nike Missile site (Fort Tilden), Building 258 (adjacent to Ecology Village), the Building 97 warehouse (adjacent to Hangar B), and the Fort Tilden Wharf warehouses. Primary trail maintenance responsibilities would remain with the Jamaica Bay Unit maintenance operations.

The former landfills at Pennsylvania Avenue and Fountain Avenue would continue to be managed by New York City with no public access. Efforts to revegetate the areas would continue. The park would continue working with New York City on the transfer of the former landfill areas to the NPS. Following the transfer, the NPS would evaluate the potential of opening the former landfills to limited public use.



The New York City Sanitation Department would continue to occupy facilities at Floyd Bennett Field and, in return, provide sanitation services for the New York units of the park. The New York Police Department would continue to occupy facilities and a portion of one runway at Floyd Bennett Field. Development of a gas transfer station in the Floyd Bennett Field hangars would continue to be explored, with no public access permitted.

Sandy Hook Unit

Most visitors would access the unit by car, although seasonal ferry service would continue to be provided to Fort Hancock from Manhattan. Boaters would continue to access Sandy Hook at Horseshoe Cove and cyclists would enter via the entrance road and multi-use path. ~~The South Maintenance Area would continue to be located on portions of the Nike Missile site.~~

Staten Island Unit

Fort Wadsworth would remain accessible by automobile, MTA bus, bicycle, and on foot. Miller Field would continue to be accessible by automobile, MTA bus, Staten Island Rapid Transit (New Dorp Station), bicycle, and on foot via New York City right-of-way (New Dorp Lane). Miller Field would continue to serve as a regular starting point and rest area for tour cycling by groups. Great Kills Park would remain accessible by car. MTA bus service continues along Hylan Boulevard, and Staten Island Rapid Transit is available at Bay Terrace Station. Pedestrian and bicycle access would continue along the multi-use trail parallel to Buffalo Street. Access by boat would continue via the marina and boat launch. Maintenance facilities would remain at current locations at Fort Wadsworth and Great Kills Park.

Management Zones

Each day, Gateway staff members make hundreds of decisions that influence how facilities and resources like buildings and beaches are cared for. Should a grassy area be mowed or allowed to grow wild for wildlife habitat? Should a new segment of trail be paved for bikes or left as a natural surface for walking? In order to help guide the appropriate locations and types of use for these activities in a big park, Gateway staff relies on GMP management zones. These zones give people an understanding of where certain activities are and are not allowed. They also tell park managers where development can and cannot be added and the intensity of management that is appropriate in different parts of the park.

Management zones are descriptions of desired conditions for park resources and visitor experience in different areas of the park. The type, size, and location of the different zones correspond to that specific alternative. While some zones in the action alternatives are the same in terms of their location, what may actually happen in each zone would vary among the alternatives. Not all activities and facilities appropriate in a management zone may be allowed or constructed everywhere a management zone occurs. Management zoning does not preclude NPS law and policy. Because the management zones describe new alternatives, they have not been applied to alternative A. The management zones developed for the action alternatives are described below and further defined in table 2-1. Following the definitions, a set of management zone maps, charts, and narrative descriptions are used to describe each of the action alternatives in detail.



Marine

- Waters managed to protect and enhance the ocean and bay environments and provide opportunities for water-based visitor use and recreation.
- Activities are regulated to protect elements of the natural environment, prevent visitor conflicts and enhance public safety.
- Use levels would be expected to range from low to high and would be influenced by adjacent zones and time of year.



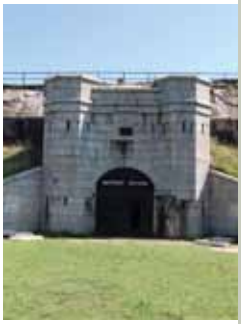
Recreation

- Park areas that accommodate a variety of recreation activities for fun, learning and physical activity.
- These areas offer a broad range of outdoor, educational, and interpretive experiences.
- High use levels would be expected especially during the summer months. Encounters with other people would be common.
  - Community Activity Subzone - This subzone supports large group gatherings such as sports leagues, community activities and special events. These places require more intensively managed facilities and landscapes.
  - Active Beach Subzone - This subzone offers traditional summer beach activities including swimming and sunbathing.



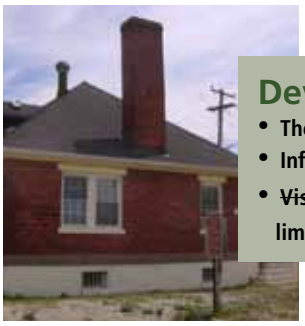
Natural

- Open, undeveloped areas managed to preserve natural resources while allowing for the enjoyment of the outdoors and nature.
- Visitors would enjoy the quiet, solitude, and sense of connection inspired by the natural world.
- Programs and facilities would facilitate nature study, interpretation and other passive activities.
- Moderate use would be expected at centralized activity areas and points of entry.
  - Sensitive Resource Subzone - These natural areas receive the highest level of protection, scientific investigation and monitoring and are sites for current and future restoration efforts. Public access is restricted to minimize impacts.



Historic

- These areas include fundamental and historic sites, structures and cultural landscapes linked to Gateway's history.
- Resources in these areas are the focus of interpretation and preservation projects and are managed to ensure the long-term protection of their historic integrity.
- Visitor use would be managed to minimize impacts on the resources while providing opportunities to learn about their associated events and history through tours and interpretive media.
  - Ruins Subzone - This subzone contains historic structures and landscapes in very poor condition. These structures and landscapes are allowed to decay naturally. Some areas may be improved for interpretation. The majority of these areas would be fenced to limit public access or stabilized for safety.



Developed

- These areas support visitor and administrative functions of the park and its partners.
- Infrastructure and facilities support maintenance, orientation, education, interpretation, lodging and transportation.
- ~~Visitor a~~Access would vary throughout this zone with some areas receiving intensive visitor use and others having limited or no public access.

Table 2-1. Management Zones for the Action Alternatives.

	Marine	Recreation
Zone Concept	Waters would be managed to protect and enhance the ocean and bay environments and provide opportunities for water-based ~~visitor~~ use and recreation. Adjacent zones may influence the levels of public access and restrictions for boating and other ~~visitor~~ uses (e.g., motor boating near Jamaica Bay Wildlife Refuge islands)	These are active park areas that accommodate a variety of activities for fun, learning, and physical activity. These areas offer a wide range of educational, interpretive, and recreational opportunities to enjoy and appreciate the park's resources. Two special zones that can accommodate more intensive use and larger groups of people are identified as the following subzones: Active Beach Subzone: Sites along the ocean and bay shorelines for traditional summer beach activities, including swimming and sunbathing, are located in this subzone. Lifeguards are present during the summer months. Community Activity Subzone: This subzone supports community-related activities and events such as sports leagues, gardening, festivals, ~~and~~ other larger group gatherings and appropriate commercial activities. Locations identified in this subzone would require more intensively managed facilities and landscapes.
Recreation and Visitor Experience	The marine environment offers natural sounds, tranquility, closeness to nature, and a sense of remoteness and self-reliance. Visitor use would be controlled to ensure that activities and their intensities are compatible with protecting resource integrity. Access and recreational use would be limited or restricted within certain sensitive marine areas, such as Spermaceti Cove. Use levels would be expected to range from low to high and would be influenced by adjacent zones and time of year (e.g., from fishing in solitude to thousands of people swimming in Sandy Hook waters). Outstanding views of natural, cultural, and scenic resources would be a highlight of this zone. Natural sounds would be audible and would enhance the visitor experience in this zone. The natural soundscape would often be mixed with sounds from human activity, visitor use, and boat traffic. Dark night skies and natural lightscapes would enhance the visitor experience in this zone. Outdoor lighting would provide appropriate illumination for safety and visitor expectation while minimizing light pollution.	These areas would be conveniently accessed and a broad range of visitor services, facilities, and programs would support varied recreation uses and appeal to a diversity of visitors. Outstanding views of natural, cultural, and scenic resources would be an integral part of the visitor experience of this zone. High levels of use in centralized activity nodes would be expected, leading to the likelihood of high rates of encounters among visitors. In particular, the Active Beach Subzone would be very busy in the summer. Encounters with other people would be common. These zones would accommodate a spectrum of group sizes, with the Community Activity Subzone specifically developed to accommodate large groups. ~~of visitors.~~ Natural sounds would be audible and would enhance the visitor experience in this zone. The natural soundscape would often be mixed with sounds from human activity and visitor use. In some areas, the soundscape would be affected by development. During times of low visitation, including nighttime and off-peak times, the natural soundscape could predominate, with occasional noise-free intervals. Dark night skies and natural lightscapes would also enhance the visitor experience in this zone. Outdoor lighting would provide appropriate illumination for safety. Only essential lights would be installed, and they would be operational only when needed. ~~Visitor a~~Access would include a system of multiple transportation modes that are highly interconnected to allow for convenient access to and within the zone. Motorized access would be available on local and park roads. Greenways, bike paths, and sidewalks would link the zone to adjacent neighborhoods and connect Recreation Zones among the park areas. Additionally motorized and water-based shuttles may provide access to central nodes within the Recreation Zone. Visitor access and recreational use would be compatible with plans for managing threatened and endangered species.

Natural	Historic	Developed
These are open, undeveloped areas managed to preserve natural resources while allowing for the enjoyment of the outdoors and nature. These areas allow for a wide range of experiences, including resource-based recreation opportunities and immersion in a backcountry type of setting where one feels a sense of remote retreat from the urban environment. Areas containing fundamental natural resources that are sensitive to impacts from visitors and other external threats are designated as a Sensitive Resources Subzone. Sensitive Resources Subzone: This type of area would receive the highest level of natural resource protection, restoration projects, scientific investigation, and monitoring. Public access is controlled to minimize impacts on sensitive habitats and wildlife.	These areas include historic and fundamental sites, structures, and cultural landscapes linked to Gateway's history. Resources in these areas are the focus of interpretation and preservation projects and are managed to ensure the long-term protection of their historic integrity. Historic areas containing cultural resources in very poor condition where preservation projects are not feasible are designated as a Ruins Subzone. Ruins Subzone: Areas where historic structures and landscapes decay naturally, returning to their component elements by the forces of nature (e.g., wind, rain, ice). These historic structures and landscapes would be stabilized for safety or fenced to limit public access.	These areas support visitor, administrative, and maintenance functions of the park and its partners. Infrastructure and facilities support maintenance, orientation, education, interpretation, lodging, commercial uses, and transportation.
Visitors would enjoy the quiet, solitude, and sense of connection inspired by the natural world. Visitors would have opportunities to directly experience the natural resources and solitude primarily from trails and beaches. Visitor use would be controlled to ensure that activities and their intensities are compatible with protecting resource integrity. Programs and facilities would facilitate nature study, interpretation, and other nature-dependent activities. Through opportunities to experience a wild setting and explore natural areas, visitors would gain an understanding and appreciation of the significance of the park's natural resources (including marine) and the potential threats to those resources. Moderate use would be expected at centralized activity areas and points of entry (e.g., trailheads) with use levels dropping in the interior of these zones. Particularly in the interior of this zone, the natural quiet would remain substantially free of human intrusions relative to the park's urban surroundings. Natural sounds would occasionally be mixed with sounds from human activity and visitor use. Dark night skies and natural lightscapes would be integral to the visitor experience in this zone and management would preserve and, where possible, restore natural nocturnal lightscapes. Only essential lights would be installed, and they would be operational only when needed. Outdoor lighting would provide minimal visibility and would be concentrated at the perimeter of the Natural Zone (e.g., trailheads), thereby minimizing light pollution. Trails and access routes would be developed and maintained through the Natural Zone and would be highly managed (i.e., restrictions on access) to protect resources. Non-vehicular access would be the primary mode of transportation throughout the zone and several of the Natural Zone areas would only be accessible via trail. Limited motorized access would be allowed along the zone perimeter and restricted to established administrative roads and park roads. Very limited interior motorized access would be available, primarily for administrative use on established park roads. Within the Sensitive Resource Subzone, visitor access would be highly restricted and controlled to ensure that activities and levels of use are compatible with and do not detract from resource protection measures. Visitor experiences would be primarily guided, by permit only, and/or associated with a stewardship, interpretive, and/or educational program.	This zone would provide distinct visitor opportunities and experiences through a range of historic settings. Visitor use would be managed to minimize impacts on the historic resources while providing opportunities to learn about their associated events, significance, and history through tours and interpretive media. There would be opportunities for learning about the history and significance of the park through self-guided discovery and interpreted tours. A high level of visitor orientation and interpretive services would be available in this zone. Communication of interpretive themes would occur through a broad array of interpretive methods. In more restricted areas, interpretive media and interpreted views would still allow the visitor to experience the historic integrity and character-defining features of the cultural resources. Use levels would be dependent on chosen adaptive uses and location of outside spaces. Some interior spaces will be closed to the public and others will only be open via guided tours or on a limited basis. Group sizes could be limited based on facility capacities and/or experiential objectives. Visitors would have varying degrees of access to the park's cultural resources. In open areas of the Historic Zone, visitors would immerse themselves in historic settings. Vehicular access and non-vehicular access such as trails would be provided to and throughout the zone. Shuttle access may occur in congested areas. Within the Ruins Subzone, visitors would have limited or no direct access to these places. Visitors may experience these resources through waysides, multimedia, and off-site programs. Limited guided tours may be given of certain areas.	Visitor access would vary throughout this zone. Visitor use would be focused on orientation, educational, interpretive, and transportation areas. Public access to most maintenance and operations areas would be highly restricted or prohibited. Visitor experience would primarily be related to interpretation and education and may include contact stations, exhibits, interpreted trails, kiosks, and media; outdoor and indoor educational activities; and/or guided programming. The zone will also serve to orient visitors to the recreation opportunities found throughout the park. This would include trip planning and transportation system orientation, interpretation of the park's features and resources, and food, lodging, and other visitor comforts. When historic or natural resources of interest are present in the Developed Zone, limited tours and/or interpretive and educational programming may be offered. Communication of interpretive themes, especially related to sustainable operations, would complement associated activities. This zone would accommodate a spectrum of group sizes. Use levels would range from low in park maintenance areas to high in centralized activity nodes. Encounters with other people and park staff would range from infrequent to common. Motorized access would be available on park roads. Greenways and bike paths would be part of trail systems and link to other zones. The greatest numbers of truck, equipment, and vehicles may be present. Additionally, motorized and water-based shuttles may provide access to central transportation nodes.

Table 2-1. Management Zones for the Action Alternatives (continued).

	Marine	Recreation
Appropriate Types of Activities	Water-based recreation opportunities are widely available. These could include swimming, wading, recreational fishing, boating, canoeing, surfing, kiteboarding, snorkeling, and windsurfing. Gateway's waters also offer a range of educational and interpretive programming. This could include low-impact activities such as kayak and boat excursions with opportunities for marine-based nature observation (e.g., bird and mammal watching). Activities are regulated to protect elements of the natural environment, prevent visitor conflicts, and enhance public safety.	A wide range of visitor activities could occur in this zone, including the following: • Beach activities such as walking along shore, swimming, sunbathing, splashing in waves, relaxing, and viewing the ocean horizon • Land-related and trail-based activities such as camping, picnicking, biking, hiking, walking, running, horseback riding, sightseeing, and bird and wildlife viewing • Other kinds of activities, such as exploring historic sites; participating in interpretive and stewardship programs, classes, and workshops; nature study; photography; and artistic endeavors
Appropriate Types of Facilities	Facilities would be limited to support water-based recreation and interpretation, research, and restoration activities and could include floating docks, piers, mooring field, designated water trails, and interpretive features such as buoys and signs. Most facility development to support water-based activities, such as a boathouse or launch sites, would occur on the land adjacent to the Marine Zone. Boat launches and park marinas provide access for boat users, including motorized watercraft. Additionally, water-based transportation such as water taxis and ferries provide visitor access to the Marine Zone. Personal watercraft would be prohibited. Commercial ~~services~~ activities in the marine zone may include water-based tours, boatels, and fishing guides as well as water taxis, ferries, or other water-based transportation services.	Recreation and other facilities necessary to welcome, orient, and support visitors would be concentrated in this zone. A broad range of visitor services, facilities, amenities, and programs would support varied recreation experiences and appeal to a diversity of visitors. Within the Community Activity Subzone, facilities would be sited and scaled to accommodate large groups of visitors. Facilities could include the following: • Interpretive and/or educational facilities, including visitor center/contact stations and interpretive kiosks • Recreational facilities, such as designated trails and trailheads, including designated hiking and biking trails; boardwalks, picnic facilities, shade structures, boat docks, designated non-motorized boat launch sites, fishing platforms, and temporary boat tie-ups; horse stables; a range of designated camping areas; indoor and outdoor recreation facilities (e.g., courts, ball fields); and entertainment venues • Support facilities such as overnight lodging facilities, food and beverage services, large event gathering areas, picnic facilities, restroom facilities, parking areas, equipment rentals, transportation facilities (multimodal hubs, bike paths, roads), and overlooks A variety of commercial services may also be available, including equipment rentals, guides, food and beverage services, recreation instruction, tours, competition/events, overnight accommodations, and retail.

Natural	Historic	Developed
Activities would be low impact and primarily natural resource-based, such as the following: • Beach activities such as walking, surf fishing, and picnicking ~~and kite-flying~~. • Land-related and trail-based activities such as camping, picnicking, biking, hiking, walking, running, horseback riding, sightseeing, bird and wildlife viewing, astronomy, and stewardship activities • Other kinds of activities, such as participating in interpretive and stewardship programs, tours, and photography; artistic endeavors; nature observation and study; and scientific research of the park's habitats, wildlife, and waters. Communication of interpretive themes would most often occur outside or at the entry to this zone through printed and digital media and information kiosks. A low to moderate level of guided/unguided interpretive services, such as tours, would be available in this zone.	Recreational activities would be primarily resource-based and could include the following: • Interpretive and educational activities such as interpretive tours, programs, and special events; viewing historic structures, artifacts, and cultural landscapes; architecture study; photography; artistic endeavors; scientific research of collections, structures, and landscapes; educational experiences focused on topics at cultural resources sites within historic settings; and stewardship "hands on" historic preservation programming • Land-related and trail-based activities such as walking, sightseeing, biking, programmatic camping, and picnicking In addition, special and organized events such as presentations, performances, and historic celebrations would be allowed. Measures would be taken to mitigate impacts on resources and other visitors during these events.	This zone would accommodate a variety of activities and more intensive use depending on the location; activities could include the following: • Land-related and trail-based activities such as walking, sightseeing, biking, camping, and other compatible uses • Interpretive and educational activities, such as interpretive tours, programs and special events, and stewardship programming
Development would be limited to those facilities needed to facilitate natural immersion, such as access routes (e.g., trails), natural resource protection measures (e.g., fences), and observation or visitor safety features (e.g., signs). Most development is concentrated at the edge of the zone at entry points. Roads, parking, and limited comfort facilities would be located on the periphery of the zone. Additional facilities and services could include trails (hiking and biking); blinds and overlook platforms; benches; tents, platforms, and other camping support; equipment rentals (e.g., canoes, binoculars); picnic tables; shade structures; trailheads with kiosks and comfort areas; and non-motorized boat launch sites. Within the Sensitive Resources Subzone, ~~some visitor facilities such as~~ trails and signs could be necessary to control visitor access and protect sensitive habitat or species. Any new development would be temporary to support resource protection and restoration.	Development would primarily entail rehabilitation or adaptive reuse of historic structures to protect and/or interpret cultural resources or to provide essential visitor services. Any new development needed to accommodate visitors (e.g., trails, signs, parking) would be sensitive to the cultural resources' character and blend with the historic setting. Buildings may be leased for compatible uses. The following types of facilities could be provided: visitor contact stations; historic house and aviation museums; interpretive kiosks; trails or paths; gathering places for interpretive programs; lodging; transportation support, such as shelters, restrooms, and parking; and picnic tables. Commercial services may be available and could include food and beverage services, retail, equipment rentals, and guided tours.	Development patterns would include a blend of rehabilitated historic structures and modern facilities to support park administration, maintenance, and operations as well as partners. Additionally, partner-run facilities and ~~permitted~~ authorized development would fall within this zone. Facilities could include educational and interpretive facilities; transportation centers, stops, shuttles, and greenways; restrooms; food and beverage services; overnight accommodations; trails and trailheads; picnic facilities; and equipment rentals. Facilities needed to accommodate operations and maintenance functions and support could include administrative offices, maintenance buildings/yards, storage, garages, roads and parking, utility management, renewable energy facilities, and treatment facilities.

Table 2-1. Management Zones for the Action Alternatives (continued).

	Marine	Recreation
Natural Resources	The protection and restoration of marine resources and their systems, processes and values would be a management priority. Aquatic and benthic resources are maintained in a near-natural condition, supporting healthy interaction among, human, plant and wildlife communities. Natural conditions predominate and there is a low tolerance for resource modifications or degradation. Impacts on water and sediment quality from park activities would be minimal. The NPS will work collaboratively with regulatory agencies to improve degraded water quality.	Natural resources provide distinct visitor opportunities and experiences through a range of park settings. The natural elements of these park settings would help define and locate visitor opportunities, services, and facilities. The natural physical processes of marine and coastal areas would be left unimpeded to the extent possible and these habitats would be protected from visitor use impacts. Native vegetation and vegetative communities would be preserved to the greatest extent possible. Species that can withstand and support intense visitor use may be desired in developed areas or areas that receive high levels of trampling. Native wildlife and wildlife habitat would be protected from visitor use impacts to the greatest extent possible and wildlife watching opportunities would be available. Species of special concern and their habitats would be managed to support species requirements. Park managers would continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education. Active Beach Subzone: Beaches would be groomed and mechanically raked to support more intensive visitor use.
Cultural Resources	Submerged (e.g., shipwreck remains) and archeological resources would be managed to protect integrity while ensuring public safety. Limited management of vegetation along the coastline would maintain views from the water to historic settings within the park. Vegetation may need to be cleared around select coastal defense or maritime resources in order to maintain views from the Marine Zone of the fundamental cultural resources.	Cultural resources would help define recreation opportunities and provide a venue for educational and interpretive activities and programs. Historic structures would be stabilized or rehabilitated based on condition and suitability for recreational, educational, and visitor use. Cultural landscape elements may be adapted to accommodate visitor use, education or park and partner operations, while preserving those features that convey historical, cultural, or architectural values.

Natural	Historic	Developed
The protection and restoration of natural resources and their systems, processes, and values would be a management priority in the Natural Zone. This zone would retain its natural, wild, and dynamic characteristics and ecological functions. The natural resources would be managed to preserve resource integrity while providing low-impact visitor uses. The natural shoreline processes occurring in this zone would be left unimpeded except when action is required for park safety. Throughout the park, the habitat mosaic of these Natural Zones would support a diversity and abundance of rare and native plant communities. Native vegetation and vegetative communities would be preserved to the greatest extent possible, with the goal of conserving native biodiversity. Rare and unique habitats would receive additional protection and would be enhanced where possible. Additionally, species of special concern and their habitats would be proactively managed to support species requirements, including recovery actions. In disturbed and degraded areas exhibiting quality habitat potential, efforts would be made to restore natural functions and processes. Park managers would continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education. In the Sensitive Resources Subzone, resources would be managed to preserve their fundamental values while being monitored and often studied for scientific purposes. External threats to resources would be aggressively addressed.	The natural elements of cultural landscapes and historic settings would be managed to maintain the historic scene and to protect and preserve cultural resources and their associated values and characteristics. The preservation of cultural resources would be predominant over natural resource values. Natural resource objectives may be pursued in collaboration with, and where they complement, cultural resource objectives. Vegetative communities and patterns that contribute to cultural resource values and/or tolerate high levels of visitor use would be maintained. Vegetation may appear more "groomed" in this zone to meet cultural resource goals. Views are a character-defining feature of many cultural landscapes and historic settings. In the Historic Zone, a range of views would be protected to ensure that visitors find opportunities to experience the expansive New York Harbor views from Gateway's defensive and maritime structures. Selective management of vegetation would be necessary to maintain views that contribute to cultural landscapes. Within the Ruins Subzone, natural processes are allowed to occur unimpeded by management.	Natural resources would be managed to accommodate operational uses/ activities and to facilitate sustainable maintenance operations. Development footprints would be limited to protect habitat and reduce impacts on historic settings. The intrusion of maintenance and operational activities on the surrounding park setting would be minimized through planning, design, screening, native plantings, and noise reduction efforts. Impacted areas within the zone would be restored to the greatest extent possible. There would be minimal protection and management of viewsheds. Views of maintenance yards and operational facilities would be screened from visitors' view. Sounds from human activity, visitor use, and park operations would predominate. During those times when activity associated with park operations is low, the natural soundscape could predominate, with occasional noise-free intervals. Dark night skies would be preserved to the greatest extent possible while operational needs and uses are accommodated. Outdoor lighting would provide adequate illumination for visibility while minimizing light pollution.
Cultural resource management would complement natural resource management objectives and not conflict with the biological integrity of natural resources. Cultural landscapes would be allowed to gradually revert to a more natural state, except where important landscape resources can be preserved without compromising natural resource values. Select views from coastal defense structures may be maintained in order to allow visitors to experience coastal views and to understand the structures' historic context.	Select historic structures and fortifications would be managed for preservation. Changes to the historic setting would be allowed for basic visitor services or conveniences, such as walkways to provide safe visitor access and historic resource protection. Management actions would preserve these resources while making them readily visible and accessible to visitors. Cultural landscapes would be managed to preserve their physical attributes and their use when that use contributes to their historical significance. Elements may be adapted to accommodate visitor use or education or park and partner operations, while preserving those features that convey historical, cultural, or architectural values. Within the Ruins Subzone, cultural resources would be documented.	Most historic structures found in this zone would be rehabilitated for adaptive reuse for the purposes of park operations, maintenance, and administration or partner use. Historic structures not suited for adaptive reuse would be stabilized or, depending on their condition, removed. Cultural landscapes would be rehabilitated for appropriate contemporary use of the landscape while preserving those features that convey historical, cultural, or architectural values. Some of these historic structures and settings would be used for public enjoyment on a limited basis while others would be used by partners and/or park operations.

Desired Conditions Common to Both Action Alternatives

There are a number of overall desired future conditions and management approaches that would guide the park regardless of the action alternative selected. These desired conditions guide actions taken by NPS staff on such topics as natural and cultural resource management, park facilities, and visitor use management.

Climate change is expected to result in many changes to the Atlantic coast, including the northeastern coast of the United States. Both historical trends and future projections suggest increases in temperature, precipitation levels, accelerated rates of sea-level rise and intensity of weather events, such as storms, should be expected.

Desired conditions articulate the ideal conditions the National Park Service is striving to attain. The term "desired conditions" is used interchangeably with goals. Desired conditions provide guidance for fulfilling the park's purpose and for maintaining the park's significance on a parkwide basis. The actions could be used by the National Park Service (and/or its partners) to achieve the desired conditions. These common ideas and actions will be taken under both the two action alternatives.

Responding to Climate Change

Over the last decade, the NPS has consulted with the scientific community, federal agencies, non-profit organizations, and other informed parties to gather data and explore strategies to prepare the national park system for potential future impacts of a changing climate. Sea-level rise, extreme precipitation events, heat waves, and increases in severe winds or other phenomena related to climate change will alter how natural and cultural resources are managed, and the types of activities, facilities and infrastructure the NPS can support.

Climate change is expected to result in many changes to the Atlantic coast, including the northeastern coast of the United States. Both historical trends and future projections suggest increases in temperature, precipitation levels, accelerated rates of sea-level rise and intensity of weather events, such as storms, should be expected. In addition, climate change is expected to affect Gateway's weather, resources (e.g., shorelines, vegetation, wildlife, historic sites, and archeological resources), and visitor use patterns. These changes will have direct implications on resource management, recreational facilities, park operations, and visitor use and experience. Some of these impacts are already occurring or are expected at Gateway in the time frame of this management plan.

There are a number of executive orders, policies and plans that guide the national park system and Gateway's response to climate change.

- *Executive Order 11988* (1977) requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development.

- *Executive Order 13653* (2013) directs federal agencies to prepare for the impacts of climate change by undertaking actions to enhance climate preparedness and resilience.

- *Executive Order 13514* (2009) establishes an integrated strategy towards sustainability in the Federal Government and makes reduction of greenhouse gas emissions a priority for Federal agencies.

- *Secretarial Order 3289, Amendment 1* (2010) directs each bureau and office of the Department to consider and analyze the potential climate change impacts when undertaking long-range planning exercises.

- Department of the Interior *Climate Change Adaptation Policy* (523 DM1) outlines a set of principles and provides guidance for integrating climate change adaptation strategies into policies, planning, programs and operations.

- *NPS Management Policies 2006 §9.1.1* guides sustainable facility planning and development.

- *NPS Climate Change Response Strategy* (NPS, 2010) outlines a four-prong approach to addressing climate change: science, adaptation, mitigation, and communication.

- *NPS Climate Change Action Plan* 2012-2014 (NPS, 2012) details actions and recommendations to implement the climate change response strategy.

- *NPS Green Parks Plan* (NPS, 2012) defines a collective vision and a long-term strategic plan for sustainable management of NPS operations including reducing greenhouse gas emissions and adapting facilities at risk from climate change.

The park's Geographic Information System (GIS) program has been working with partners since 2008 to document and model the potential effects of climate change, specifically sea-level rise, storm surge and flooding, at Gateway and nearby national park sites. Park staff are engaged in discussions with academic institutions and NYC agencies as part of regional climate change initiatives. The GIS team has been documenting natural and cultural resource impacts and changes from key storm events such as the Nor' Easter of 2010, Hurricane Irene in 2011, and Hurricane Sandy in 2012. Since Hurricane Sandy, the GIS team has worked to develop elevation maps and apply Federal Emergency Management Agency (FEMA) guidance to assist in the recovery efforts, including the ABFE's (advisory base flood elevation) for the NYC area. A series of Surface Elevation Tables (SET's) are in place and being monitored throughout the park. Efforts are currently underway to collect and analyze first floor elevation data for all buildings at Gateway, the first initiative of this kind in the national park system. This data will assist future resource management initiatives and facility planning.



The general management plan describes the approach that the park would take to mitigate and adapt to the effects of climate change during the next 20 years.

Management Strategies

The general management plan describes the approach that the park would take to mitigate and adapt to the effects of climate change ~~and~~ during the next 20 years. Many opportunities exist for Gateway to incorporate climate change adaptation into long-term planning across its three park units at Sandy Hook, Staten Island and Jamaica Bay. Specific options to protect Gateway's resources include integrating long-term planning into park operations, monitoring observed and projected climate trends, conducting climate-related



National parks can demonstrate how to minimize their contribution to global warming through practices such as energy efficiency and use of renewable energy.

vulnerability assessments for fundamental resources and values, monitoring climate sensitive species, and implementing ~~adaptive restoration~~ a range of adaptive management actions.

Strategies for Visitor Facilities and Park Operations

Gateway's highest visitor use areas are in coastal environments and are vulnerable to future sea-level rise and storm surges. Climate change will result in significant effects on conditions at the park, including impacts from sea level rise and potentially destructive storm events. More detailed examination of these effects will be critical as actions envisioned in the GMP are analyzed and implemented at site-specific levels. Factoring in sea level rise, these analyses will influence the type, design, location, and ultimate feasibility of park facilities and developments. When developments do occur, site-specific design will provide an outstanding opportunity for the park to teach through example – to demonstrate forward thinking, innovative designs, flexibility, and readiness for change in response to sea level rise.

Coastal resiliency will be incorporated into any new developed areas and adaptively reused structures and facilities. While the action alternatives propose a range of facility additions and renovations to expand recreational opportunities, proposed facility investments will be evaluated using the following climate change strategies prior to project approvals to ensure the long-term sustainability of these investments. Future plans and studies (see table 2-11) would provide technical data and resource information to support the following strategies:

- Find creative solutions to limit impacts from future flooding, storm surge and other impacts on existing visitor and operations facilities. When these facilities are no longer viable to retain and use, transition to moveable and portable facilities or other means to continue to offer visitor services.

- ~~Retain existing visitor and operations facilities and find creative design solutions to limit impacts from future flooding, storm surge and other impacts. When these facilities are no longer viable to retain and use, transition to moveable and portable facilities.~~

- Continue to provide a range of experiences by transitioning recreational use away from locations where changes in resource conditions no longer support such uses.

- Remove existing visitor facilities and discontinue recreational uses where continued use is unsafe, infeasible, or undesirable due to changing environmental conditions.

- Avoid or minimize additions of new infrastructure, construction of high value assets or major investments in facility renovations within coastal flood or storm surge zones.

- Substantial facility investments within the FEMA 100-year floodplain, including an adjustment for projected sea level rise by year 2100, should be avoided to the extent possible. Essential improvements within these flood-prone areas, such as rehabilitation of historic structures or provision of necessary facilities for beach access and recreation, will be carefully evaluated to determine whether facilities should be elevated, made

portable, hardened or otherwise made resilient to potential flooding. Any decision to proceed with substantial improvements within the flood zone as adjusted for sea level rise will be documented in a floodplain statement of findings per EO 11988.

~~• When considering facility investments within the FEMA 100-year floodplain (based on the Advisory Base Flood Elevation), evaluate risk (and cost/benefit), depending on their location and flood zone category. This could be a high level scan, examining the FEMA ABFE flood zones, and considering whether constructing or investing in the facility makes sense for the NPS or any other source/partner.~~

- Transition wastewater and sewage treatment systems to more sustainable systems and facilities.

- Keep utilities and critical systems and infrastructure out of flood zones.

- Use up-to-date policy guidance to respond to changing conditions.

National parks can demonstrate how to minimize their contribution to global warming through practices such as energy efficiency and use of renewable energy. Because emissions from visitor driving are estimated to contribute the highest percentage of the park's emissions, park staff and partners would assist in reducing visitor greenhouse gases by providing opportunities for alternative transportation options. The park will reduce the CO2 emissions of NPS and partner operations, increase the use of renewable energy and other sustainable practices, and reduce visitor emissions by lessening dependency on personal automobiles. Specific actions that the park would pursue:

- Test, use, and promote carbon-neutral energy, innovations, and infrastructure for NPS and partner operations.

- Consolidate park operations to reduce energy consumption.

- Construct and operate visitor facilities with the highest sustainability standards possible (e.g. more mobile/temporary structures).

- Use biodegradable/recycled resources and zero waste options.

- Upgrade/retrofit vehicle fleets and machinery for low emissions.

- Reduce vehicle miles traveled by Gateway staff and visitors who work in and use the park.

- Integrate climate change mitigation into all NPS business, operations, and management practices.

- Pursue Leadership in Energy and Environmental Design (LEED) certification for rehabilitated buildings as educational topic and as sustainable practice.



Strategies for Responding to Changing Conditions

Gateway would use and promote innovation, best practices, and partnerships to respond to the challenges of climate change and its effects on park resources. By using and developing tools and monitoring methods, including seeking outside assistance, the park staff can better respond to climate change. The park staff would interpret climate change science and develop management strategies, which may include predicting and projecting expected changes. The park staff would coordinate with other agencies in developing tools and strategies to help identify and manage climate change impacts. By adopting the best information on climate change as it becomes available, the park staff would be positioned to respond quickly and appropriately to the local effects of climate change.

Consistent with DOI policies, Gateway would use ~~Gateway may choose to use~~ an adaptive management framework to respond to the effects of climate change. Temperature and precipitation changes may require that the park manages for native biodiversity and ecosystem function instead of managing for natural communities. In most cases park managers would allow natural processes to continue unimpeded, except when public health and safety or the park's fundamental resources and values are threatened. Scenario planning would likely play a pivotal role in developing the park's responses to climate change.

The park staff would coordinate with neighboring communities while implementing adaptation strategies that support the protection, preservation, and restoration of coastal wetlands and coastal processes, and can serve as vital tools in buffering coastal communities from the effects of climate change and sea level rise. Some of the strategies the park would pursue include:

- Inventory, monitor and assess vulnerability of key ~~Inventory and monitor~~ attributes of the natural systems, cultural resources, and visitor experiences likely to be affected by climate change.

- Build resiliency of natural coastal resources to sea level rise and other effects of climate change.

- Restore key ecosystem features and processes, and protect key cultural resources to increase their resiliency to climate change. By reducing other types of impacts on resources, the overall condition of the resources could more easily recover from or resist the impacts of climate change.

- Reduce current and future stressors to the resource and the environment; this would improve the condition of the resource and build resiliency in the ecosystem that would help to minimize future adverse effects of climate change.

- Reduce habitat fragmentation and increase habitat connectivity and movement corridors.

- Give highest priority to preserving cultural resources and artifacts in situ, coupled with sustainable efforts (intervention techniques) to mitigate and reduce ~~any~~ stressors that might adversely affect the resource. As warranted to protect from loss due to sea level rise

and storm events, implement strategies to relocate or document cultural assets, or remove artifacts to safe locations.

Engage the Scientific Community and Visitors in Climate Change

Gateway would continue to collaborate with a variety of academic and scientific institutions, non-profit organizations and agencies on research and projects to find creative solutions for the long-term preservation of natural and cultural resources. Climate change science would be one of the focus areas of the new Jamaica Bay Science and Climate Resilience Institute (JBSCRI). This new Institute would play a major role in promoting scientific investigations of urban marine ecosystems, using Jamaica Bay as a functioning "laboratory." The Institute would help coordinate the many existing research and restoration efforts already underway in the bay on the part of multiple agencies and organizations, and more widely sharing the results of their research. Applied research conducted at the Institute would inform future park planning, development and resource management. Gateway will explore with partners, the development of a facility or campus for the Institute at Floyd Bennett Field or Fort Tilden.

Education and interpretive programs help visitors understand climate change impacts at Gateway and beyond, and how they can respond to climate change. NPS and its partners would engage visitors on the topic of climate change, provide the latest park research and monitoring data and trends, inform the public about what response is being taken at the park, and inspire visitors to aid in that response.



The desired future condition for Gateway waters and sediments is an estuary free of chemical contaminants, such that less than 1 percent of the aquatic animal species will experience adverse biological effects manifested by abnormal physical, behavioral, biological and population responses.

Cooperative Stewardship and Marine Resources

Two-thirds of Gateway is covered by water—more than 17,500 acres of bay and oceanic waters that are part of larger systems influenced by land uses and activities taking place outside the park. The long-term management of natural resources and ecological processes within these waters will not be sustainable without the control of contaminant inputs and other human-caused disturbances.

Water Quality Enhancements

Elimination and control of pollution sources that cause degradation to the park's ecosystems is perhaps the most critical of desired conditions. These sources include effluents from wastewater treatment plants (WWTPs), combined sewage outfalls (CSOs), nonpoint runoff, atmospheric deposition and landfill leachates. Elimination or reduction of these contaminants would reduce nutrient pollution and long-term accumulation of contaminants in sediments and biota. These actions would have the widest influence on enhancing the recovery of Jamaica and Raritan Bays to a fully functioning ecosystem. Water quality levels should be attained that would eventually support and sustain fish and wildlife habitats and populations. This level of attainment would also support visitor contact recreational activities including bathing, fishing, and shellfishing. Nutrient removal with additional reduction of contaminants, including pharmaceutically active compounds, would benefit the entire ecosystem by providing increased ~~DO~~, dissolved oxygen, reduced algal blooms and turbidity, decreased organic loading, and reduced pathogen levels.



A more natural shoreline that maximizes ecosystem functions such as habitat for wildlife, connectivity between the bay and upland habitats, and natural processes such as sediment transport and shoreline migration would be Gateway's goal

Desired conditions also include the control, inhibition and prevention of invasive exotic aquatic species, including harmful algal and sea lettuce (*Ulva* spp.) blooms. The estuary should be maintained as a refuge for proliferation and reproduction of aquatic biota at all trophic levels. To further aid overall water quality, borrow pits (dredge holes) should be filled to a depth that would improve levels of dissolved oxygen estuary-wide,, especially where anoxic or hypoxic conditions exist.

Sediment Contaminants

The desired future condition for Gateway waters and sediments is an estuary free of chemical contaminants, such that less than 1 percent of the aquatic animal species will experience adverse biological effects manifested by abnormal physical, behavioral, biological and population responses. Presently, about 10 to 50 percent of the aquatic species are affected, as approximated by Effects Range Low (ERL) and Effects Range Median (ERM) levels of contaminants and numerous contaminants research reports.

Gateway would take the lead in calling for reductions and elimination of these sources of contamination. Primary actions should include decreasing contaminants and nutrients from wastewater treatment plant effluents, decreasing input of contaminated surface runoff from the Jamaica Bay and Raritan Bay watersheds, cessation of sewage discharge from combined sewer outfalls, decrease air pollution to lessen contaminant deposition, and restoration of clean freshwater sources feeding into the bay.

Estuarine Shorelines

A more natural shoreline that maximizes ecosystem functions such as habitat for wildlife, connectivity between the bay and upland habitats, and natural processes such as sediment transport and shoreline migration would be Gateway's goal. Achieving this goal will require the removal of hard structures wherever possible and restoration of natural shoreline features, including salt marsh, estuarine beach, and freshwater wetlands. In addition, alternative "soft" solutions would be identified and implemented in areas where shoreline protection is necessary. The primary focus for softening of the shoreline should occur on NPS and private property within park boundaries. Currently 30% of the shoreline along Jamaica Bay within park boundaries is human modified. Partnerships should also be advanced to soften shorelines along the primary creeks and bay shoreline that is not within park boundaries. Additional strategies would be:

- identify and prioritize other suitable sites, methodologies and partners for shoreline restoration/rehabilitation along other areas of shoreline,

- road and parking area could be redesigned and rehabilitated with permeable pavement to provide visitor access to the area,

- remove hard structures wherever possible and restore natural shoreline features, including salt marsh, estuarine beach, and freshwater wetlands,

- identify and implement alternative "soft" solutions in areas where shoreline protection is necessary.

Salt Marshes

Salt marshes will provide for sustainable and ecologically functioning salt marsh islands and fringing salt marshes. Some strategies to achieve this condition would be:

- Develop a system for prioritizing marshes for restoration,

- Adopt shared goals for marsh preservation, restoration and the elimination/management of anthropogenic causes of marsh loss, working with residents, organizations and partner agencies,

- Pursue research to understand and eliminate and/or manage human-related stressors and causes of marsh loss. Direct research at understanding future effects of sea level rise and global climate change on the sustainability of marshes,

- Pursue salt marsh restoration as a method of increasing our understanding of the causes of marsh loss as well as the processes and functions of marsh islands in an urban setting,

- Continue to develop and evaluate construction methods that are ecologically sound and cost effective. Continue beneficial use of dredge materials and explore mechanisms to couple restoration and dredge projects and cost-effectively obtain dredge materials.

Estuarine Benthic Habitats

The ultimate littoral-zone restoration objective is to re-establish self-sustaining benthic communities of Eastern Oysters, Eelgrass, and Bay Scallops, along with their numerous indigenous species. As these natural estuarine communities develop, they are likely to include more than 150 species of invertebrate animals, plants, and micro-organisms. Some strategies would be:

- Improve water quality, rebuilding shell beds at multiple locations throughout the bay, replanting key species (Eelgrass, Eastern Oysters, Bay Scallops) at sub-tidal depths in numerous locations, and restricting human disturbance at those sites,

- Develop a sustained, multi-partnership effort to achieve ecosystem restoration goals, including acquiring public and private funding, as well as innovative means of reducing current costs restoration.

Estuarine and Marine Finfish and Shellfish Communities

Finfish and shellfish communities in Gateway waters should reflect and sustain a high level of species richness, appropriate diversity and sustainable populations of each species. Healthy and robust fish and shellfish communities are dependent on healthy estuarine ecosystems with a complete assemblage of habitats and species throughout the food web. A key goal would be to achieve a sustainable fishery, representative of and supported by a biologically productive mid-Atlantic region estuarine habitat complex.

Healthy and robust fish and shellfish communities are dependent on healthy estuarine ecosystems with a complete assemblage of habitats and species throughout the food web.

Table 2-2. Summary of Natural Resource Conditions.

Desired Conditions	Examples of Future Actions
• The park's fundamental natural resources obtain a higher degree of ecological integrity and resilience to changing climatic conditions, their associated natural processes continue unimpeded to the greatest extent possible. • Natural resource management, conservation, restoration, and research focus on fundamental natural resources that are adapting to changing ecological and climatic conditions. ~~sustainable levels of extraction by park visitors, and new scientific information.~~ • Gateway NRA is a leader in the study of urban ecology and collaboration with external partners to protect fragile ecosystems in the urban context and in demonstrating practical approaches for climate change adaptation and sustainability. • Internal and external human impacts on Gateway's resources are monitored and harmful effects minimized, mitigated, or eliminated in coordination with partners. • Gateway expands and improves the inventory, monitoring, and understanding of its natural resources so as to have the best possible science based information available to guide management decisions. • Threatened and endangered species and habitat are protected to the greatest extent possible and other particularly sensitive species and biotic communities are closely monitored and protected. • Extractive uses of natural resources by hunting, fishing and trapping are regulated to maintain ecological integrity, recreational values and the sustainability of target populations.	• Promote research to increase understanding of Gateway resources, natural processes, and human interactions with the environment with emphasis on fundamental resources. • Continue to participate in and encourage ongoing partnerships with local, state, and federal agencies, and nongovernmental organizations in programs that have importance within and beyond park boundaries. • Continue to monitor water quality and quantity within a local and regional context, and expand monitoring as needed to more fully understand the status and trends of ground and surface water. • Participate in local, state, and national water quality remediation and watershed planning programs. • Update strategies for water resources management as needed to reflect changing resources and management issues. • Continue to inventory wetlands so that important wetland communities can be identified and protected. • Provide education and outreach programs to highlight conservation and management issues facing the park and related lands and encourage partners who are able to assist with ecosystem stewardship. • Continue to assess human-related threats to water quality and quantity. • Continue to eradicate invasive nonnative plants in the park. Work with local, state, and other federal agencies, private landowners, and visitors to minimize introduction and the spread of invasive nonnative plant species into the park and the region. • Continue cooperative management of threatened and endangered species within and outside the national park to stabilize or improve the status of these species. • Strive to preserve populations and habitats of migratory species inhabiting the park, and cooperate with external partners . • Continue to educate visitors and the public about wildlife issues and concerns. • Manage extractive uses of natural resources by hunting, fishing and trapping to maintain sustainable populations of the target species and provide rewarding visitor experiences. • Continue to collect baseline data regarding disturbance to threatened and endangered species, such as data on disturbance levels from authorized activities, unauthorized intrusions, visitation levels, staffing levels.

Table 2-2. Summary of Natural Resource Conditions (continued).

Desired Conditions	Examples of Future Actions
	Continue with monitoring and conservation measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education. Continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservations measure as conditions change. Continue to consult with USFWS on conservation measures for threatened and endangered species for site specific planning efforts and natural resource management plans. Continue to work with USFWS to update resource management plans for threatened and endangered species (such as the Shoreside Plan) as needed to reflect changing conditions.
Conditions Specific to Marine Resources	
Coastal and maritime ecosystems including the Jamaica Bay waters are protected, studied and restored. Recreational uses are compatible with resource protection goals. Visitors to the marine zone avoid physical impacts and conserve the aesthetic and ecological values of shoreline areas and marine habitats. Visitors possess knowledge and awareness to safely pursue recreational opportunities and protect the resources they enjoy.	Work to protect the values of marine and estuarine resources, including preservation of fundamental physical and biological processes. Improve marking and signage of channels and boundaries for sensitive zones and other fragile areas. Expand boater outreach and education programs to protect submerged and shoreline vegetation and wildlife while allowing a wide range of recreation opportunities and reasonable recreational access. Require ~~commercial services providing~~ entities providing activities such as kayak and boat excursions, camping, and hiking to avoid damaging fragile shoreline and marine areas and avoid disturbance of wildlife. Work with partners to develop and disseminate a Jamaica Bay Map and Guide to provide boaters with information on the unique ecology and wildlife of the Bay as well as zones, regulations and stewardship of marine resources. Identify lands/waters outside the national park where ecological processes and human use affect park resources or are closely related to park resource management considerations; initiate joint research, monitoring, management actions, agreements, or partnerships to promote resource conservation.

To attain the desirable level of estuarine ecosystem health and productivity requires comprehensive actions that include:

- eliminating the current levels of chemical and nutrient input,

- improving sediment chemistry to a point where contaminant bioaccumulation would be eliminated or at least substantially reduced,

- restore portions of the bay that are not supporting benthic / nekton communities due to chronically low levels of dissolved oxygen (hypoxia), and in some areas, anoxia,

- working with local, state and federal authorities, ensure the appropriate levels of fishing to maintain sustainable populations and outstanding recreational fishing opportunities.

Marine and Estuarine Resource Management Plan

A science-based plan would be developed to identify baseline and desired conditions to improve management of fish and shellfish resources, submerged aquatic vegetation and marine species, working closely with state, local and federal partners and the public. The plan would evaluate user capacity and identify types and levels of marine recreational uses necessary to improve the quality of park resources, reduce crowding and conflicts between uses, and provide a full range of visitor experiences. Visitor surveys and direct input from stakeholders will inform the plan.

Preserving Heritage: A Sustainable Future for Cultural Resources

To date, Gateway has not had a comprehensive approach for the management and repair of cultural resources. Cultural resources, which include the majority of the physical structures in the park, were repaired when funding became available; uses found when outside entities expressed interest in the building. With more than 550 historic structures and landscapes spread across three units, preventative maintenance was completed on some, but not all of the structures. This disjointed approach left the majority of the resources vacant, in poor condition and in need of major capital repair projects. The park determined that prioritization of these resources was necessary to guide cultural resource management and GMP decisions.

Prioritization Process

In order to guide GMP decisions, the planning team determined that a prioritized list of resources was necessary to inform future preservation efforts, funding, maintenance and business leasing efforts. Using a variety of information sources, a group of park and NPS staff with expertise in history, historic architecture, conservation, cultural landscapes and business services, created a process to evaluate over 330 structures and associated landscapes that are contributing resources to the park's nine National Register Districts (see the "Cultural Resources – Historic Districts and Structures" section of Affected Environment for a complete description). Eight factors were used to evaluate and prioritize the park's resources. These include the following:

- Fundamental Resource
- National Register Status
- National Register Level of Significance
- Condition
- Uniqueness to Gateway
- Visibility
- Potential Use
- Vulnerability to Future Storm Events

Numerical points were assigned to each criterion and totaled for a score. Depending on that score, each resource was placed in one of three bands: preserve, stabilize, or ruin. The bands are defined as follows:

- **Preserve:** Actions will be taken to maintain and preserve these structures. Efforts will be made to maintain these structures in their current condition or move these structures into good condition through preservation or rehabilitation by NPS or partners. ~~These structures will be utilized for operations, visitor services, and interpretation.~~ These structures would be used to support visitor programs, interpretation, operations and appropriate commercial uses.

- **Stabilize:** Structures where actions will be taken to render an unsafe, damaged, or deteriorated property stable while retaining its present form. Minimal efforts will be made to maintain the structure in its current condition. Unless a use and/or funding is found, the structure may fall into disrepair.

- **Ruin:** Structures in poor condition where one or more of the basic structural elements has been lost and due to this condition are without viable reuse options. Resources may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resource.

Under all the alternatives, the structures in very poor condition that the NPS has placed in the ruin band would remain as ruins and continue to decay naturally by the forces of nature. Some of these resources are zoned in the Ruin Subzone. Others may be part of another zone and removed from the landscape in keeping with the intention of that management zone. Gateway would prioritize documentation of these structures and, in some cases, use interpretive media to convey information about their significance and former use.

The contributing structures and landscapes priority band may change as data used to evaluate these resources is updated. As condition information and national register nominations are updated and/or new nominations are prepared, the list of resources and the priority band will be updated. The priority band may change.

Table 2-3. Future Conditions for Cultural Resources at Gateway.

Desired Future Conditions	Examples of Future Actions
Cultural Resource Management	
• Locations where cultural resource management is a priority are identified, and at these locations human and natural impacts on cultural resources are monitored, minimized, or eliminated. • Visitors and park staff recognize and understand the value of the park's military and maritime history and resources within their local and national context. • Cultural resource managers look beyond the park's borders and take into account resources found within the regional context (including other units of the National Parks of New York Harbor) and encourage scholarly research of Gateway's ties to the region. • Sea level rise models as well as current climate change science inform cultural resource management. • Research and documentation of the park's cultural resources are aligned with its purpose, significance and fundamental resources and values. • Through ongoing investigation, study, and scholarly research, Gateway expands and improves the inventory, monitoring, and cataloging of its cultural resources so as to have the best possible information available to guide management decisions.	• Conduct scholarly research and use the best available scientific information and technology for making decisions about management of park cultural resources. • Continue to collect information to fill gaps in the knowledge and understanding of the national park's cultural resources, to assess status and trends, and to effectively protect and manage cultural resources. • Build partnerships focused on the preservation, maintenance, and interpretation of fundamental cultural resources. • Update and keep current the park's Cultural Landscape Inventory and ~~List of Classified Structures,~~ list of Classified Structures and other cultural resource inventories.
Historic Structures	
• Finding viable uses for historic structures is emphasized and the adaptive use of historic structures for park needs is encouraged before building new infrastructure. • Historic buildings and cultural landscapes are managed to produce income that offsets the cost of their ongoing maintenance.	• Reduce impacts of natural resources on cultural resources (i.e. remove vegetation) • Pursue ~~options for~~ leasing or other alternative authorities for use of fundamental historic structures to help preserve these through adaptive re-use in the face of limited funding. • Prepare historic structure inventories and reports and implement actions as appropriate. • Monitor, inspect, and manage identified and evaluated historic structures to enable long-term preservation of historic features, qualities, and materials. • Create design guidelines and/or historic structure reports for specific areas in the national park to preserve architectural and character-defining features. • Conduct preservation maintenance and other approved treatments of historic structures in a manner that maintains, to a high degree, the integrity of historic materials and fabric.

Table 2-3. Future Conditions for Cultural Resources at Gateway (continued).

Desired Future Conditions	Examples of Future Actions
Historic Structures (continued)	
	• Document and demolish non-fundamental cultural resources in a poor, degraded state that do not provide natural resource value.
Cultural Landscapes	
• Cultural landscapes are preserved to retain a high degree of integrity.	• Prepare cultural landscape inventories and reports and amend existing reports as needed. • Monitor, inspect, and manage identified and evaluated cultural landscapes to enable long-term preservation of historic features, qualities, and materials. • Create design guidelines and/or cultural landscape reports for specific developed areas in the national park to preserve character-defining features. • Implement actions identified in cultural landscape reports. • Collaborate with park natural resource staff to develop cultural landscape preservation strategies that complement activities to manage vegetation and natural processes.
Museum Collections	
• A scope of collections reflective of the park's purpose is maintained, protected, and made available to support scholarly research and interpretation. • Gateway's museum collection is properly inventoried, curated, protected, and preserved. • Provisions are made for appropriate access to the collection by NPS staff and the public for their use in exhibits, interpretation, resource management, and research.	• Acquire, develop, and preserve museum collections that document the history, resources, and significance of the national park. Remove those items that do not belong. • Maintain high standards for museum practices and ensure accountability for park collections. • Continue to research, document, and catalog the museum collection, which serves as an interpretive and management resource for park staff and the public. • Develop traditional and web-based exhibits to make collections more accessible. • Use existing and emergent technologies for collections access and management. • Upgrade facilities and staffing to better protect the park's collection of archeological and historic artifacts.

Table 2-3. Future Conditions for Cultural Resources at Gateway (continued).

Desired Future Conditions	Examples of Future Actions
Archeological Resources	
• Archeological resources and submerged cultural resources would remain in situ and undisturbed, unless removal of artifacts or intervention into cultural material is justified by preservation treatment, protection, research, interpretation, or development requirements. • Significant archeological and other scientific data threatened with loss from the effects of natural processes, human activities, preservation treatments, park operations, or development activities would be recovered, recorded, or otherwise preserved.	• Conduct sufficient research to identify and evaluate park archeological resources and assess condition and potential threats. • Continue long-term monitoring of archeological sites to measure deterioration from natural and human sources and to evaluate the effectiveness of management actions to protect resources and mitigate impacts. • Preserve and protect archeological resources by eliminating and avoiding natural and human impacts, stabilizing sites and structures, monitoring conditions, and enforcing protective laws and regulations. • Make decisions that promote preservation of archeological resources in place. • Carry out required consultation and legal compliance and consider concerns raised. • Include information about archeological resources, as appropriate, in interpretive and educational programs for the public.
Ethnographic Resources	
• Ethnographic resources having cultural importance for tribes and other groups are identified and protected. • Opportunities remain for tribal members and traditionally associated people to access culturally important places in the park.	• Consult with the culturally associated Delaware Nation, Delaware Tribe and Stockbridge-Munsee Community on program and resource management planning • Conduct park programs and activities in a way that respects the beliefs, traditions, and other cultural values of those who have ancestral or historic ties to park lands. • Identify and document, through studies and consultations, traditional cultural properties and other ethnographic resources, traditionally associated people and other affected groups, and such groups' cultural affiliations to park resources. • Recognize the sensitivity of ethnographic resources and associated data and provide confidentiality to the extent possible under the law. • Collaborate with traditional cultural experts to develop a park strategy for ethnographic resources.

The criteria definitions and a list of the evaluated resources and their bands are found in Appendix B. Additional information about the resources and National Register districts is detailed in the "Cultural Resources – Historic Districts and Structures" section of chapter 3.

Future cultural resource management at Gateway would be guided by the desired future conditions described in the management zone chart and in Table 2-3 as well as specific guidance at individual park areas. In each alternative, finding viable contemporary uses for historic structures and cultural landscapes would be a priority preservation strategy for Gateway. The park would pursue public-private partnerships that assist with the preservation and reuse of these places for a wide variety of uses including visitor services, administrative and partner needs, recreational business opportunities or compatible private use.



Under both alternatives, NPS and its partners would make a concerted effort to raise awareness of Gateway's recreational opportunities and natural and cultural resource and to recruit a broader array of users to visit the park.

Improving Visitor Experience

Both alternatives focus on improving the visitor experience at Gateway in several ways. There would be an emphasis on improving communications, promotions, and wayfinding in order to raise the visibility of Gateway, to recruit new audiences and to improve visitors ability to navigate to and through the park. Additionally, both alternatives expand on the existing park experiences by providing more opportunities for multi-day excursions and overnight stays within the park.

Enhanced Communications, Outreach & Wayfinding

Under both alternatives, NPS and its partners would increase efforts to raise awareness of Gateway's recreational opportunities and natural and cultural resources and to recruit a broader array of users to visit the park. As listed in table 2-4, creative communications campaigns employing innovative technologies as well as traditional outreach channels would target visitors and potential visitors from a diversity of socio-economic and cultural backgrounds. Educational, interpretive, recreational and volunteer stewardship programs would be expanded in both alternatives and will be important tools for increasing visitor understanding and appreciation of the park's significance and its resources.

Orientation and wayfinding is another challenge both alternatives would address. Through more frequent and more visible signs, the visibility of Gateway's park lands would be increased for passerbys and neighboring residents. Additionally, orientation kiosks with maps and park information would be located at key locations and would reveal that Gateway's individual park lands are part of a much larger network of protected park lands within the NYC metropolitan area. Traditional signs at entrances and along roads would be complemented by technological-based information sources (e.g. gps-enabled apps, websites, social media) geared toward facilitating more convenient and clearer navigation of Gateway's resources.

Multiple-day Experience

Gateway is a large park with thousands of acres spread out among three units in two states with additional adjacent park lands managed by local and state agencies. All of these places provide a variety of things to see and do that cannot be experienced in a single day. The



Learn-to-Camp. This would be camping in an instructional setting where visitors would gain skills and confidence related to camping and other outdoor activities.

alternatives will propose different types of camping and lodging, varied use levels, and a range of supporting facilities. ~~that may be appropriate~~. In the future, Gateway will work with partners to ~~develop~~ explore and offer a variety of overnight accommodations such as camping, youth and elder hostels, eco-friendly lodges and small inns, where appropriate and feasible at each unit. These overnight lodging facilities will be similar to those found in other national parks throughout the country.

As part of this general management plan effort, NPS staff and partners developed options for camping to be tested as part of the GMP/EIS alternatives. The options represent initial recommendations for camping at Gateway, based on the best information available at the time of planning and will require further planning, analysis, consultation and compliance. This information was derived from multiple sources, including the GMP/EIS alternative concepts and management zones, site visits and preliminary site analysis, and input received during two planning workshops and at summer 2012 public open house meetings.

The initial camping recommendations within the GMP/EIS would require further analysis, site planning, consultation and compliance. Camp sites would be appropriately sited to avoid impacts to threatened and endangered species. Access and trails to/from camp site areas would be defined, controlled, and signed, to limit disturbance to threatened and endangered species and other resources. Educational materials concerning threatened and endangered species would be provided at camp site areas. In areas of the park, that have threatened and endangered species, beach camping would not be permitted during breeding season (March 15- September 1). The park would continue protection measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season.

The camping program at Gateway is intended to provide a variety of opportunities for visitors. Proposed camping options range from primitive tent camping in remote backcountry areas to facilities for recreational vehicles that may offer full utility hookups. Staying overnight in permanent or semi-permanent structures (e.g., cabins, tent-cabins, or yurts) may be pursued. This range of camping opportunities would enable new campers to gain confidence and skills as they camp in different parts of the park, and allow experienced campers to "get away from it all" in the "urban wildlands" of Gateway. The following section describes a range of camping types to be offered at Gateway. The camping options presented in this plan use these defined types, exploring different configurations for their placement within Gateway's three units. Where mentioned, "campsite living space" refers to the area in which a camper would sleep, cook, and eat. Amenities within this space would include a tent pad, fire pit/grill, and picnic table.

Programmatic Camping

Programmatic camping would consist of guided or ranger-led camping activities that emphasize interpretation and education on a variety of natural and cultural resources. Equipment and supplies may be provided to campers depending on the program.

- **Learn-to-Camp.** This would be camping in an instructional setting where visitors would gain skills and confidence related to camping and other outdoor activities. Educational experiences for beginner campers to those with advanced skill sets would be offered, enabling a large cross-section of participants to be included.

- **Historic.** This would entail camping in a historical setting where camping or other living quarters would have existed during a historical period of significance. Examples might include camping in historic forts or parade grounds. Storytelling, artifacts, architectural character, interpretive exhibits, and interactive programs would bring to life the history of the site for participants. Interpretive programs and events would be integral to the camping experience.

- **Natural.** This type of camping that would immerse participants in a natural setting and promote the learning of outdoor skills, natural history, and environmental stewardship. Organized activities might focus on natural resources. Interpretive programs would be integral to the camping experience. Examples might include overnight canoe/kayak programs, dune camping, etc.

- **Permanent or Temporary Campsites.** These programs would be offered on an occasional basis. The character of campsites would vary, depending on the program. In some instances permanent tent pads or platforms might be provided, while in others (for instance, a historically significant setting), campers might pitch a tent in a field and avoid leaving a lasting mark.

- **Moderate Services and Amenities.** Where appropriate, services provided might include vault or flush toilets, showers, and areas for interpretive programs.

Backcountry camping would appeal to self-reliant visitors seeking opportunities for solitude and a nature-based camping experience.

Designated Backcountry/Beach Camping

Backcountry camping would appeal to self-reliant visitors seeking opportunities for solitude and a nature-based camping experience. Beach camping opportunities may vary. In some instances beach camping may offer the high probability of solitude, while in other places it may facilitate the enjoyment of recreational activities such as fishing, in the company of others. Where threatened and endangered species have historically existed, beach camping will be seasonal and will occur outside of breeding season and will not be located within threatened and endangered species habitat.

- **Moderate to High Opportunities for Solitude.** Backcountry campers would expect minimal levels of interaction with other visitors and largely unmodified natural or natural-appearing environment. Opportunities for solitude may vary from one beach camping experience to another.

- **Highly Self-Reliant Campers.** Campers would carry everything they need (including tents, food, and water) and follow Leave No Trace principles.

- **Designated, Dispersed Campsites.** Campsites would be designated to prevent resource impacts and would be widely spaced to promote opportunities for solitude in

the backcountry and in some beach camping. Spacing between designated campsites may vary from approximately one to four campsites per acre, but each campsite would occupy a small area.

- **Most Remote Access.** Backcountry campers would hike or paddle to the designated campsite from a parking lot / trailhead or boat launch. Distances would vary, but would be expected to be greater than one-quarter mile. The recreational activity of accessing the campsite would be an integral part of the backcountry experience. In some instances, beach camping could require just a short walk from the parking area.

- **Primitive, Designated Campsites.** Visitors would be required to camp at designated sites, which would be marked by a stake or similar method. Resource conditions would be monitored, and from time to time campsites could be relocated to prevent or limit impacts. ~~Seasonal closures to protect bird nesting sites would probably be implemented.~~



- **Motorized Use Prohibited.** Motorized use would not be permitted.

- **Limited Services and Amenities.** Services and amenities would be minimal and might include a marker, vault toilets (at parking or perhaps at the campsite), and limited signage (e.g., directional signs or informational signs at the trailhead that focus on site resources).

Walk-in Tent Camping

Walk-in tent camping would require visitors to walk a short distance from their vehicles or parking lot to a designated tent campsite within a campground. Walk-in tent campers would typically see, hear, and possibly interact with other tent campers close by.

- **Moderate Opportunities for Solitude.** Campers would expect moderate to high levels of interaction with other visitors and, as feasible and appropriate, a natural-appearing environment. The fully pedestrian environment might encourage visitor interactions but also would limit the impact of modern development on solitude.

- **Self-reliant Campers.** Campers would carry everything they need (including tents, food, and water) to their campsites and follow Leave No Trace principles.

- **Concentrated Campsites.** Spacing between campsites might vary to promote differing levels of solitude and privacy; however, in general the walk-in campsites would be concentrated to limit the development footprint. The density of campsites might range from approximately 15–60 campsites per acre.

- **Moderately Remote Access.** Campers would walk a short distance from a parking lot/ trailhead (approximately 50–300 feet). Campers would therefore enjoy a moderate degree of separation from roads, parking, and other developments.

- **Improved Campsites.** Campgrounds would be modestly improved, with accessible walkways leading to campsites. Campsites would include designated tent pads and living spaces.

- **Motorized Use Prohibited.** Motorized use within walk-in camping areas would not be permitted. Parking would be consolidated at the edges of the campground.

- **Moderate Services and Amenities.** Where appropriate, services and amenities might include: vault or flush toilets, showers, or picnic facilities. Campsites would include designated tent pads and living spaces.

RV Park

The recreational vehicle (RV) park would allow for high-density RV camping. Utility hookups or dump stations might be provided.

- **Low Opportunities for Solitude.** Campers would expect moderate to high levels of interaction with other visitors and, as feasible and appropriate, a natural-appearing environment. The immediate setting may resemble a large parking lot, but it would be adjacent to more natural areas.

- **Consolidated Sites.** Parking stalls would be in close proximity to one another. Appropriately sized stalls would accommodate RVs. Visitors might stay within their vehicle or park it for several days while staying overnight in other areas of the park or outside the park.

- **Moderate Services and Amenities.** Where appropriate, available services and amenities might include: vault or flush toilets, showers, and a camp store. The RV park might be in a central location within the park, where some services might be available nearby. Electric or other hookups might be provided.

Drive-in (Vehicle Access) Campground



"Drive-in" campsites allow for a traditional designed campground experience for tent and RV campers. Visitors would park their vehicles at their campsites, which typically would be arranged around a campground loop drive.

- **Low Opportunities for Solitude.** Campers would expect moderate to high levels of interaction with other visitors, and a designed environment, but one that is still scenic and natural-appearing, as feasible and appropriate.

- **Developed Campsites.** Campsites would be arranged around designed loop roads, allowing campers to park their vehicles right at the campsite. Within the campground, loops might be designated for different types of camping (e.g., RV, tent, or a combination of both). An accessible, internal pedestrian circulation network would also be provided.

- **Moderate to High Services and Amenities.** Where appropriate, services and amenities might include: vault or flush toilets, showers, interpretive/educational areas, playgrounds, utility hookups, and/or a camp store. The campground might be in a centrally located position in the park so some of these amenities might be available nearby.

- **Tent.** Campsites would include a parking area that could accommodate up to two standard-size vehicles (probably a back-in spur) and a living space. Campers would pitch their tents on assigned tent pads.

- **RV.** Campsites would include a parking area that could accommodate a recreational vehicle and condensed living space. Pull-through parking would be preferred in order to safely accommodate large vehicles.

Structural Camping

The types of structures would vary but all would provide some degree of shelter, privacy, convenience, and comfort for campers. Depending on site factors, campers could drive up to the structure or take a short walk to the structure. Typically, this experience would require minimal camping equipment or supplies.

- **Low to Moderate Opportunities for Solitude.** Depending on location and other factors, campers would expect moderate to high levels of interactions with other visitors and, as feasible and appropriate, a natural-appearing environment.

- **Shorter Access to Limited Motorized Access.** Access may vary. Campers may walk a short or moderate distance to access some camping units or enjoy direct access by vehicle to camping units.

- **Moderate Services and Amenities.** Campers would stay overnight in shelters which may include lean-to shelters, yurts, moveable or permanent cabins, or tent-cabins. Where appropriate, other services and amenities may include: vault or flush toilets, showers, or educational/interpretive areas. Camping equipment (sleeping bags, stoves, etc.) may be provided by the operator.

Future visitor use and experiences at Gateway would be guided by the desired future conditions described in the management zone chart and in Table 2-4 as well as specific guidance at individual park areas. Table 2-4 provides desired conditions and examples of future actions to improve visitor use and experience at Gateway.

Table 2-4. Visitor Use and Experience.

Desired Conditions	Examples of Future Actions
Communications and Outreach	
Visitors from a diversity of socio-economic and cultural backgrounds learn about Gateway's resources, find convenient access to and through the park, and enjoy a wide variety of recreational, stewardship and educational opportunities. Park-related messaging and media respond to evolving social conditions, staying current and relevant to visitors and changing audiences. Outreach efforts build and sustain relationships with schools, organizations, partners, and neighboring communities. Awareness of the park's mission and fundamental resources increases among partners and a diversity of audiences.	Utilize print media, social media and digital media to more broadly disseminate information about Gateway's recreational opportunities, programming and resources. Work with partners to increase visibility and understanding of NPS and Gateway's resources through joint outreach, programming, communication and cross-promotions. Develop interpretive media supportive of park purpose, significance, and interpretive themes that is relevant to a more diverse audience and recruits more interest in Gateway. Actual and virtual interpretive programs are designed to appeal to a broad audience and increase visitor understanding of and appreciation for the park's resources. Continue to educate staff, visitors, and the public about park interpretation/education programs. Link programming and activities to school science and history curricula in NY/NJ Stay informed of changing visitor demographics and preferences to effectively tailor programs for visitors. Continue to promote improved pre-trip-planning information and orientation for park visitors through the park's website and other media. Work with local communities and partners to provide services inside and outside park boundaries, where appropriate.

Table 2-4. Visitor Use and Experience (continued).

Desired Conditions	Examples of Future Actions
Visitor Experience	
• Visitors enjoy an NPS experience that is consistent with the purpose, significance, fundamental resources, and values of Gateway. Park management prioritizes its focus and shapes the visitor experience to provide opportunities for the use and enjoyment of resource-based recreation, historic landscapes and sites, educational and interpretive activities, open spaces, and natural areas. • The recreational needs of the diverse audiences of the surrounding communities are identified and used to inform management decisions regarding facility development and visitor services. • Interpretive and educational programs increase visitor understanding and appreciation of the park's significance and its resources. • Gateway is a regional and national learning laboratory offering abundant field learning experiences. Curriculum-appropriate, place-based educational programming inspires student understanding and is regularly updated to reflect current scholarship. • ~~Visitor services and~~ Facilities and programs are appropriately scaled and sensitively located to meet the needs of visitors, minimize impacts on park resources, and facilitate enjoyable, safe, and educational visits to the park. ~~Accessible f~~Facilities and programs enable visitors of all abilities to enjoy the park. • Natural soundscape and dark night skies are preserved within Gateway and the sounds of modern society and light pollution are minimized in order to provide visitors a unique nature experience in such a highly developed urban context. • Views of New York Outer Harbor and ocean horizon are protected. • Sports-related activities are used as a foundation for a broader national park experience. • Collaborative partnerships with non-profit and private partners expand the park's capacity to protect park resources and provide high quality recreation opportunities, interpretive and educational programming, and other visitor experiences.	• Hands on environmental stewardship and cultural resource preservation programming provide opportunities to learn about the park's habitats and ecological systems as well as its history and significance. • Cooperate with partners, other governmental agencies, educational institutions, and other organizations to enrich interpretive and educational opportunities locally, regionally, and nationally. • Build on ongoing place-based learning experiences that link traditional science and history classrooms with resources found at Gateway ~~(e.g., OPEX – operation explore)~~ • Develop and update a long-range interpretive plan, with emphasis on providing information, orientation, and interpretive and education services in the most effective and engaging manner possible. • Create and implement an education strategy plan that outlines goals and actions for providing curriculum and place-based education programs. • Explore management and maintenance of athletic fields and sports leagues by a third party.

Table 2-4. Visitor Use and Experience (continued).

Desired Conditions	Examples of Future Actions
Orientation, Access, and Wayfinding	
• Visitors are informed and oriented before they arrive and throughout the visit. They enjoy a safe and comfortable experience at the park, and navigate clearly among the districts and units. • Public access to and within Gateway is made more convenient through a combination of ferry services, busses, subway, and non-motorized modes such as walking, biking, and human powered boats. • Gateway is accessible via non-motorized/human-powered modes including bicycle, foot-powered and watercraft. A multitude of opportunities to experience the units and districts of Gateway via non-motorized/human-powered modes are available. • Many technologies are used to provide an effective orientation, wayfinding, and communication system that guides visitors easily between and within the park's districts.	• Through improved signage, branding, virtual connections and a significantly increased ranger presence, make visitors more aware that Gateway is administered by the NPS • Provide information kiosks, brochures, maps and digital media that showcases Gateway's parklands as part of a broad network of public lands within the New York City metropolitan area. • Increase the visibility of Gateway and improve wayfinding through a unified and comprehensive sign system • Expand on efforts to tie into regional water-based transportation systems (e.g., New York City water trail, ~~NPNYHC ferry planning~~) • Continue to support and plan enhanced regional trail linkages including filling gaps in current facilities and expanded connectivity to New York City greenways. Promote these regional trails (greenways) as recreation corridors (e.g., Belt Parkway) • Improve wayfinding from local transit stops to parks • Implement traveler information system (TIS) to include parking management system (PMS), highway advisory system (HAR), and variable message signs (VMS)
Facilities, Services and Operations	
• Facilities and related development are the minimum necessary to serve visitor program needs and protect park resources. • Visitor and administrative facilities are as compatible as possible with natural processes and surrounding landscapes, aesthetically pleasing, and functional. • ~~Commercial services in the park are limited to those that are necessary and appropriate and that are compatible with the park purpose.~~ • Staff housing is sufficient to ensure an adequate level of protection for park resources, visitors, employees, and government property, and to provide necessary services. • Gateway is a leader in sustainability. Decisions regarding NPS operations, facilities management, and development —from initial concept through design and construction—reflect principles of resource conservation and sustainability. • Staffing and volunteer and partner support is adequate to meet the park's management objectives.	• ~~Work to make the park appear more cared for overall~~ • Improve facilities that welcome visitors to the park and improve the sense of arrival and visibility of the NPS and its park units • Actively pursue the adaptive re-use of ~~fundamental~~ historic structures. • Implement the PAMP and reduce the number of non-fundamental assets that the park must maintain • Integrate NPS asset management practices into decision making and planning. Build, modify, and/or maintain facilities according to projected funding levels and defined park priorities. • Consider removal of facilities that do not meet minimum NPS criteria and/or are not cost effective to maintain. • Continue to strive to provide affordable housing in or near the park for emergency response staff and seasonal and entry-level employees. • Continue to provide overnight accommodations in the park for volunteers and partner organizations.

Alternative B: Discovering Gateway – NPS Preferred Alternative



New activities, programs and enhanced facilities will attract users of all neighborhoods, backgrounds, and ages, drawing a diverse audience of local residents, national and international visitors to enjoy all of the park's offering.

Overview

This alternative provides the widest range of activities and most recreation opportunities in dispersed locations throughout the park. New connections would be forged with park lands and communities adjacent and nearby Gateway. This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment. More convenient and affordable park access is developed through trail connections, bicycle infrastructure, public transit, and waterborne transportation. This alternative prioritizes joint management and operations for visitor services, orientation, programs, and facilities with New York City and other partners.

Jamaica Bay Unit

Under this alternative, Jamaica Bay will be Gateway's premier outdoor recreation destination. The park lands at Jamaica Bay would provide an unmatched variety of recreational, interpretive and educational opportunities for New York residents and park visitors. New activities, programs and enhanced facilities will attract users of all neighborhoods, backgrounds, and ages, drawing a diverse audience of local residents, national and international visitors to enjoy all of the park's offerings. Areas within the Jamaica Bay Unit including Floyd Bennett Field and the Rockaway peninsula parks (Jacob Riis Park, Fort Tilden, and Breezy Point Tip) would emerge as destinations for daily use and multiple day experiences.

Recreation and Visitor Experience

In partnership with New York City and other groups, the NPS would attract neighborhood, regional and distant visitors with new and improved amenities and recreation facilities (e.g., trails, camp sites); improved community-based recreation such as sports leagues and event spaces; and ~~enhanced~~ greatly expanded interpretive and environmental educational programming. With development of water trails, water skills programming, equipment rentals, and the expansion of beach access, the Jamaica Bay Unit would be established as a popular recreation destination for water-based activities. The combination of improved transportation infrastructure and widespread outreach and promotion, would ensure that these new opportunities for outdoor recreation, learning and skill building are accessible and popular among diverse audiences.



Under this alternative, the park lands would provide opportunities for youth and families to experience nature and to develop the skills and knowledge that would foster lifelong enjoyment of the outdoors. Improved and expanded facilities including trails, overlooks, viewing blinds, kayak launch sites, indoor and outdoor classrooms and campsites would provide more convenient access to natural areas and facilitate the exploration of Gateway's varied natural environments. These resource-based experiences would be complemented by opportunities to experience and learn about history and the park's significance through guided interpretive activities, interpretive media, and educational programming.

New multiple day experiences would be developed and promoted on NPS and New York City park lands throughout Jamaica Bay. A variety of camping options from special programs in unique locations to a variety of tent, structural and RV sites would enhance the national park experience. Lodging accommodations in historic buildings and associated support areas would be explored.

A multi-use trail network would be created throughout the area and would cater to different physical capabilities and recreation interests. The existing trail system would be greatly expanded and would provide paved as well as soft-surface trail experiences. The extensive network of trails would provide connections from adjacent parks and neighborhoods by tying into the Jamaica Bay Greenway.

Table 2-5. Jamaica Bay Unit - Alternative B - Summary of Visitor Experiences.

Desired Experience	Types of Change	Where Change May Occur
Physical and programmatic connections created to link Gateway sites, New York City parks and neighborhoods to Jamaica Bay	Explore new linkages by trails, sidewalks, paths and bridges Work with NYC and other partners to introduce new recreational skills and educational and interpretive programs in adjacent parks and communities	Plumb Beach Bergen Beach Canarsie Pier Pennsylvania Avenue and Fountain Avenue Parks Spring Creek Frank Charles Park Hamilton Beach
Orientation portals established to provide information on sites and activities throughout all Jamaica Bay park lands	Create distinctive access corridors to parks and Jamaica Bay through art, signs and other visual expression Improve signs and wayfinding Use virtual and modern technology for orientation and maps	Plumb Beach Canarsie Pier Spring Creek Floyd Bennett Field Fort Tilden
Recreation improvements	New picnic and open space area ~~at Bergen Beach and Spring Creek~~ Improved areas for horse-related activities at Bergen Beach ~~Improved launching areas for human-powered boating and wind sports at Plumb Beach~~	Bergen Beach ~~Plumb Beach~~ Jacob Riis Park Canarsie Pier Pennsylvania Avenue and Fountain Avenue Parks Spring Creek
Offer a wide variety of camping opportunities and support areas and services	Create new areas for ~~all types of camping~~ Offer special camping programs in places like historic buildings or natural areas.	Bergen Beach Floyd Bennett Field Fort Tilden Jacob Riis Park ~~Jamaica Bay Wildlife Refuge~~
Connect park sites through trails and paths	Convert former roads into trails Improve biking and walking infrastructure and circulation Improve access and linkages to Jamaica Bay Greenway	Unit-wide

Table 2-5. Jamaica Bay Unit - Alternative B - Summary of Visitor Experiences (continued).

Desired Experience	Types of Change	Where Change May Occur
Community gathering spaces	• Link athletic use/sports leagues with opportunities for NPS experience • Accommodate small outdoor concerts and performances • Create areas for gardens, markets, festivals and other community uses	• Pennsylvania Avenue and Fountain Avenue Parks • Floyd Bennett Field • Canarsie Pier • Frank Charles Park • Fort Tilden • Jacob Riis Park
Natural immersion	• Create learning opportunities and services for activities such as kayaking and wildlife observation • Formalize nature trails to bays and waterways for fishing, walking • Establish overlooks for outstanding/distance views of Jamaica Bay	• Unit-wide
Environmental education	• Improve or develop places and facilities to learn about marine resources such as salt marsh, and wetlands	• Floyd Bennett Field • Bergen Beach • Jamaica Bay Wildlife Refuge • Fort Tilden
Formal water trails established	• Establish new water trails connecting to NYC parks and other Gateway areas	• Unit-wide
Expand access to Jamaica Bay and other waterways	• Improve docking and marina area • New boat sites, storage, shuttles, and equipment rental	• Floyd Bennett Field • Fort Tilden - Riis Landing • Canarsie Pier • Pennsylvania Avenue and Fountain Avenue Parks

Resource Management



NPS would continue cultivating and leveraging partnerships to accomplish natural resource objectives. Improving water quality within Jamaica Bay would be prioritized along with restoring marine resources and degraded stretches of coastal habitats.

Partners sharing the NPS vision for a healthy and restored Jamaica Bay are numerous. In both action alternatives, NPS would continue cultivating and leveraging partnerships to accomplish natural resource objectives. Improving water quality within Jamaica Bay would be prioritized along with restoring marine resources and degraded stretches of coastal habitats. In conjunction with partners, NPS would produce a system-wide study of wetlands throughout Jamaica Bay that would determine the extent of freshwater wetland habitat projects. This study would identify the relationship of these wetlands habitats at park areas throughout Jamaica Bay and the appropriate habitat restoration that should occur.

Natural resource protection and restoration efforts in the Jamaica Bay Unit would focus on softening hardened coastal edges, restoring wetland and coastal habitats, and creating additional freshwater wetlands. Increased use would be balanced with additional monitoring and management of wildlife and habitats. Conservation measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season would continue across all management zones, as needed.

NPS would work closely with New York City and other landowners to build the resiliency of coastal habitat and to improve conditions along the entire Rockaway coastline. Together the agencies would produce a holistic shoreline management plan that would help guide recovery efforts and future uses and development.

Select ~~H~~historic structures and landscapes would be stabilized, and preserved for recreation, visitor or commercial services, education, and sustainable energy. Creative solutions would be ~~found~~ considered to continue use and adapt to future flooding, storms and other climate change related events. Mobile technology and other innovative media would enrich communication about the park land's history and significance.

Transportation

Through improved bike infrastructure, public transportation, and park shuttles, access to and within Jamaica Bay would be made affordable and convenient to more people. In partnership with its New York City partners, NPS would complete and expand the Jamaica Bay Greenway and trail network. The Jamaica Bay park lands and surrounding communities would also be connected via a system of land-based shuttles as well as water trails, water taxis and ferry service.

Plumb Beach

~~*Recreation Zone*~~

Natural Zone

Beach/dune habitats would be protected and maintained. Formal trails would be established through the natural area to prevent trampling of vegetation, reduce impacts to wildlife, and

Alternative B: Discovering Gateway - NPS Preferred Alternative

General Management Plan
Gateway National Recreation Area - Jamaica Bay Unit

United States Department of the Interior - National Park Service
2014

Management Zones

- Marine
- Recreation
- Active Beach Subzone
- Community Activity Subzone
- Natural
- Sensitive Resource Subzone
- Historic
- Ruins Subzone
- Developed

- GATE Legislative Boundary
- Existing Trail / Bike Path
- NYC / Other Federal Agency Land
- City / County / State Park Land

North

0 1 Mile
.5 Miles

Pennsylvania Ave Park
Fountain Ave Park
Spring Creek Park
Belt Parkway
Frank Charles Memorial Park
Hamilton Beach Park
Canarsie Pier
Canarsie Park
Spring Creek
North Channel
Joseph P. Addabbo Bridge
Elders Point
Bergen Beach
Canarsie Pol
JFK International Airport
Jamaica Bay Wildlife Refuge
Marine Park
Flatbush Avenue
Mill Basin Inlet
Jamaica Bay
Cross Bay Blvd
North Forty
Floyd Bennett Field
East High
Yellow Bar
Ruffle Bar
JoCo
Gateway Marina
Hangar Row
Plumb Beach
Dead Horse Bay
Broad Channel
Silver Hole
Little Egg
Big Egg
Rockaway Community Park
Rockaway Inlet
Marine Parkway Gil Hodges Mem. Bridge
Cross Bay Veterans Mem. Bridge
Rockaway Point Blvd
Battery Harris
Riis Landing
Roxbury
Jacob Riis Parking Lot
Breezy Point Surf Club
Breezy Point Co-Op
Silver Gull Beach Club
Nike Missile Launch Site
Jacob Riis Bathhouse
Rockaway Beach and Boardwalk
Breezy Point
Fort Tilden
Jacob Riis Park
Atlantic Ocean



The greatest amount and widest spectrum of camping facilities would be developed to attract a variety of overnight users.

ensure that restoration efforts are successful. Plantings of native coastal trees and shrubs and well as other techniques would help stabilize eroding natural areas. Some shoreline activities may be restricted to accommodate species of special concern conservation measures.

Plumb Beach would serve as a new orientation portal providing information on sites and activities for the Jamaica Bay park lands. The NPS would work with ~~the NYCDPR~~ New York City agencies to improve connections to outlying neighborhoods and other nearby park lands including Marine Park and Floyd Bennett Field. A water trail to Marine Park and Dead Horse Bay would be explored. Circulation and site improvements would enhance safety and enjoyment of the Jamaica Bay Greenway.

Beach uses would continue including ~~be maintained and improved as~~ a launching site for human-powered boating and wind sports. New visitor amenities such as bathrooms, rentals (bikes and wind sports), and food trucks, ~~and launching areas~~ would be developed. The existing building would be rehabilitated to accommodate administrative uses such as storage and a ranger office. Additionally, the building could be improved to offer limited visitor amenities such as food, restrooms, equipment rentals, and/or supplies for beach recreation (e.g. sunscreen, umbrella rental). The building could be jointly managed by the NPS and New York City.

~~***Natural Zone***~~

~~Beach/dune habitats would be protected and maintained. Formal trails would be established through the natural area to prevent trampling of vegetation, reduce impacts to wildlife, and ensure that restoration efforts are successful. Plantings of native coastal trees and shrubs and well as other techniques would help stabilize eroding natural areas.~~

Floyd Bennett Field

Recreation Zone and Community Activity Subzone

Floyd Bennett Field would become a bustling park and Jamaica Bay's premier destination for year-round outdoor recreation, community activities and environmental education. Much of the airfield's currently underused open spaces and structures would be energized and accommodate community events, outdoor recreation, skill development programming, entertainment, and learning. An extensive trail system would cater to hikers, bikers and nature lovers while water trails and launch sites would invite visitors to explore Jamaica Bay on kayaks, canoes, sailboards and other non-motorized boats.

In partnership with others, NPS would develop new recreation opportunities and host a wide range of activities and instructional programming. Recreational uses of the airfield would be offered year-round and cater to a diversity of visitors and skill levels. New opportunities for outdoor skill building (e.g., learn to camp, stargazing) and hands on environmental education would be explored.

The greatest amount and widest spectrum of camping facilities would be developed to attract a variety of overnight users. This diversity of camping opportunities would include instructional programs and equipment rentals to help people build new skills and confidence

in sleeping overnight in the great outdoors. In addition to camping, overnight lodging would be ~~developed~~ explored in cooperation with park partners and to the greatest extent possible, utilize an existing historic building.

An area along ~~Hangar Row~~ Flatbush Avenue would be designated as flexible open spaces intended to accommodate community activity such as picnics and group gatherings, and events. These areas could also be used for community uses such as gardens, markets, educational events and outdoor concerts and performances. Community activity spaces would be primarily located along Flatbush Avenue. ~~Hangar B would be rehabilitated for an entertainment venue.~~ Future uses of Hangar B would continue to be explored and may include the rehabilitation of the hangar and site for an entertainment venue.

With more miles of hiking and biking trails throughout Floyd Bennett Field and new signs, maps, multiple trailheads and a variety of trail features, Floyd Bennett Field would accommodate different skill levels and user groups. Connecting the airfield's main visitor facilities and internal trail network with the Jamaica Bay Greenway would ensure convenient trail access to the park.

The arrival sequence to the park would be improved with increased access to the airfield's main visitor facilities off Flatbush Avenue. Through improved circulation and way finding signs, a more welcoming sense of arrival would be established near the Ryan Visitor Center. Improved wayfinding, interpretive and orientation facilities and materials would orient visitors to the resources that can be found throughout Jamaica Bay and Gateway.

Improved transportation infrastructure would likely be divided between the Recreation Zone and the Developed Zone. Floyd Bennett Field would be established as the most accessible park in the Jamaica Bay Unit, and the airfield would serve as a multi-modal transportation hub developed to provide transportation access and visitor distribution (via public transportation, shuttles, bikes, water taxis, etc.) to park lands throughout Jamaica Bay.

Marine Zone

The ~~marina~~ park would offer more public uses, including boat rentals, water-based recreation, and boating/sailing lessons. The enhanced marina area would serve as the Jamaica Bay unit's primary portal for experiencing the bay by water. The marina would serve as a water-based access point for ferries, water taxis, and other boats. Guided interpretive boat tours as well as a designated water trail would encourage people to explore the airfield and other Jamaica Bay resources from the water. Additionally, greater shoreline access and several launch sites for human-powered boats (e.g. kayak, canoe) would create more boating and fishing opportunities.

Natural Zone

Habitats would be managed to improve resilience and healthy environments as part of the larger Jamaica Bay system. The restoration of freshwater and saltwater wetland habitat would be explored in portions of the North Forty natural area and along the shoreline. The shoreline would return to natural (soft) conditions through the removal of bulkheads and other hardened structures and allow natural sediment transportation processes to occur. The



Habitats would be managed to improve resilience and healthy environments as part of the larger Jamaica Bay system. The restoration of freshwater and saltwater wetland habitat would be explored in portions of the North Forty natural area and along the shoreline.

park would explore the development of a wetlands interpretive center with partners. This center would highlight fresh and saltwater wetland environments and may include an interpretive and environmental education center, trails and boardwalks, outdoor classrooms, observation facilities, interpretive media and educational exhibits.

Upland forest management would continue within areas of the North Forty not designated for wetland habitat, and expanded visitor use in the North Forty would be compatible with the protection of the remaining species-rich forest. Grasslands habitat would be managed and maintained for grassland birds.

Nature-based recreation and environmental education programming would be expanded. Along soft-surface trails, people would encounter facilities such as blinds, scopes, observation decks, and boardwalks. Along with interpretive materials, these facilities would be designed to facilitate nature study, wildlife observation, and immersion in a natural setting. Environmental education programming, as well as guided tours, would feature equipment rental facilities (e.g., bike, binocular, or tent rentals) developed to allow visitors to try new activities and to facilitate "gateway" experiences of the outdoors.

Historic Zone

The character-defining cultural landscape elements that reveal the airfield's historic municipal period (such as Ryan Center, Hangar Row, and runways) would be preserved and interpreted. The open pattern of the airfield landscape would be preserved through the maintenance of low vegetation and appropriately-scaled recreation facilities. Existing grasslands habitat would be managed and maintained for ecological function and values.

~~The historic aviation buildings along Flatbush Avenue known as Hangar Row would be rehabilitated for an aviation interpretive center and feature aviation exhibits, aircraft collections, and flexible interior and exterior space and would provide space for community activities, informal gatherings, interpretive programs, and special events.~~ The exterior facades of the historic aviation buildings would be rehabilitated for an aviation interpretive theme. Flexible interior and exterior spaces at the historic aviation buildings along Flatbush Avenue known as Hangar Row would be rehabilitated for an aviation interpretive center and feature aviation exhibits and aircraft collections, and provide space for community activities, informal gatherings, interpretive programs, special events or other uses. The historic plane collection would be relocated from Hangar B to Hangar Row. The expansive views of the bay and orientation to the airfield's cultural landscape would be enhanced by elevated areas such as the Ryan Center tower, a tethered balloon, or other related facilities.

Developed Zone

The eastern and southern portion of the airfield would accommodate a variety of visitor and/or commercial services, transportation infrastructure, and operations and maintenance facilities. Uses in this zone would complement other uses on the field.

Visual shields would block views from maintenance and other functions, reducing impacts from these uses on visitors. Circulation throughout the airfield would be improved for operations, especially trucks and vehicles traffic. A separate access entrance would be

designated for commercial, operational and maintenance vehicles that allows for direct access to the Developed Zone. Dilapidated and underutilized buildings in this zone may be demolished and the spaces would either be reused to accommodate operations and maintenance or restored as natural habitats.

The park would explore development of alternative energy and opportunities for more sustainable operations, including waste management. A new composting facility that processes food waste, vegetation, and other organic matter from concession stands, restaurants, groceries and other sources in and around the park and local vicinity would be considered.



Visitor uses would be expanded to include nature-based recreation opportunities. The condition of coastal habitats would be improved through increased restoration efforts as well as more tightly controlled visitor use.

Bergen Beach

Recreation Zone

New connections would be explored from Bergen Beach to McGuire Park, Paerdegat Basin Park, Eco Park and Flatlands, Bergen Beach and Mill Basin neighborhoods. A new water trail would be developed to Paerdegat and Mill Basin inlet. Vehicular, bicycle and pedestrian access from the Jamaica Bay Greenway and Belt Parkway would be improved.

The NPS would maintain equestrian use and facilities. The NPS would work with the concession-run business to reduce impacts on the area's habitats through the designation of equestrian trails and improved signs and wayfinding. The park would be open to additional types of visitor uses in addition to equestrian uses and new facilities would be developed to accommodate expanded uses. Such facilities could include trails and picnic areas. A trail would be developed that provides access to the bay for fishing, walking and nature study. Additionally, the park could serve as another destination for water-based sports and provide launching sites, storage, shuttles, and equipment rental.

Natural Zone

Visitor uses would be expanded to include nature-based recreation opportunities. The condition of coastal habitats would be improved through increased restoration efforts as well as more tightly controlled visitor use. Bioengineering techniques would be used to stabilize eroding natural areas with plantings of native coastal trees and shrubs. Beach/dune habitats along with fringe wetlands would be protected and maintained. Visitor and equestrian use would be limited to designated trails to prevent trampling of vegetation, reduce impacts to wildlife and ensure restoration efforts are successful.

Canarsie Pier - Common to Both Action Alternatives

Recreation Zone – Community Activity Subzone

Canarsie Pier would become a vibrant destination for community-oriented events as well as water-related recreational activities. This site would serve as a new orientation portal for the Jamaica Bay park lands and Gateway. Given the park's close proximity to New York City's Canarsie parks, NPS would work closely with NYC agencies on programming, transportation and other management issues.



The former landfills at Pennsylvania Avenue and Fountain Avenue would be transformed into new park areas for recreation, community activities and outstanding views of Jamaica Bay.

The pier and its outlying spaces would be improved to better accommodate community events such as concerts, markets, and festivals. Additionally, spaces for picnics and group gatherings would be expanded and enhanced through shade trees and other plantings. The existing contact station could be adaptively reused to support community use and to provide expanded visitor amenities. Along the coast on either side of the pier, the NPS and its partners would develop improved spaces for fishing, kayaking, and other human-powered watercraft. Improvements would include lessons and a designated instructional and beginner paddling zone as well as equipment rentals.

Canarsie Pier would serve as another Jamaica Bay hub for waterborne transportation and water trail connections to other park lands. A launch site would provide access to a designated water trail for human-powered boat exploration. Additionally, ferry and/or water taxis access would be explored for both transportation and a launch site for guided Jamaica Bay boat tours. The NPS would work with NYC agencies to improve connections from Canarsie Pier to New York City's Canarsie Park and to improve trail linkages to the Jamaica Bay Greenway.

Natural Zone

Restoration projects to the east and west of the pier would strive to create a healthy shoreline habitat and an intertidal area. Signs, trails, and clear beach and water access points would be developed in order to control visitor traffic and minimize disturbance to the coastal habitat.

Pennsylvania Avenue and Fountain Avenue Parks

Recreation Zone

The former landfills at Pennsylvania Avenue and Fountain Avenue would be transformed into new park areas for recreation, community activities and outstanding views of Jamaica Bay. Former service/haul roads at each park would be converted into a multi-use trail system. Facilities such as viewing platforms and/or overlooks would offer ~~distance~~ distant views of Jamaica Bay. New visitor amenities such as restrooms, orientation and gathering areas would be developed. At the Pennsylvania Avenue Park, the NPS and partners would explore the potential of establishing a ferry portal and/or water taxi stop and would develop a launch site for human-powered watercraft. Physical connections between each of the areas and their neighboring communities as well as nearby park sites would be improved. Natural areas would be maintained and/or improved.

Developed Zone

Renewable energy development, such as solar, would be explored at both Pennsylvania Avenue and Fountain Avenue Parks. Additionally, areas for recreational activities and community activities would be provided. At Fountain Avenue ~~Landfill~~ Park, the NPS would explore the potential of a community gathering space with associated facilities that could accommodate events such as outdoor concerts and performances.

Frank Charles Park - Common to Both Action Alternatives

Recreation Zone

Existing recreation ~~uses~~ at Frank Charles Park would be ~~maintained~~ continued and the park would remain an active community destination. The NPS and NYCDPR would work closely together on programming and other management issues at Frank Charles Park. As existing facilities are in need of replacement, NPS would develop shaded and flexible gathering areas as well as creative play structures for youth. Water access from the park to Jamaica Bay would be improved with trails, fishing access and boat launching/landing sites. Fringe wetlands would be protected and habitat along the shoreline improved.

Hamilton Beach Park - Common to Both Action Alternatives

Recreation Zone

Hamilton Beach Park would continue to provide open space and outdoor recreation opportunities for the communities outlying the park. New shaded picnic areas would be created in order to improve community-gathering areas. Water access from the park would be improved with trails, fishing access and boat launching/landing sites. Fringe wetlands would be protected and habitat along the shoreline improved.

Jamaica Bay Wildlife Refuge - Common to Both Action Alternatives

Natural Zone and Sensitive Resources Area Subzone

The refuge would remain a popular destination for nature study, environmental education and nature-based interpretation while offering considerably more opportunities for nature-based and water-based activities ~~recreation~~. Habitats at Jamaica Bay Wildlife refuge would be protected and maintained. Habitats would be managed to support a diversity of migratory birds. Migratory bird identification, counting and research would be increased. Monitoring and conservation measures for migrating birds would continue to be a priority.

The refuge would remain a popular destination for nature study, environmental education and nature-based interpretation while offering considerably more opportunities for nature-based and water-based recreation.

Programming at the refuge would be expanded with an emphasis on engaging youth and families. In partnership with other, NPS would pilot a series of educational and stewardship experiences and programs that could be replicated in other areas. Efforts would also be made to tie the refuge programmatically into other park sites within the bay and their environmental education and nature activities so that complementary programs are offered across the bay. An expanded network of trails, boardwalks and nature study facilities (e.g. scopes, blinds, observation decks) would facilitate self-guided exploration as well as interpretive tours and educational programming throughout the Natural Zone.



Multi-modal transportation to and from the refuge would be improved. Greenway connections would link the refuge with Sunset Cove Park and other NYCDPR and NPS sites. ~~Water-based shuttles could physically tie programming at Jamaica Bay Refuge with the proposed wetlands interpretive center at Floyd Bennett Field and other environmental and interpretive facilities ringing the Bay.~~

A wide variety of water-based recreational experiences, from traditional beach uses at a guarded swim beach, to learn-to-swim programming, splash parks, and a water skills park appropriate to the coastal location would be offered.



Marine Zone

Water quality would be improved throughout the Marine Zone. Aquatic and benthic habitat restoration projects would continue to be studied, explored and implemented with partners.

The refuge would also be established as a portal for accessing Jamaica Bay waters. Additional water- based interpretive and recreation facilities would be developed including water trails, kayak instructional programming, equipment rental, offshore docks and additional landing/launch sites. NPS would work closely with NYCDPR to improve Sunset Cove Park and other areas as access points for water-based exploration of the refuge and Jamaica Bay waters. A designated water trail that hugs the shoreline with several launching points would allow visitors to venture into the bay and experience many of Jamaica Bay Unit's districts from the water. ~~Primitive camping may be permitted on Canarsie Pol and would be limited to NPS (or partner)-guided camping trips.~~ Water-based shuttles could physically tie programming at Jamaica Bay Refuge with the proposed wetlands interpretive center at Floyd Bennett Field and other environmental and interpretive facilities ringing the Bay.

Spring Creek

Recreation Zone

Spring Creek would serve as a new orientation portal for the Jamaica Bay park lands and provide access to the bay. New facilities would be developed to invite recreational use and to promote exploration of the Spring Creek area. Proposed new facilities would include trailheads and parking areas, orientation kiosk, trails, and picnic areas. ~~Facilities to encourage water access would also be developed such as boat launch and landing sites, observation deck, and fishing access areas.~~ A multi-use trail network would be established and would facilitate recreation within the park and improve neighborhood connections to outlying park sites and communities. Connections to the Jamaica Bay Greenway would be improved.

Natural Zone

Efforts to control and eradicate *Phragmites* and other invasives would be increased and complemented by native plantings. Monitoring and assessment of the saltmarsh and forested areas would be ongoing and these habitats would be restored, protected, and maintained to improve resiliency. To prevent trampling of vegetation, reduce impacts to wildlife and ensure restoration efforts are successful, social trails would be eliminated and access would be limited to designated trails. Water access would also be developed such as boat launch and landing sites, observation deck, and fishing access areas.

Jacob Riis Park

Recreation Zone, Active Beach and Community Activity Subzones

Jacob Riis would be transformed into a multi-season community activity area and a destination for both beach and water-based recreation. The park would attract and invite more community use and water-based and beach recreation with expanded facilities for

community activities such as shaded picnic areas, sports fields, and more educational, arts, and entertainment programming.

A wide variety of water-based recreational experiences, from traditional beach uses at a guarded swim beach, to learn-to-swim programming, splash parks, and a water skills park appropriate to the coastal location would be ~~offered~~ explored. The parking lot would be redesigned to potentially accommodate sports fields, courts, camping, an entertainment venue, transportation, as well as flexible open spaces for group gatherings. Physical connections between Jacob Riis and the other park lands on the Rockaway Peninsula would be improved through a shuttle, linkages to public transportation, and bike infrastructure.

The Jacob Riis bathhouse would be rehabilitated to accommodate visitor and community uses such as performances and events as well as group gatherings while providing a shaded indoor space and basic amenities for beach goers. Interpretive programming at the site and digital media would be expanded to communicate the story of the bathhouse, recreation on the Rockaways as well as climate change. Any offices, restaurant, or more permanent uses would be relocated to the second floor of the building. The boardwalk and other cultural landscape features associated with the bathhouse would be maintained (with the exception of the parking lot as noted above). The NPS would use portable and mobile facilities to the extent possible to meet visitor needs (e.g. mobile equipment rentals, food trucks).

Fort Tilden

Recreation Zone

Fort Tilden would become a destination for natural and cultural immersion activities. New overnight options, expanded programming and recreation opportunities would promote the Rockaway park lands as a premier multi-day excursion. The ~~parade ground~~ post area would become the hub for lodging and activities that supports the recreation and interpretive uses of Fort Tilden. Select rehabilitated buildings would provide overnight ~~accommodates~~ accommodations and visitor amenities needed to support overnight stays such as food service and equipment rentals. A variety of camping opportunities and support facilities would be developed including instructional programs and equipment rentals. Any new construction or substantial investment in rehabilitation at Fort Tilden will only be made, however, after evaluating whether these investments are located within the 100-year floodplain adjusted for sea level rise, and whether that investment within the flood zone could be avoided. Any improvements that are necessary within the flood zone will be designed to maximize flood resiliency.

The trails network throughout Tilden would be expanded and some trailheads and segments of the trails would be located within the Recreation Zone. Equestrian uses and facilities would be explored. Flexible open spaces would accommodate group gatherings as well as informal, recreation such as picnicking and an ~~Additionally, the parade ground area becomes the park's staging~~ area for instructional programming, equipment rentals, and guided tours. The buildings would continue to accommodate community groups and other compatible uses. ~~and could support additional interpretive exhibits and educational programming in the future.~~

The trails network throughout Tilden would be expanded and some trailheads and segments of the trails would be located within the Recreation Zone.



The Silver Gull Beach Club use would be maintained. Public use of the beach club would be expanded to include water-based and ~~beach~~ recreation opportunities such as educational and interpretive programming and guided ~~kayak~~ tours and lessons.

Natural Zone

Coastal habitats and processes would be restored, protected and monitored. Habitat value of the Rockaway Inlet side of Fort Tilden would be studied and coastal habitat and wetland projects would be initiated, where appropriate. Opportunities for environmental education programming and nature study would be promoted.

The ocean and bay shorelines would offer a natural coastal experience more than other Gateway beaches. Appropriate access points and visitor amenities would be developed to support increased beach use. An improved trail system with trailheads and a robust backcountry trail experience along designated routes would invite exploration of Tilden's natural environments and cultural resources. Tent camping and appropriate support facilities would be introduced for overnight stays within the Natural Zone.

Historic Zone



Fort Tilden would be the primary location for interpreting Gateway's coastal defense story within the Jamaica Bay Unit. Through enhanced interpretation, the site would offer a greater appreciation for the role of the fort in protecting New York. Battery Harris would be stabilized and the existing overlook would be improved and interpretive media and programming would be expanded. The Nike Missile site would also be stabilized and interpreted. Access to, and interpretation of, these resources would be improved through an expanded trail network, enhanced interpretive media, and increased programming.

Developed Zone



Circulation between Riis Landing and Fort Tilden and other park lands on the Rockaway Peninsula would be improved through shuttles, safer road crossings, and bike infrastructure. Fort Tilden would act as the orientation portal for park lands on the Rockaway Peninsula and provide information on resources and opportunities offered throughout Gateway. Additionally, trailhead and parking areas would feature orientation media. Riis Landing would continue to serve water-based transportation and recreation including as a ferry landing and kayak launch site. More public uses, including boat rentals, water-based recreation, boating/sailing lessons, and fishing access, would be considered on the inlet. Riis Landing and other established access areas would serve as portals for experiencing the bay by water. Guided interpretive boat tours as well as a designated water trail would encourage people to explore the Rockaway Peninsula and Jamaica Bay. The buildings at Riis Landing would be adaptively reused and leased for community and other uses. Operations moved from the Nike Missile Site at Fort Tilden would be relocated to Riis Landing or other locations within the Jamaica Bay Unit.

Breezy Point Tip - Common to Both Action Alternatives

Recreation Zone ~~and Active Beach Subzone~~

The Breezy Point Surf Club use would be maintained. Public use of the beach club would be expanded to include water-based and ~~beach~~ recreation opportunities such as educational and interpretive programming and guided ~~kayak~~ tours and lessons.

Natural Zone and Sensitive Resources Area Subzone

Breezy Point Tip remains a natural area open to limited nature-based recreation. Habitats would be maintained, protected and enhanced through monitoring and restoration projects. Monitoring and conservation measures for threatened and endangered species would continue to be a priority. Conservation measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season would continue. Efforts to control and prevent invasive species in the freshwater wetland areas would be increased.

~~Fishing~~ In the Natural Zone, fishing access would be maintained. The area would continue to offer a quiet, natural immersion experience. NPS would with partners to offer limited environmental education and natural resource stewardship volunteer opportunities.

Sandy Hook remains a popular beach recreation destination where visitors find a variety of opportunities to have fun and enjoy the natural environment. New and expanded trails, boating launch sites, camping facilities and interpretive programs facilitate the coastal experience.

Sandy Hook Unit

Recreation and Visitor Experience

Sandy Hook would remain a popular beach recreation destination where visitors find a variety of opportunities to have fun and enjoy the natural environment. New and expanded trails, boating launch sites, camping facilities and interpretive programs facilitate the coastal experience. Connections with neighboring communities including orientation, land and water trail systems, and linkages to related interpretive sites would provide for a richer experience at Sandy Hook.

Resource Management

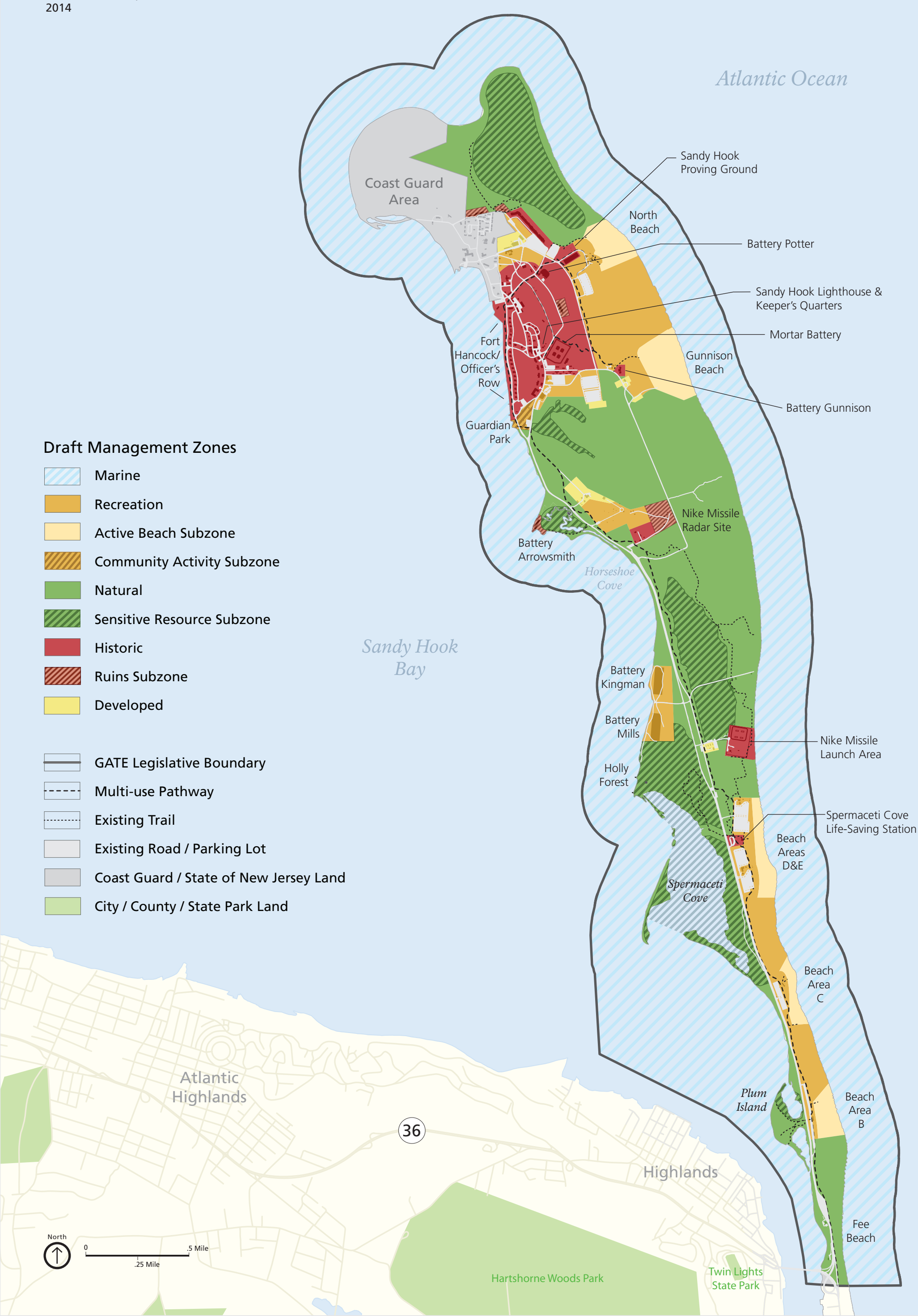
Protection and restoration of the beach dune community as well as forest, shrub and wetland habitats at Sandy Hook would be increased in this alternative. To reduce impacts on these sensitive and rare habitats, access would be tightly controlled and restricted in some cases. Aggressive control of invasive species, strengthening healthy communities and repairing beach erosion would be management priorities. Additionally, research and monitoring of the unit's habitats would be increased.

With its lighthouse, lifesaving station, and long coastline, Sandy Hook would emerge as Gateway's focal point for maritime heritage interpretation. The preservation of these iconic structures along with expanded programming, activities, and interpretive media would engage visitors in the park's maritime story.

Alternative B: Discovering Gateway - NPS Preferred Alternative

General Management Plan
Gateway National Recreation Area - Sandy Hook Unit

United States Department of the Interior - National Park Service
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Preservation and protection of threatened and endangered species would continue through monitoring and enforcement and would be balanced with additional recreational opportunities. The monitoring and conservation measures for threatened and endangered species would continue to be a priority and occur throughout all management zones.

Transportation

A variety of transportation systems would be developed to make Fort Hancock and the entire Sandy Hook peninsula more convenient to access. Within Fort Hancock, ferry service would be expanded to include summer weekdays, shoulder seasons and special events. Additionally a seasonal water ferry/taxi connection would be explored from other communities and NPS sites. Opportunities to provide private/transient water access and dockage at Sandy Hook would also be evaluated.

A shuttle system would relieve parking issues and traffic congestion and provide convenient access to the park. The shuttle would collect visitors from surrounding towns, transportation stops and the ferry terminal and drop them off at Sandy Hook's beaches and activity nodes. Opportunities would be explored with partners to extend public transit service into Sandy Hook, and initiate a transit shuttle to connect the Highlands. Interpretive media would be incorporated into both the on ferry service and/or internal landside shuttle system.

An expanded multi-use path network would traverse more of the peninsula and accommodate cross-island travel so people could explore both the ocean side and the bay side. Designated on-street bike routes from the Highlands would connect with regional trails serving the park unit. Bike access would be encouraged to/from and within Sandy Hook, with bike rental stations at parking facilities near the park entrance and within the park.

Parking options would be evaluated for remote intercept parking lot(s) outside of the Sandy Hook boundary with transit shuttle and/or bicycle connections provided into the park. Advanced traveler information systems would be improved with partners.

Recreation Zone and Active Beach Subzone

Active beach recreation, including swimming on lifeguarded beaches, would continue. The location and size of these areas could change in the future depending on changes along Sandy Hook's Atlantic coastline. Visitor services and facilities would be redesigned to be more resilient to storms and flooding. At North Beach, expanded and improved facilities would be able to accommodate more Fort Hancock use.

The Kingman and Mills batteries area would be developed as a recreation activity center. Trails would extend from the batteries allowing for exploration of the bayside shoreline and inland natural environments. The batteries would also serve as a launch site for water-based exploration with equipment rentals, instructional programming, piers, and launch sites. Also, guided programming, interpretive media, and exhibits would reveal the history of the batteries. Finally, the batteries and coastal landscape could also accommodate camping. Additional camping opportunities would be explored at several locations within the Recreation Zone.

Historic Zone

The Fort Hancock Area would become a premier New Jersey shore destination for outdoor recreation and historic interpretive experiences. The widest variety of potential adaptive reuses for the Fort Hancock buildings would be considered such as, but not limited to, ~~ranging from~~ lodging, ~~to~~ restaurants, conference space, and offices. The cultural landscape within the Fort Hancock area would be maintained. Areas within the cultural landscape would be rehabilitated to function as flexible open space areas for relaxation, gatherings, picnics, and community events. The Sandy Hook Lighthouse and Spermaceti Cove Life Saving Station would be preserved.

Nike Missile Launch and Radar Site would be stabilized and interpreted. New opportunities for guided and self-guided exploration of the area would be created. Batteries Potter, Gunnison, McCook and Reynolds (Mortar) would be preserved and interpreted through guided tours and/or interpretive media. Additional batteries within the Fort Hancock area would be stabilized, opened to visitor access and interpreted, including off site through digital media and/or exhibits.

Natural Zone and Sensitive Resource Subzone

Habitat conditions of the forest, shrub, and wetland habitats would be improved. Current natural resource management practices would be maintained and protection, research, and monitoring of sensitive habitat areas like the beaches on the northern tip and the maritime forest would be increased. The mosaic of coastal habitats would provide unique opportunities for experiencing and learning about natural systems and native plant communities.

~~A variety~~ In the Natural Zone, a variety of natural immersion experiences would be created to increase visitor awareness and enjoyment of the natural environments including nature study, wildlife viewing, camping, and instructional programming.

Marine Zone

Water quality would be improved throughout the Marine Zone. Aquatic and benthic habitat restoration projects would continue to be studied, explored and implemented with partners.

Sandy Hook would be a popular recreation area for boating, wind sports as well as water-based interpretation and nature study. Water-based recreation would be encouraged through expanded guided tours via boat or kayak. Interpretive boat tours could link Sandy Hook physically and thematically with other NPS and local sites. Additionally, NPS would offer more instructional programming to introduce people to these sports and to build skills. This could include swimming, surf, kite boarding and kayaking lessons. Additionally, instructional and/or beginner zones would be designated offshore in order to create more comfortable learning environments.

A designated water trail focused on Sandy Hook Bay would provide a water-based connection between Fort Hancock, Highlands and the southern portion of the Sandy Hook peninsula. Several launch sites along the bay coastline as well as boat rentals and

Table 2-6. Staten Island Unit - Alternative B - Summary.

Desired Changes	Types of Change	Where Change May Occur
Physical and programmatic connections created to link Gateway sites, New York City parks and neighborhoods	Explore new linkages by trails, sidewalks, and paths Work with NYC and other partners to introduce new recreational skills and educational and interpretive programs in adjacent parks and communities	Fort Wadsworth Miller Field Great Kills
Orientation portals established to provide information on sites and activities throughout Staten Island	Improved contact stations, trailheads and parking Create distinctive access corridors to parks through art, signs and other visual expression Improve signs and wayfinding Use virtual and modern technology for orientation and maps	Fort Wadsworth Miller Field Great Kills
Recreation improvements	New picnic and open space areas Enhanced multi-use trail systems and connections Improved launching areas for human-powered boating	Great Kills Fort Wadsworth Miller Field
Offer a wide variety of camping opportunities and support areas and services	Create new areas for all types of camping Offer special camping programs in places like historic buildings or natural areas.	Great Kills Fort Wadsworth
Connect park sites through trails and paths	Convert former roads into trails Improve biking and walking infrastructure and circulation Improve access and linkages to NYC Greenway and paths	Great Kills Fort Wadsworth Miller Field
Community gathering spaces	Link athletic use/sports leagues with opportunities for NPS experience Accommodate small outdoor concerts and performances Create areas for gardens, markets, festivals and other community uses	Fort Wadsworth Miller Field
Natural immersion	Create learning opportunities and services for activities such as kayaking and wildlife observation Formalize nature trails to bays and waterways for fishing and walking Establish overlooks for outstanding/distance views of bays	Great Kills Fort Wadsworth Miller Field

Table 2-6. Staten Island Unit - Alternative B - Summary (continued).

Desired Changes	Types of Change	Where Change May Occur
Environmental education	Improve or develop places to learn about bay-related resources such as forests and wetlands	Great Kills Fort Wadsworth Miller Field
Formal water trails established	Establish new water trails connecting to NYC parks and other Gateway areas	Great Kills Fort Wadsworth Miller Field
Expand access to waterways	New boating sites, storage, shuttles, and equipment rental	Great Kills Fort Wadsworth Miller Field

instructional programming at the Kingman and Mills recreation site would support travel along the water trail. An ocean water trail would be developed offshore and would link coastal features and attractions extending from Beach Area B to North Beach. Equipment rentals, boat storage facilities and shuttles at the beaches would facilitate the water-based exploration of Sandy Hook.

A mooring field would be developed within the Sandy Hook Bay. Moorings would encourage day and/or overnight trips to Sandy Hook and allow for greater physical and programmatic connections to other sites within the NY Harbor area as well as nearby New Jersey communities. Within certain Marine Zone areas, access may be restricted, such as Spermaceti Cover waters.

Developed Zone

Within this zone, existing systems, infrastructure and maintenance areas would remain, where appropriate. Location of new facilities would be determined in subsequent planning efforts.

Staten Island Unit

Recreation and Visitor Experience

Improved trailheads and more miles of trail within and between the Staten Island sites as well as picnic areas, camping facilities, and interpreted historic sites would create more recreation opportunities. Opportunities to access and experience Gateway waters would also be increased. Water trails, interpretive boat tours, launch sites, and expanded beach and fishing access would encourage exploration of the coastline and New York Bay. These water trails and guided tours would facilitate paddling from Fort Wadsworth ~~out to Hoffman and Swinburne islands and/or~~ down the coast to Miller Field and Great Kills Park. The NPS would evaluate the possibility of developing overnight accommodations and expanded the locations and types of camping available throughout the Staten Island Unit.

Alternative B: Discovering Gateway - NPS Preferred Alternative

General Management Plan
Gateway National Recreation Area - Staten Island Unit

United States Department of the Interior - National Park Service
2014

Management Zones

- Marine
- Recreation
- Active Beach Subzone
- Community Activity Subzone
- Natural
- Sensitive Resource Subzone
- Historic
- Ruins Subzone
- Developed

- GATE Legislative Boundary
- Existing Trail / Bike Path
- NYC / Other Federal Agency Land
- City / County / State Park Land
- NYC DPR Water

I-278
Staten Island
Expressway

Von Briesen Park

Fort Tompkins

Battery
Weed

Verrazano -
Narrows
Bridge

Hylan Blvd

Fort Wadsworth

Franklin D. Roosevelt Boardwalk and Beach

Hoffman Island

Hangar

Miller Field

Swinburne Island

Education
Field Station

Hylan Blvd

*Great Kills
Harbor*

Lower New York Bay

*Crookes
Point*

Beach
Center

Great Kills Park

North

0 .5 Mile
.25 Mile

Resource Management

Habitats and current natural resource practices would be maintained including controlling invasive species, planting trees and monitoring beach erosion. Cultural resources would be preserved, stabilized and maintained, where appropriate.

Transportation

Fort Wadsworth would become a destination for both outdoor activities and community use and would offer a wide range of recreation facilities as well as interpretive experiences.

Improved public transportation and an expanded greenway, as well as, shuttles between the sites would make access more convenient. Also, bike infrastructure would be developed throughout the unit including a bike-sharing system, maps, and convenient bike parking to encourage more bike use at the parks and provide convenient connections with other Staten Island trail systems. A shuttle system linking the Staten Island Unit park sites with Saint George Ferry Terminal would be considered as a means of promoting sustainable access and a first point of visitor orientation to the Staten Island Unit from those arriving via the Staten Island Ferry.

Fort Wadsworth

Recreation Zone

Fort Wadsworth would become a destination for both outdoor activities and community use and would offer a wide range of recreation facilities as well as interpretive experiences. Expanded trails and interpretation, access to the water, and improved facilities, would enhance opportunities to recreate in a scenic setting amidst the impressive coastal defense batteries. Camping facilities would be expanded and include a variety of different types of camping closer to the coastline and for various skill levels.

A multi-use trail system would be developed that connects to the New York City Greenway (NYC Greenway) and adjacent neighborhoods and cater to different physical capabilities and recreation interests. The NPS would work with NYCDPR to expand the greenway so that it links Fort Wadsworth, Miller Field, and Great Kills Park together. The NPS would work with partners to develop a multimodal transportation system including improved public transit, bike paths, and a shuttle, that would link Fort Wadsworth with the Staten Island Ferry and other areas.

Biking and water-based recreational activities such as kayaking and fishing would be encouraged through instructional programming designed to introduce people to these sports and to build skills. Instructional and/or beginner zones would be designated offshore in order to create more comfortable learning environments. Equipment sharing and rentals would encourage visitors to try new activities and to facilitate “gateway” experiences of the outdoors. (e.g., bikes, binoculars or tent rentals).

Visitor orientation would be improved with new signs and wayfinding, Fort Wadsworth would be more visible and clearly identified as a park welcoming to visitors. A new contact station, possibly at the Gate House or Fort Tompkins, would be developed in order to improve the sense of arrival and better orient visitors through exhibits, media and staff contact.

Historic Zone

At Fort Wadsworth, interpretive programming and media related to the fundamental resources would be increased, allowing for a more in-depth and richer experience of the site's cultural defense resources and cultural landscapes. Battery Weed and Fort Tompkins would be preserved and open to more regular visitor use. Public access to both forts would be increased and interpretive programming of these resources would be expanded. The Battery Weed seawall would be repaired and fortified to protect the resource from storm surges. Additional batteries would be stabilized and their unique features incorporated into the recreational and interpretive trail system. A new "Coastal Defense Trail" would be developed among the batteries and offer expanded interpretation and up close experiences of the coastal defense resources. Additional foot trails would also be re-established at Fort Tompkins. The character-defining features of Mont Sec and New York Avenue would be preserved and both avenues would be incorporated into the visitor experience of Fort Wadsworth through improved wayfinding, signage and interpretation.

Natural Zone and Marine Zone

Natural resource protection of offshore habitats would be maintained within the Marine Zone. In cooperation with partners, NPS would take recommended measures to improve water quality within the bay and Hudson River.

Opportunities for water-based recreation would be greatly expanded at Fort Wadsworth. These activities would include greater fishing access, a coastal water trail extending to Great Kills and the islands, human-powered boat launch sites, and equipment rental. From Fort Wadsworth, a water trail would lead out to an offshore dock positioned nearby Hoffman and Swinburne Islands for distant wildlife observation.

~~Hoffman and Swinburne islands would remain natural areas. The wildlife and habitat value would be monitored and studied. NPS would explore the possibility of creating guided tours for limited visitor use. Through guided tours or self-guided boat trips along a marked water trail, visitors could gain greater access to the islands. NPS would explore the feasibility of developing a dock on Hoffman in order to allow visitors on the island. Alternatively, an offshore, floating dock would be developed to accommodate distant wildlife observation. In particular, the impact of increased use of the islands would be monitored and the degree of access adjusted as needed.~~

Sensitive Resource Subzone

Hoffman and Swinburne islands would be managed for their natural and cultural resources and no visitor access would be permitted on either island. The island's wildlife and cultural resources would be viewed from the water.

Developed Zone

The park's administration and operation functions and facilities would continue at Fort Wadsworth. Park housing would be maintained or adaptively reused to support interpretive programming and other visitor services and/or provide short-term park housing for park

Miller Field would remain a vibrant center for community-based recreation and offer new forms of recreation tailored to youth and their families. Fields designed for a range of sports uses including soccer, softball and pee-wee leagues would be upgraded to better accommodate intensive use.



A wide-variety of water-based recreational experiences from traditional beach uses at a guarded swim beach, to learn-to-swim programming, and kayaking lessons would be offered.

partners and volunteers. ~~The character-defining features of Mont Sec and New York Avenue would be preserved and both avenues would be incorporated into the visitor experience of Fort Wadsworth through improved wayfinding signage and interpretation.~~

Miller Field - Common to Both Action Alternatives

Recreation Zone and Community Activity Subzone

Miller Field would remain a vibrant center for community-based recreation tailored to youth and their families. Fields designed for a range of sports uses including soccer, softball and pee-wee leagues would be upgraded to better accommodate intensive use. In both alternatives, NPS would explore management of the ball fields and sports leagues with another entity. The NPS would explore opportunities to introduce more children and their families to the NPS, and other parks and experiences Gateway offers.

A multi-use Perimeter Trail would circumnavigate the entire park and connect the forest with the bay. Walkability throughout the park would be improved by expanding the width of multi-use paths and retrofitting park roads to slow traffic and include sidewalks or designated bike/walk ways. An active nature-based recreation experience that would appeal to youth and their families (e.g. bike trails/facilities, play features, nature adventure zone) would be offered and complement the sports league use.

The NPS would work with partners to host concerts, performances, tournaments and events. ~~The community gardens would be expanded to accommodate more use.~~ Additionally, the picnic and group gathering around the contact station would be expanded and improved. The hangar area would be redeveloped as a community activity area and could include a picnic pavilion, trailhead, and community event space. ~~The hangar would be stabilized and new uses sought.~~ Future uses of Hangar 38 would continue to be explored and may include the stabilization of the hangar and site for recreation or other compatible uses.

NPS would work with partners to develop more direct public transit routes that serve Miller Field. A bike-sharing terminal at Miller Field would encourage bike travel along the NYC Greenway up to Fort Wadsworth Park, and the NPS would work with partners to establish a designated bike route to Great Kills Park.

Natural Zone and Marine Zone

A kayak launch site, and kayak instructional zone would be developed on Miller Field's coastline. The Miller Field launch site would be an access point to the buoyed interpretive water trail that extends from Fort Wadsworth to Great Kills. The dune habitat along Miller Field's shoreline would be protected and maintained. Formal access points to the beach and shoreline would be established to protect the dune system. Restoration projects would improve habitat in the swamp white oak forest and provide an interpretive and education component.

Developed Zone

The park housing on Miller Field and the Visitor Contact Station would be maintained. Location of maintenance and operations area will be identified upon further study. Maintenance area will be located to complement recreational opportunities.

Great Kills Park

Recreation Zone and Active Beach Subzone and Marine Zone

The Great Kills Harbor would become a destination for a variety of water-based recreational activities. Recreational opportunities such as a ~~marina, kayak concessions,~~ boating, kayaking, water trails, instructional boating zones, sailing lessons, equipment rental, and tours would be offered. The feasibility of "boatels" or other water-based accommodations would be studied. Supporting facilities such as boat storage and other amenities would be appropriately located. A wide-variety of water-based recreational experiences from traditional beach uses at a guarded swim beach, to learn-to-swim programming, and kayaking lessons would be offered. Expanded visitor amenities would be developed in conjunction with the harbor. Circulation and pedestrian access between the beach center and harbor would be improved.

A variety of new nature-themed recreation and camping opportunities would be ~~developed~~ explored at multiple sites throughout Great Kills. RV, structural, walk-in tent, and drive-in tent camping options would be offered. Additionally, flexible open spaces to accommodate picnicking, school groups, discovery zones for youth, and other unstructured recreational activities would be created. The Education Field Station would be enhanced with a trailhead, outdoor classrooms, camping facilities, and a nature playground to create a fun and safe way for youth to connect with nature.

The popular multi-use pathway would be expanded to create a system of looped routes. Internal park trails would also tie into proposed community bike routes and the NYC Greenway. The NPS would coordinate with partners to complete missing pieces of on- and off-street trails and bike routes for connecting Great Kills to Miller Field. Improved bike infrastructure including bike rentals, maps and wayfinding, and bike parking facilities would also encourage park access by bike. Finally, the park would work with partners to determine the feasibility of introducing ferry service to Great Kills Marina that would provide links to other Gateway sites.

Natural Zone and Sensitive Resource Subzone

Current natural resource practices would be maintained including controlling invasives, planting trees and monitoring beach erosion. NPS would work with neighbors and partners to implement solutions for improving resiliency of beach/dune habitat of Great Kills and further east along Staten Island coastline. Habitat restoration efforts would continue on Crooke's Point.



In alternative C, the protection, preservation, and interpretation of the unit's coastal defense fortifications, aviation structures, and cultural landscapes would be substantially increased. The aviation history at Floyd Bennett Field would be preserved and showcased.

Developed Zone

Within this zone, existing infrastructure and maintenance areas would remain, where appropriate. Location of new facilities would be determined in subsequent planning efforts.

Alternative C: Experiencing Preserved Places

This alternative provides the most opportunities for independent exploration and "wild" experiences that immerse visitors into natural areas, historic sites and landscapes. Natural systems, historic sites and landscapes receive the highest levels of preservation and restoration in this alternative. This alternative increases the visibility, enjoyment and protection of coastal resources and focuses resource management on beach and dune ecosystems and coastal defense landscapes. New recreational programming emphasizes low impact activities that facilitate enjoyment of historic settings and natural areas and emphasize opportunities for education and interpretation through hands-on learning and stewardship opportunities. This alternative maximizes sustainable operations and concentrates activities, access and facilities in distinct locations in order to improve operational efficiency and energy conservation.

Jamaica Bay Unit

Recreation and Visitor Experience

Throughout the Jamaica Bay Unit, such as Breezy Point Tip, Fort Tilden, the Jamaica Bay Wildlife Refuge, and Floyd Bennett Field, visitors would find open, protected natural areas. In these area visitors can retreat into natural environments; experience the sounds, smells, and views; and learn about healthy habitat remnants that are unique within the New York City metropolitan area. Clusters of recreation facility development throughout the unit's park lands including trail networks, campgrounds, and observation platforms would encourage independent discovery and facilitate outdoor recreation. All new facilities would be designed to be "light on the land" and minimize impacts on natural and cultural resources.

This alternative would focus on engaging visitors, communities, and partners in participatory science, education, and natural resource stewardship while creating opportunities for self-guided exploration of the area's natural environmental and historic settings. The NPS and partner stewardship programming would harness volunteer energy and work toward improving water quality and habitat conditions throughout Jamaica Bay. In addition, increased monitoring, research, volunteer programs, and collaboration with regional partners would continue to address water quality issues, habitat restoration, and stewardship.

Alternative C: Experiencing Preserved Places

General Management Plan
Gateway National Recreation Area - Jamaica Bay Unit

United States Department of the Interior - National Park Service
2014

Management Zones

- Marine
- Recreation
- Active Beach Subzone
- Community Activity Subzone
- Natural
- Sensitive Resource Subzone
- Historic
- Ruins Subzone
- Developed

- GATE Legislative Boundary
- Existing Trail / Bike Path
- NYC / Other Federal Agency Land
- City / County / State Park Land

North

0 1 Mile
.5 Miles

Pennsylvania Ave Park
Fountain Ave Park
Spring Creek Park
Belt Parkway
Frank Charles Memorial Park
Hamilton Beach Park
Canarsie Pier
Canarsie Park
Spring Creek
North Channel
Joseph P. Addabbo Bridge
Elders Point
Bergen Beach
Canarsie Pol
JFK International Airport
Jamaica Bay Wildlife Refuge
Marine Park
Flatbush Avenue
Mill Basin Inlet
Jamaica Bay
Cross Bay Blvd
North Forty
Floyd Bennett Field
Yellow Bar
East High
Ruffle Bar
JoCo
Gateway Marina
Hangar Row
Plumb Beach
Dead Horse Bay
Broad Channel
Silver Hole
Little Egg
Big Egg
Rockaway Inlet
Marine Parkway Gil Hodges Mem. Bridge
Rockaway Community Park
Cross Bay Veterans Mem. Bridge
Rockaway Point Blvd
Battery Harris
Riis Landing
Roxbury
Jacob Riis Parking Lot
Breezy Point Surf Club
Breezy Point Co-Op
Silver Gull Beach Club
Nike Missile Launch Site
Jacob Riis Bathhouse
Rockaway Beach and Boardwalk
Breezy Point
Fort Tilden
Jacob Riis Park
Atlantic Ocean

Table 2-7. Jamaica Bay Unit - Alternative C - Summary.

Desired Experience	Types of Change	Where Change May Occur
Programmatic and stewardship connections created to link Gateway sites, New York City parks, and neighborhoods to Jamaica Bay	New programs and stewardship opportunities	Unit-wide
Natural immersion opportunities are developed and promoted	Create learning opportunities and services for activities such as kayaking and wildlife observation Formalize nature trails to bays and waterways for fishing, walking Establish overlooks for outstanding/distance views of bays and ocean More nature trail and nature observation facility development	Unit-wide
Environmental education	Improve or develop places to learn about bay-related resources such as salt marsh, wetlands	Floyd Bennett Field Bergen Beach Plumb Beach Fort Tilden
Recreation improvements	~~New picnic and open space area at Spring Creek~~ Equestrian use at Floyd Bennett Field or Fort Tilden Improved launching areas for human-powered boating ~~and wind sports~~ Trailheads and parking areas, orientation kiosk, trails and picnic areas	Bergen Beach Plumb Beach Canarsie Pier Landfills ~~Spring Creek~~ Floyd Bennett Field Fort Tilden Jamaica Bay Wildlife Refuge
Offer low impact camping opportunities	Create low-impact camping areas and support services Offer special camping programs in places like historic buildings or natural areas.	Bergen Beach Floyd Bennett Field Fort Tilden
Connect park sites through trails and paths	Convert former roads into trails Improve biking and walking infrastructure and circulation Improve access and linkages to Jamaica Bay ~~NYC Greenway~~	Unit-wide
Formal water trails established	Establish new water trails connecting to NYC parks and other Gateway areas	Unit-wide
Expand access to Jamaica Bay and other waterways	Improve marina area at FBF New boat sites, storage, shuttles, and equipment rental	Unit-wide

Resource Management

Under alternative C, natural resource restoration projects would be widespread throughout the Jamaica Bay Unit. Ongoing restoration, research, and environmental protection projects would be broadened, expedited and strengthened by outside funding, and the involvement of additional partners and the broader scientific community. Management would focus on protecting and restoring natural conditions throughout the unit including hassocks and water quality within the bay, freshwater marshes at Breezy Point and Tilden's scrub/shrub-dominated covered dunes and grassy/forb-dominated fore and inner dunes. This more robust natural resource management would be complemented by expanded outreach, environmental education programming, citizen science, and volunteer stewardship projects. Along with this enhanced natural resource management would come expanded opportunities for nature-study, environmental educational and participatory natural resource stewardship programming.

A designated natural area to the east with interpreted nature trails and outdoor education facilities would provide more opportunities for volunteer projects, environmental education programming, and quiet nature study.

In alternative C, the protection, preservation, and interpretation of the unit's coastal defense fortifications, aviation structures, and cultural landscapes would be substantially increased. The aviation history at Floyd Bennett Field would be preserved and showcased. On the Rockaway Peninsula, preservation and interpretation of Fort Tilden's cultural landscape, batteries, the Nike Missile site, and the Jacob Riis landscape would round out the predominantly natural resource-based recreational experiences found throughout the unit and result in richer communication about the area's history. Extensive preservation and interpretation projects at Fort Tilden's Battery Harris and the Nike Missile site would lead to improved access to the fundamental cultural resources and enriched communication about the site's coastal defense history.

NPS would work closely with the NYCDPR and other landowners to build the resiliency of coastal habitat and to improve conditions along the entire Rockaway coastline from Breezy Point Tip to NYC Rockaway parks. Together the agencies would produce a holistic shoreline management plan that would help guide recovery efforts and future uses and development. The effects of climate change and these park lands' vulnerability to future storms would continue to be studied.

Transportation

Similar to alternative B, but with less of an emphasis on waterborne transportation, management would make accessing the Jamaica Bay sites more convenient by establishing an interconnected system of trails and greenways, introducing bike-sharing stations, improving shuttle services between districts and linking to public transit stations. A transportation hub would be created at Floyd Bennett Field to improve access and circulation and to promote multi-modal options.

Plumb Beach

Natural Zone

The beach would be managed for nature-oriented, low-impact activities such as wildlife observation and environmental education. A designated natural area with interpreted

nature trails and outdoor education facilities would provide more opportunities for volunteer projects, environmental education programming, and quiet nature study. The NPS would tie programming at Plumb Beach into New York City's environmental education programming at the Salt Marsh Nature Center in Marine Park. Similarly, the NPS and its partners would expand and offer volunteer and educational programs. The NPS will work with the NYCDPR, to improve programmatic and stewardship opportunities with adjacent neighborhoods and other nearby park lands including Marine Park, Floyd Bennett Field, and Dead Horse Bay. The NPS would work with New York City a~~nd NYCDOT~~ agencies. improve conditions of the parking lot. The existing building would be rehabilitated to accommodate administrative uses and to support restoration efforts (e.g., tool storage) and stewardship projects and programming. The building would likely be jointly managed by the NPS and New York City.

Social trails would be eliminated and access to the Natural Zone would be controlled in order to prevent trampling of vegetation, reduce impacts to wildlife and ensure restoration efforts are successful. NPS would minimize disturbance to the saltmarsh and intertidal habitat by reducing foot traffic and limiting travel to a designated trail corridor. Additionally the saltmarsh and eastern end of beach would be evaluated to better understand its potential habitat value. Bioengineering techniques would be used to stabilize eroding beach and dune areas with plantings of native coastal trees and shrubs.

Sensitive Resources Subzone

Access to the Sensitive Resources Subzone would be limited to guided tours, volunteer stewardship projects, research and educational programs. Through signs and increased enforcement, the NPS would prevent illicit damage to horseshoe crabs and other wildlife.

Floyd Bennett Field

Recreation Zone

Floyd Bennett Field would become a destination for learning about and experiencing aviation history and participating in nature-oriented activities and experiences. NPS would focus on providing opportunities for self-guided exploration of the field's natural resources and expanding opportunities for natural immersion, and interpretive and educational programming.

New recreation development would be clustered in order to minimize impacts on the natural environment and to maximize the amount of space devoted to either habitat restoration and/or historic preservation. Overall, in this alternative, new recreation development is minimized and the NPS focuses more resources on expanding interpretive and educational programming.

Smaller-scale, concentrated camping areas would be established with the highest level of consideration to green design that serves as both an educational and recreational opportunity. NPS and its partners would offer skill building camping programs with a focus on encouraging independent exploration and healthy outdoor recreation. In this alternative, facilities would be designed and scaled to provide visitors quieter, more secluded nature and overnight experiences than offered in alternative B.

Improved wayfinding, interpretive and orientation facilities and materials would orient visitors to the resources that can be found throughout Jamaica Bay and Gateway. The marina would serve as a water-based access point for ferries, water taxis, and other boats.

Along stretches of coastline that are not targeted for restoration, access to and recreational use of the shoreline for fishing, nature study and kayaking/ boating would be increased.

The arrival sequence to the park would be improved with increased access to the airfield's main visitor facilities off Flatbush Avenue. Through improved circulation and wayfinding signs, a more welcoming sense of arrival would be established. Improved transportation infrastructure would likely be divided between the Recreation Zone and the Developed Zone. Floyd Bennett Field would be established as the most accessible park in Jamaica Bay and the airfield would serves as a multi-modal transportation hub developed to provide transportation access and visitor distribution (via public transportation, shuttles, bikes, water taxis, etc.) to park lands throughout Jamaica Bay. Connecting the airfield's main visitor facilities and internal trail network with the Jamaica Bay Greenway would ensure convenient trail access to the park. Improved wayfinding, interpretive and orientation facilities and materials would orient visitors to the resources that can be found throughout Jamaica Bay and Gateway. The marina would serve as a water-based access point for ferries, water taxis, and other boats.

Natural Zone

Habitat protection and wetlands restoration would be extensive. Within the North Forty and Mill Basin area, the shoreline would be softened through the removal of impervious surfacing and the restoration of former saltmarshes, sandspits, and intertidal mudflats. Additionally, more freshwater wetland habitat would be created than in alternative B. There would also be extensive restoration of former saltmarshes, sandspits, and intertidal mudflats. Areas south of Dead Horse Bay would be restored as tidal mudflats.

Existing grasslands habitat would be managed and maintained for ecological function and values. Grassland habitat would be actively managed to support butterfly, moths, bluebird and grassland-dependent birds including migrants (e.g. Bobolink) that use the Floyd Bennett Field grasslands as stop-over sites. Managed lawn in certain areas would be allowed to convert to natural meadows and when building or impervious surface removal allows, new areas of grassland would be established elsewhere on the site.

Portions of the North Forty would be converted to freshwater wetland habitat. Areas not converted or restored to wetland as part of the wetland interpretive center, would continue to be managed as upland forest. Expanded visitor use in the North Forty would be compatible with the protection of the remaining species-rich forest in the North Forty including successional maritime forest. Shrubland communities found in the back dune areas Floyd Bennett Field area including the Northern Bayberry Dune Shrubland and Northern Beach Heather Dune Shrubland would be protected and maintained.

Under alternative C, more extensive habitat restoration and habitat construction would occur than under alternative B. Aside from these trail corridors, new built visitor facilities will be minimal and limited to small-scale, low impact developments such as viewing blinds and observation platforms. The public would experience the new and restored habitat via trails and boardwalks. Under alternative C, the center would serve as an area where volunteers are trained for natural resource stewardship projects throughout Jamaica Bay.

The zone would be open to nature-based recreation along designated, soft-surface trails. The area would provide a venue for both environmental education programming and volunteer stewardship projects. Volunteers would be tasked with projects such as monitoring, native plantings and weed control. As in alternative B, visitors would encounter

facilities such as blinds, scopes, observation decks and boardwalks along the trails. Along with interpretive materials, these facilities would be designed to facilitate nature study, wildlife observation and immersion in a natural setting. A limited number of low-impact camping facilities would be sited in the Natural Zone.

Marine Zone

Along stretches of coastline that are not targeted for restoration, access to and recreational use of the shoreline for fishing, nature study and kayaking/boating would be increased. Like in alternative B, a water trail would be established offshore and NPS and its partners would offer boat tours that allow visitors to experience the airfield and Jamaica Bay by water.

The ~~Gateway Marina~~ park would offer more public uses, including boat rentals, water-based recreation, and boating/sailing lessons. The enhanced marina area would serve as the Jamaica Bay unit's primary portal for experiencing the bay by waters. Guided interpretive boat tours as well as a designated water trail would encourage people to explore the airfield and other Jamaica Bay resources from the water. Additionally, greater shoreline access and several launch sites for human-powered boats (e.g. kayak, canoe) throughout this zone would create more boating and fishing opportunities.

Historic Zone

Compared to alternative B, more of Floyd Bennett Field would be dedicated to historic preservation and aviation interpretation with larger portions of the airfield's cultural landscape preserved and more character-defining landscape elements would be restored. Through cultural landscape restoration of select character-defining features and the adaptive reuse of historic aviation structures along Hangar Row, the experience of Floyd Bennett Field would be enriched through interpretation and immersion in a preserved historic setting.

The Aviation District would be energized and activated with abundant visitor use and interpretive experiences. The rehabilitated hangars and cultural landscape would feature aviation exhibits, aircraft collections, and flexible interior and exterior spaces and would provide space for community activities, informal gatherings, interpretive programs, and special events. Prominent buildings and character-defining cultural landscape elements that reveal the aviation history of the airfield (such as Ryan Center, Hangar Row and runways) would be preserved and interpreted.

The period of significance for this cultural landscape would be the Municipal Airport Era. Current development located within this Aviation District that is not compatible with the airfield's historic character would be removed and the uses would be relocated to areas outside of the zone. Alternative C would include the preservation and, in some cases, restoration of many more character defining features of the cultural landscape such as vegetation, lighting, circulation patterns and entrance sequence to the Ryan Center, small-scale features and these features would be interpreted for visitors. Within the Aviation District, adaptively reused historic hangars, new structures, events, and exhibits, as well as preserved cultural landscape elements such as the runways, would create venues for interpreting a wide variety of topics from natural resources and habitat restoration to aviation history.

Like in alternative B, the southern portion of the airfield would be designated as a Developed Zone that would accommodate transportation infrastructure as well as operations and maintenance facilities.



Bergen Beach would be managed as a natural area with opportunities for quiet, nature study, research, volunteer stewardship, environmental education, and interpretive programming.

The historic aviation buildings along Flatbush Avenue known as Hangar Row would be rehabilitated to provide a range of visitor activities and uses that could include exhibits, informal gatherings, interpretive programs, and special events. The historic plane collection would be relocated from Hangar B to Hangar Row. Current uses of Hangar B would be relocated to Hangars 3 and 4. Future uses of Hangar B would continue to be explored and may include the rehabilitation of the hangar and site for an entertainment venue.

Developed Zone

Like in alternative B, a portion of the airfield would be designated as a Developed Zone that would accommodate transportation infrastructure as well as operations and maintenance facilities. In areas not needed to support operational or visitor uses, impervious surfaces would be removed and grassland or other native vegetation would added.

Existing maintenance facilities would be reconfigured in the Developed Zone and new maintenance areas and storage and operation facilities would be developed in order to care for new recreation facilities, accommodate increased visitor numbers, and protect and preserve both natural and cultural resources. These new and expanded operations and maintenance facilities would be clustered in one area.

The NPS and New York City would continue evaluating the technical and environmental feasibility of siting a facility in the park that would process food waste, vegetation, and other organic matter from concession stands, restaurants, groceries, and other sources in and around the park and local vicinity.

A separate access for commercial, operational and maintenance vehicles that allows for direct access to the Developed Zone would be maintained. Uses by other agencies would be screened in order to minimize its visual impact on any visitor uses that would occur in the southern portion of the airfield. Some uses may be permanently removed from the airfield in the future.

Bergen Beach

Natural Zone

Bergen Beach would be managed as a natural area with opportunities for quiet, nature study, research, volunteer stewardship, environmental education, and interpretive programming. Existing equestrian facilities would be removed, relocated, or repurposed, and the equestrian use areas would be restored to natural conditions. The park would be made more accessible and would cater to nature study. Facility development and programming would facilitate nature-based activities such as volunteer stewardship projects, guided nature tours, research, and self-guided nature study as well as permitted research. Bergen Beach will be designated as a research area for urban ecology and the study of other relevant research topics. Additionally, the area will be a center for volunteer stewardship projects and training as well as environmental education programs. A limited number of backcountry camping sites would be developed.

To prevent trampling of vegetation, reduce impacts to wildlife and ensure restoration efforts are successful, visitor use would be limited to designated trails within the Natural Zone. Trail development may include the addition of interpretive media as well as observation facilities such as viewing blinds.

Natural conditions would predominate at Bergen Beach and NPS and its partners would spearhead a number of restoration projects to protect and enhance the area's coastal habitats. More extensive beach/dune habitat restoration would be undertaken including bioengineering techniques would be used to stabilize eroding natural areas with plantings of native coastal trees and shrubs. Beach/dune habitats along with fringe wetlands would be protected, maintained, and restored. Efforts to control and eradicate *Phragmites* and other invasives would also be increased.



At the Pennsylvania Avenue Park, the existing roads would be converted into a multi-use trail system. Facilities such as viewing platforms and/or overlooks would be developed to take advantage of the landfill's elevation and the views of Jamaica Bay.

~~Canarsie Pier~~

~~The same as alternative B, Canarsie Pier would become a vibrant destination for community-oriented events as well as water-related recreational activities. Given its location on the Belt Parkway and proximity to dense housing developments, Canarsie Pier would serve as a new orientation portal for the Jamaica Bay park lands and Gateway. The pier would be improved to include orientation media such as a kiosk with a park map. Given the park's close proximity to New York City's Canarsie parks, the NPS would work closely with the NYCDPR on programming, transportation, and other management issues.~~

~~Canarsie Pier would serve as another Jamaica Bay hub for waterborne transportation and water trail connections to other park lands. A launch site would provide access to a designated water trail for human-powered boat exploration. Additionally, if it is demonstrated that the pier could support a ferry and or water taxis, it could also become a launch site for guided Jamaica Bay boat tours. The NPS will work with the NYCDPR to improve connections from Canarsie Pier to New York City's Canarsie parks and to improve trail linkages to the Jamaica Bay Greenway. Additionally, the NPS and its partners would actively target outreach to neighboring residents and encourage them to use the park's resources.~~

~~The pier and its outlying spaces would be improved to better accommodate community events such as concerts, markets, and festivals. Additionally, spaces for picnics and group gatherings would be expanded and enhanced though shade trees and other plantings. Along the coast on either side of the pier, the NPS and its partners would develop improved visitor facilities for fishing, kayaking, and other human-powered watercraft. Improvements would include lessons and a designated instructional and beginner paddling zone as well as equipment rentals. The existing contact station could be adaptively reused to support community use and to provide expanded visitor amenities.~~

~~Restoration projects to the east and west of the pier would strive to create a healthy shoreline habitat and an intertidal zone. Areas of saltmarsh and forested areas along the shoreline extending from Bergen Beach to Fresh Creek would be observed and assessed for habitat value. Signs, trails and clear beach and water access points would be developed in order to control visitor traffic and minimize disturbance to the coastal habitat.~~



Pennsylvania Avenue and Fountain Avenue Parks

Recreation Zone

Under alternative C, the Pennsylvania Avenue and Fountain Avenue Parks would be developed for recreation and community use and would offer a wide range of recreation facilities as well as community gathering spaces. At the Pennsylvania Avenue Park, the existing roads would be converted into a multi-use trail system. Facilities such as viewing platforms and/or overlooks would be developed to take advantage of the elevation and the views of Jamaica Bay. Other facility development would be basic visitor amenities such as restrooms and orientation and wayfinding signs. All new development on both sites would be designed to respect the sensitivity of the cap and other infrastructure. Vegetation and native habitats established at the parks sites would be protected, maintained, and interpreted.

Outreach to surrounding communities and creative programming led by the NPS and its partners would foster lasting engagement and would attract more local residents to Jamaica Bay park lands. Physical connections between the Pennsylvania Avenue Park and its neighboring communities as well as nearby park sites would be improved.

Developed Zone

Renewable energy development would be explored at both Pennsylvania Avenue and Fountain Avenue Parks. While visitor access will be limited to guided tours, the NPS would incorporate renewable-energy development into its interpretive media.

Spring Creek

Natural Zone

Spring Creek would act as a gateway to Jamaica Bay for adjacent communities and provide convenient access to the water and expanded recreation opportunities. Under alternative C, more extensive habitat enhancements would take place at Spring Creek, including more native plantings and ongoing monitoring and assessment of saltmarsh and forested areas. Under this alternative, the NPS would work with a variety of partners ~~the~~ ~~NYCDPR~~ to improve habitat conditions along the natural corridor connecting Spring Creek with New York City park lands.

Jacob Riis Park

Recreation Zone and Active Beach Subzone

Jacob Riis Park would remain a destination for high-quality beach recreation activities. Riis would remain an active beach destination and would offer additional community recreation opportunities as well as nature and water- based recreation facilities. Facility development would be significantly less intensive than alternative B and larger areas of the park would be managed as flexible open spaces and/or natural areas.

Active beach use would be maintained and the visitor experience would be expanded with the development of a trail system, nature play features (e.g., dune playscapes), and boat launch. Additionally, shaded spaces for picnicking and gathering would be developed.

Even more impervious surfaces would be removed in this alternative and more of the park would be converted to flexible open spaces that can still accommodate recreation uses, but are more resilient to storm surges. Additionally, portions of the parking area would likely be converted to natural habitat and flexible open space.

The NPS would work with partners to adaptively reuse the bathhouse for a wide variety of uses, ranging from visitor amenities to interpretive exhibits to park operations. Interpretive programming at the site and digital media would be expanded to communicate the story of the bathhouse, recreation on the Rockaway Peninsula, and climate change.

Similar to alternative B, portions of the Jacob Riis parking lot would be adaptively reused for transportation facilities such as shuttle parking and a bike sharing station. The majority of the parking lot not needed for parking and transportation would be converted to flexible open spaces or natural habitats. In this alternative, NPS and partners would also investigate the possibility of using a portion of the parking lot for renewable energy development. Physical connection between Jacob Riis and the other park lands on the Rockaway Peninsula would be improved through a shuttle, linkages to public transportation and bike infrastructure.

Fort Tilden

Natural Zone

The park would be a destination for both nature-oriented recreation and historic interpretive experiences. Within the Natural Zone, Fort Tilden's largely undisturbed plant community with scrub/shrub-dominated covered dunes as well as grassy/forb-dominated foredunes and interdunes, would be protected, monitored, and enhanced. The beach intertidal zone, supratidal zone, and the grassy areas would continue to support marine invertebrates and other native wildlife. Visitors find opportunities for a diversity of opportunities to explore the site's natural environments and enjoy a quiet immersive experience in a predominantly natural area.

Beach and dune habitats would be actively restored following damage from Hurricane Sandy. As the scrub/shrub-dominated covered dunes as well as grassy/forb-dominated fore and interdunes are reestablished, these habitats would be protected and monitored. In alternative C, research of these habitats would be increased and Fort Tilden would become another center for volunteer-based stewardship, monitoring, and restoration projects.

Overall, facility development would be significantly less than alternative B. Many visitor amenities would be provided on a seasonal basis using mobile facilities. Limited, low-impact camping opportunities would be developed in the Fort Tilden backcountry. Fort Tilden's existing equestrian facilities would be improved and used to accommodate trail rides throughout the park. The trails network throughout Fort Tilden would be expanded and some trailheads and segments of the trails would be located within the Recreation



Beach and dune habitats would be actively restored following damage from Sandy. As the scrub/shrub-dominated covered dunes as well as grassy/forb-dominated fore and interdunes are reestablished, these habitats would be protected and monitored.

Zone. Improved trail system with trailheads and a robust backcountry trail experience along designated routes. Expanded interpretation along trails and interpretive programming would highlight both the natural and cultural resources. Fort Tilden remains an unguarded beach and offers more of a natural coastal experience than other Gateway beaches. Shore Road would be converted to a trail providing convenient access to the beach. Limited fishing access would also be provided. Fort Tilden would host a number of volunteer stewardship projects throughout the year.

Habitat value of the inlet side of Fort Tilden would be studied. If warranted, coastal habitat and wetland projects would be initiated. This area could also present opportunities for environmental education programming and limited public access for nature study.

Recreation Zone

Under alternative C, the Silver Gull Beach Club would be maintained. However, public use of the beach club would be expanded to include water-based and beach recreation opportunities such as educational and interpretive programming and guided kayak tours and lessons. NPS would work closely with concessionaire to ensure that future development of the beach club is more resilient to storms.

Historic Zone

At Fort Tilden, cultural resource preservation and stewardship projects as well as enhanced interpretation of the Fort's landscape, batteries and Nike missile site compliment the natural-resource based recreational experiences found elsewhere in the Jamaica Bay Unit.

Under alternative C, the Historic Zone is larger and preservation efforts are more extensive than in alternative B. Preservation projects under alternative C encompasses the batteries as well as the Nike Missile site and the Parade Grounds. Additionally, volunteers and partners would be engaged in the preservation of the cultural resources within the Historic Zone.

Battery Harris would be stabilized and made accessible. The battery's existing overlook would be improved and interpretive media and programming would be expanded. The Nike Missile site would also be stabilized and interpreted. Interpretation and programming at the missile site would be more extensive than in alternative B. Maintenance facilities would be moved out of the Nike Missile site to allow for interpretation and visitor access. Access to and interpretation of these resources would be improved through expanded trail network, enhanced interpretive media, and increased programming.

The cultural landscape ~~of the parade ground~~ would undergo significant preservation projects under alternative C, so that it would evoke the look and feel of the historic period. This would involve the removal of incompatible modern uses such as the athletic fields and ball fields. Depending on the results of the damage assessments of the parade ground, the buildings would continue to be adaptively reused be to support visitor facilities as well as community uses. Some rehabilitated buildings could provide overnight accommodates and visitor amenities needed to support overnight stays such as food service and equipment rentals. Additionally, the buildings would continue to accommodate community groups and could house additional interpretive exhibits and educational programming in the future.

The parade ground would serve as a primary center for historic preservation volunteer and training projects. Additionally, the history of Fort Tilden would be interpreted through interpretive media and exhibits as well as guided programs.

Circulation between Riis Landing and Fort Tilden and other park lands on the Rockaway Peninsula would be improved through shuttles, safer road crossings, and bike infrastructure. Fort Tilden would act as the orientation portal for park lands on the Rockaway Peninsula and would provide information on resources and opportunities offered throughout Gateway. A visitor contact station would be established within an existing building. Additionally, trailhead and parking areas would be provided.

Development Zone

Riis Landing would continue to serve as a ferry landing. Additionally, buildings at the site would be preserved and adaptively reused. Operations moved from the Nike Missile site at Fort Tilden would be relocated to Riis Landing or other areas. The buildings at Riis Landing would be preserved and leased for community and other uses.

Breezy Point Tip

In both alternatives, Breezy Point Tip remains an undeveloped natural area open to limited nature-based recreation. The Breezy Point Surf Club would be maintained. However, public use of the beach club would be expanded to include water-based and beach recreation opportunities such as educational and interpretive programming and guided kayak tours and lessons. NPS would work closely with concessionaire to ensure that future development of the beach club is more resilient to storms.

In this alternative, Breezy Point Tip would be managed as a natural area with a greater emphasis on protecting the significant shorebird and marine bird/waterfowl habitat. The area's unique combination of marine/exposed ocean beach/dune system with somewhat secluded back dunes and palustrine wetland swale features, as well as its salt panne pools would be monitored, protected and enhanced.



With its lighthouse, lifesaving station, and long coastline, Sandy Hook would emerge as Gateway's focal point for maritime heritage interpretation. The preservation of these iconic structures along with expanded programming, activities, and interpretive media would engage visitors in the parks maritime story.

Sandy Hook Unit

Recreation and Visitor Experience

Sandy Hook's beaches, forests, wetlands, and waters would serve as living laboratories where visitors and volunteers would be engaged in participatory science, education and stewardship. These programs would nurture personal connections with the coastal environment and inspire greater appreciation for the park's historic significance. Recreational uses would be maintained along the beach and bay.

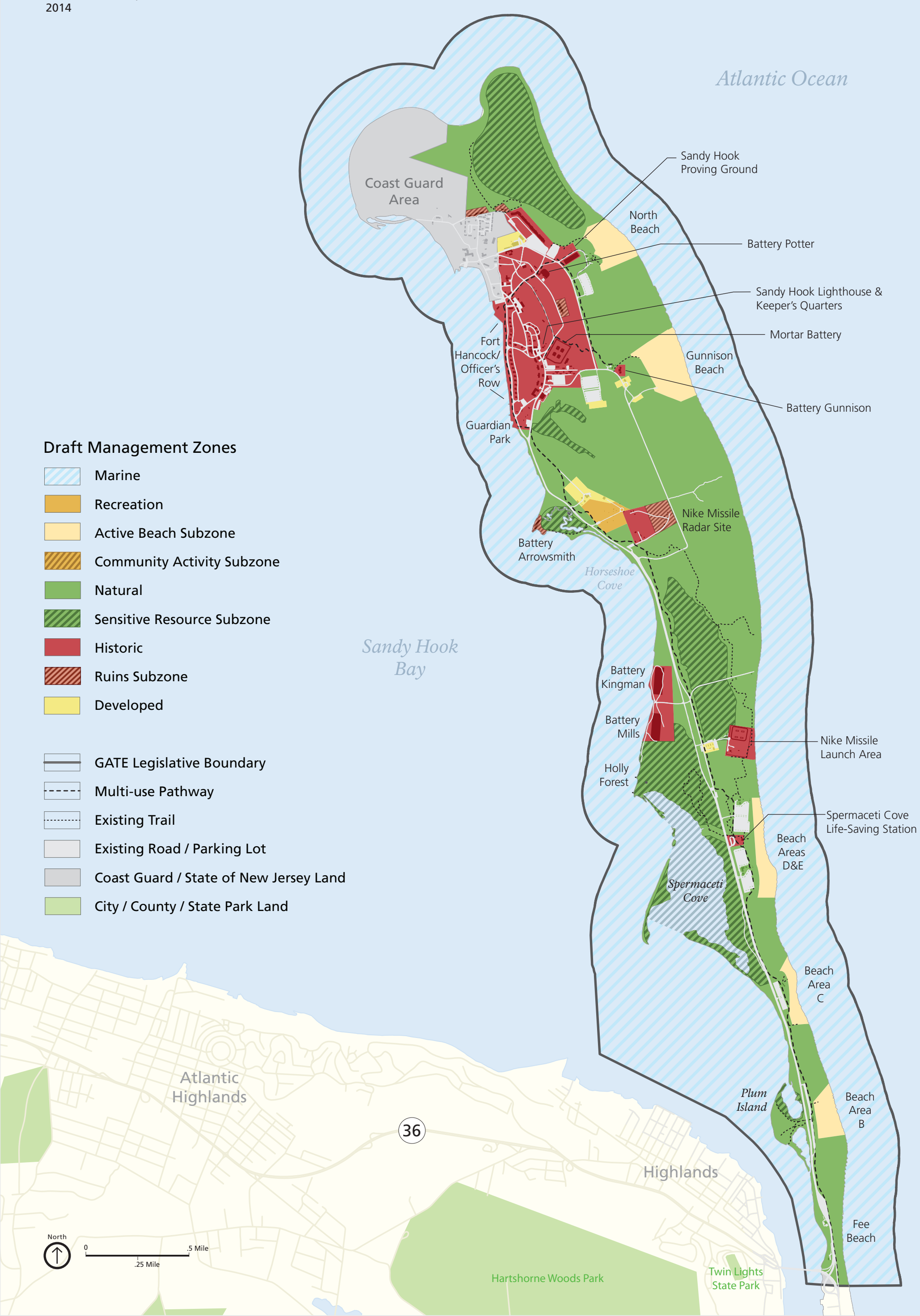
Resource Management

Protection and restoration of the beach dune community as well as forest, shrub and wetland habitats at Sandy Hook would be increased in this alternative. To reduce impacts on these sensitive and rare habitats, access would be tightly controlled and restricted in

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Additional batteries within the Fort Hancock area would be stabilized open to visitor access and interpreted. Batteries that would be preserved and interpreted through guided tours and/or interpretive media could include Batteries Potter, Gunnison, McCook and Reynolds (Mortar).



some cases. Aggressive control of invasive species, strengthening healthy communities and repairing beach erosion would be management priorities. Additionally, research and monitoring of the unit's habitats would be increased.

Historic preservation efforts would be most widespread in this alternative with the largest number of projects to stabilize, preserve, and interpret both historic structures and cultural landscapes. At Sandy Hook, historic preservation training programs would be offered and people would find opportunities to engage in volunteer stewardship projects. Students, partners, and volunteers trained at Sandy Hook would be mobilized to participate in historic resource stewardship projects throughout Gateway.

With its lighthouse, lifesaving station, and long coastline, Sandy Hook would emerge as Gateway's focal point for maritime heritage interpretation. The preservation of these iconic structures along with expanded programming, activities, and interpretive media would engage visitors in the park's maritime story.

Transportation

A variety of transportation systems would be developed to make Fort Hancock and the entire Sandy Hook peninsula more convenient to access. Within Fort Hancock, ferry service would be expanded to include summer weekdays, shoulder seasons and special events. Additionally a seasonal water ferry/taxi connection would be explored from other communities and NPS sites. Opportunities to provide private/transient water access and dockage at Sandy Hook would also be evaluated.

A shuttle system would relieve parking issues and traffic congestion and provide convenient access to the park. The shuttle would collect visitors from surrounding towns, transportation stops and the ferry terminal and drop them off at Sandy Hook's beaches and activity nodes. Opportunities would be explored with partners to extend public transit service into Sandy Hook, and initiate a transit shuttle to connect the Highlands. Interpretive media would be incorporated into both the on ferry service and/or internal landside shuttle system.

An expanded multi-use path network would traverse more of the peninsula and accommodate cross-island travel so people could explore both the ocean side and the bay side. Designated on-street bike routes from the Highlands would connect with regional trails serving the park unit. Bike access would be encouraged to/from and within Sandy Hook, with bike rental stations at parking facilities near the park entrance and within the park.

Parking options would be evaluated for remote intercept parking lot(s) outside of the Sandy Hook boundary with transit shuttle and/or bicycle connections provided into the park. Advanced traveler information systems would be improved with partners.

Historic Zone

The preserved and interpreted historic setting of Fort Hancock would provide for a variety of historic interpreted experiences. Additionally, the area would draw people interested in learning more about historic preservation and participating in hands on preservation projects. In alternative C, there would be a greater emphasis in also

preserving and interpreting the Fort's cultural landscape and in expanding historic interpretive and educational programming at Fort Hancock. Additionally, in alternative C, the interior of buildings within Fort Hancock would be more intensively restored to their period of significance.

The cultural landscape within the Fort Hancock area would be maintained and the preservation of additional character defining features would reinforce the military character and function of the fort. Along with preservation efforts, the features of the cultural landscape would be interpreted and revealed to people visiting Fort Hancock through new programming, interpretive media and educational programming.

Additional batteries within the Fort Hancock area would be stabilized open to visitor access and interpreted. Batteries that would be preserved and interpreted through guided tours and/or interpretive media could include Batteries Potter, Gunnison, McCook, and Reynolds (Mortar). Along with the structures themselves, the historic setting of some of these batteries would be preserved to more accurately represent the historic period. Additionally, volunteer stewardship projects would engage people in the hands on care and preservation of these structures.

An interpretive Battery Trail would extend from Fort Hancock and allow for self-guided exploration of the fortifications. The Battery Trail would provide greater access to the coastal defense structures within the Fort Hancock area and would provide a trail connection south to Batteries Kingman and Mills and north to the ruins of Batteries Morris and Urmston. The trail experience would be enriched by interpretive media of the structures and Sandy Hook's history (e.g. wayside signs, brochures).

Batteries Kingman and Mills would be stabilized, open to visitor access, and interpreted. Along with the structures themselves, the historic setting of some of these batteries would be preserved to more accurately represent the historic period. Additionally, volunteer stewardship projects would engage people in the hands-on care and preservation of these structures. Sandy Hook interpretive programming and media would also be expanded to incorporate these batteries.

The Nike Missile radar site would be converted into an interpreted, visitor-ready site. In alternative C, there would be more extensive preservation efforts, interpretation and programming related to the Nike Missile infrastructure on Sandy Hook than in alternative C. Alternative C would be more robust and the Nike Missile launch site would be converted into a primary interpretive destination. The interworkings of the launch site and the radar site would be interpreted. Preservation and restoration efforts at the launch and radar sites in combination with interpretive media would reveal what the site looked like during the Cold War era and allow visitors to visualize how Sandy Hook was employed to defend New York City over periods in U.S. history.

Recreation Zone and Active Beach Subzone

Recreational uses would be maintained. Redevelopment of the beach centers following damage from Hurricane Sandy would be dependent on an assessment of their vulnerability to future storms. Under alternative C, the redeveloped beach centers would all utilize

portable architecture technologies and as a result would offer fewer amenities than those in alternative B and would be suited for seasonal use only.

Access to the beaches and between the beaches and other destination on Sandy Hook would be improved through the development of additional modes of transportation. A land-based shuttle would provide more convenient access to the beaches and would link the beaches with Fort Hancock and the bayside visitor amenities. The shuttle would also provide connections to nearby communities and carpool parking areas. The addition of east and west lateral trail connections would facilitate travel from the Oceanside to the Bayside. Additionally, implementation of a bike sharing system on Sandy Hook would encourage bike travel along the peninsula along with expanded ferry service and the shuttle would reduce car-dependency among park visitors.

Camping opportunities would be more widely distributed throughout the park than in alternative A, but less so than in alternative B. Sites would be concentrated in fewer locations than in alternative B in order to minimize impacts and would include designated backcountry / beach camping, walk-in tent, drive-in tent and RV.

Natural Zone and Sensitive Resources Subzone

Coastal bay habitats would be improved through restoration projects and would be ongoing. Control of invasive species within the Natural Zone and Sensitive Resource Area subzone would be increased. Monitoring and study of the Holly and Eastern Red Cedar Forests would be increased.

Under alternative C, the visitor experience of the bayside would be expanded to include more opportunities for nature study, environmental education programming and volunteer, natural resource stewardship. Throughout the Natural Zone, access would be restricted to designated trails and recreation areas to reduce impacts to the natural resources. Within the Sensitive Resource Subzone, visitor access would be highly restricted and limited to guided tours.

The existing multi-use path network would be expanded to include direct connections to the bay. The paved multi-use path would link into a network of soft surface trails that allow for self-guided exploration of the bay and inland natural environments.

Opportunities for self-exploration, facilities, media and programming that facilitate nature study and wildlife observation and enrich the visitor experience of Sandy Hook's natural environments would be expanded. An interpreted nature trail would lead people through the various habitats. Alongside the trail, facilities for observing natural and wildlife would be developed such as observation blinds, scopes, and species lists. NPS would work with partners to offer expanded wildlife-observation and nature study programming (e.g. seasonal events, ID workshops). Additionally, NPS and their partners would engage volunteers in monitoring, species counts and habitat restoration projects. Shaded areas would be developed on the bayside to accommodate groups and allow for picnicking in a natural setting.

Current protection, monitoring and study of the beach/dune habitats would be increased. Access to the Holly Forest, dunes, and saltmarshes would be increasingly restricted in order to minimize habitat impacts. Management would encourage invertebrate and shore bird use of the intertidal zone.

Marine Zone

The Atlantic Ocean waters off Sandy Hook's beaches would remain a protected natural area while accommodating water-based recreation. Conditions within Sandy Hook Bay would continue to be monitored and ongoing efforts to protect offshore habitats would be maintained.

Interpretive media and programming related to Sandy Hook's coastal habitats and maritime and coastal defense heritage would be expanded. This would include tying interpretation of Sandy Hook's cultural resources into other regional sites such as Twin Lights. Interpretive boat tours would also physically link Sandy Hook with other maritime and coastal defense sites.

Water-based recreation would be encouraged through expanded guided tours via boat or kayak. New launch/landing sites would be developed, however, to a lesser degree than in alternative B.

Natural resource protection of offshore habitats would be maintained within the Marine Zone. Research and monitoring of these habitats and wildlife would be increased. The use of offshore artificial reefs to increase habitat and reduce wave action in eroding beach areas would be evaluated.



The Staten Island Unit would provide opportunities to experience nature, explore Fort Wadsworth's coastal defense heritage, and recreate in historic and natural settings.

Staten Island Unit

Recreation and Visitor Experience

The Staten Island Unit would provide opportunities to experience nature, explore Fort Wadsworth's coastal defense heritage, and recreate in historic and natural settings. Park managers would preserve historic structures and landscapes that tell the story of continuous military and civilian use of the fort and tie thematically with other parks and historic sites within New York Harbor. Recreational uses throughout the Staten Island unit would be maintained, and enriched by expanded interpretive and educational programming. Participatory cultural resource stewardship programming in which partners and volunteers would engage in the hands-on preservation of the coastal defense structures would be introduced at Fort Wadsworth. Likewise, Great Kills would offer new opportunities for nature study, environmental educational, and participatory natural stewardship programming.

Resource Management

Natural resource stewardship would be prioritized at the Staten Island districts. The NPS would focus resource protection efforts on improving beach/dune habitat at the unit and working with neighbors and partners to expand and care for the coastal stretch of protected wetlands and beach/dune habitat.

Historic preservation at Fort Wadsworth would be a management priority and preservation trainings and workshops would enable volunteers and partners to contribute to the preservation of Fort Tompkins and select Endicott/Taft-era batteries. In this alternative, more

Table 2-8. Staten Island Unit - Alternative C.

Desired Changes	Types of Change	Where Change May Occur
Programmatic and stewardship connections created to link Gateway sites, New York City parks, and neighborhoods	• New programs and stewardship opportunities	• Great Kills • Fort Wadsworth • Miller Field
Natural immersion opportunities are developed and promoted	• Create learning opportunities and services for activities such as kayaking and wildlife observation Stewardship • Formalize nature trails to bays and waterways for fishing, walking • Establish overlooks for outstanding/distance views of bays and ocean • More nature trail and nature observation facility development	• Great Kills • Fort Wadsworth • Miller Field
Environmental education	• Improve or develop places and facilities to learn about bay-related resources such as salt marsh, wetlands	• Unit-wide
Recreation improvements	• New picnic and open space area • Improved launching areas for human-powered boating • Trailheads and parking areas, orientation kiosk, trails and picnic areas	• Great Kills • Fort Wadsworth • Miller Field
Offer low impact camping opportunities	• Create low-impact camping areas and support services • Offer special camping programs in places like historic buildings or natural areas.	• Great Kills • Fort Wadsworth
Connect park sites through trails and paths	• Convert former roads into trails • Improve biking and walking infrastructure and circulation • Improve access and linkages to NYC Greenway	• Great Kills • Miller Field • Fort Wadsworth
Formal water trails established	• Establish new water trails connecting to NYC parks and other Gateway areas	• Great Kills • Fort Wadsworth • Miller Field
Expand access to ~~Jamaica Bay~~ New York and Great Kills Harbor and other waterways	• New boat sites, storage, shuttles, and equipment rental	• Great Kills • Fort Wadsworth

of Fort Tompkins would be opened, preserved, and interpreted. Also, interpretation of Fort Tompkins, Battery Weed, and the Endicott/Taft-era batteries would be enhanced through a Coastal Defense Trail. The trail would wind through and among the historic structures offering excellent views and interpretive media along the route.



The coastal defense structures at Fort Wadsworth would become a focal point for participatory stewardship and a learning laboratory for hands on historic preservation. Visitors would experience the history and discover the coastal defense structures through increased interpretive programming and expanded interpretive media.

Transportation

Similar to alternative B, improved public transportation and an expanded greenway, as well as, shuttles between the sites would make access more convenient. In addition, bike infrastructure would be developed throughout the unit, including a bike-sharing system, maps, and convenient bike parking, to encourage more bike use at the parks and provide convenient connections with other Staten Island trail systems.

Fort Wadsworth

Historic Zone

Fort Wadsworth would become a destination for interpretive experiences in a preserved historic setting. The cultural landscape surrounding the batteries and ruins would be preserved to a greater degree than in alternative B and more accurately reflect the fort's periods of significance. The coastal defense structures at Fort Wadsworth would become a focal point for participatory stewardship and a learning laboratory for hands on historic preservation. Visitors would experience the history and discover the coastal defense structures through increased interpretive programming and expanded interpretive media. A new "Coastal Defense Trail" would be developed among the batteries and offer expanded interpretation and up close experiences of the coastal defense resources. Additional foot trails would also be re-established at Fort Tompkins.

Similar to alternative B, Battery Weed and Fort Tompkins would be preserved and open to more regular visitor use. However, in alternative C, NPS would increase the level of access to these structures and expand interpretive and education programming of the two fortifications. Fort Tompkins would be rehabilitated to serve as a visitor facility that orients visitors, includes interpretive exhibits and hosts educational programs. The Battery Weed seawall would be repaired and fortified to protect the resource from storm surges.

With the exception of the primary coastal defense structures (Weed and Tomkins) that are already interpreted, the following batteries would undergo minimal stabilization and would be featured interpretive stops along the Coastal Defense Trail: Duane, Caitlin, Torpedo, Bacon, Barbour. Some of these batteries would be made more visible by clearing vegetation from them. Those left covered in vegetation would be used to interpret the relationship between natural and cultural resources and to demonstrate how, overtime, some of the defense structures came to serve as habitat. In addition, overlooks would be developed on some of the batteries to facilitate, access, and frame cultural landscape vistas.

The cultural landscapes of Mont Sec and New York avenues would receive more extensive preservation treatments in alternative C and both avenues would be incorporated into the visitor experience of Fort Wadsworth through improved wayfinding signage and interpretation.

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Management Zones

- Marine
- Recreation
- Active Beach Subzone
- Community Activity Subzone
- Natural
- Sensitive Resource Subzone
- Historic
- Ruins Subzone
- Developed

- GATE Legislative Boundary
- Existing Trail / Bike Path
- NYC / Other Federal Agency Land
- City / County / State Park Land
- NYC DPR Water



Recreation Zone

As in alternative B, visitor orientation within the entire park would be improved. NPS would establish multiple new contact stations in order to improve the sense of arrival and better orient visitors.

With improved signs and wayfinding, Fort Wadsworth would be more visible and clearly identified as a park welcoming to visitors. The NPS would work with the NYCDPR to expand the greenway so that it links Fort Wadsworth, Miller Field, and Great Kills together. Carolina Street would be closed to cars and converted into a bike/pedestrian route. Multi-modal transportation systems including public transit, bike paths, and a shuttle would link Fort Wadsworth with the Staten Island Ferry. At Fort Wadsworth and the other Staten Island park sites, the NPS would work in cooperation with NYCDPR to develop bike-sharing stations. These rental opportunities along with improved wayfinding and signs would encourage an promote bike travel through and between the park units.

Existing recreational facilities would be expanded to accommodate greater recreational use. Existing camping facilities would be expanded and include campsites closer to the coastline.

Natural Zone

The beach/dune habitat along Fort Wadsworth's coastline would be protected and enhanced through park and volunteer stewardship projects. The NPS would build resilience by working with partners and volunteer stewards to restore dune habitat along Fort Wadsworth coastline.

Access to the water would be maintained and new opportunities for water-based recreation would be introduce. This would include to greater fishing access, a human-powered boat launch site and boat-based interpretive tours. From Fort Wadsworth, a water trail would lead out to an offshore dock positioned nearby Hoffman and Swinburne Islands for distant wildlife observation. The interpretive water trail would also link to launch sites at Miller Field and Great Kills Harbor.

The NPS and its partners would work together to offer guided boat tours to interpret Fort Wadsworth, other NPNYHC coastal defense resources and natural resources from the water.

Hoffman and Swinburne Islands

Hoffman and Swinburne islands would be managed for their natural and cultural resources and no visitor access would be permitted on either island. The island's wildlife and cultural resources could be viewed from the water. The wildlife on the islands and the islands' habitat value would be monitored and study (e.g. heron rookery and seal haul out).

~~Miller Field~~

~~Recreation Zone - Community Activity Subzone~~

Miller Field would remain a vibrant center for community-based recreation tailored to youth and their families. Fields designed for a range of sports uses including soccer, softball and pee-wee leagues would be upgraded to better accommodate intensive use. In both alternatives, management of the ball fields and the sports leagues would be transferred from the NPS to another entity.

A multi-use Perimeter Trail would circumnavigate the entire park and connect the forest with the bay. Walkability throughout the park would be improved by expanding the width of multi-use paths and retrofitting park roads to slow traffic and include sidewalks or designated bike/walk ways. An active nature-based recreation experience that would appeal to youth and their families (e.g. bike trails/facilities, play features, nature adventure zone) would be offered and complement the sports league use.

The visibility of the NPS would be increased at Miller Field through improved signs and wayfinding. The NPS would take advantage of the busy park to introduce more children and their families to the NPS, and Gateway's NPS outreach would target sports leagues and families and inform them about the other parks and experiences Gateway offers.

The NPS would work with partners to host concerts, performances, tournaments, and events on the field. The community gardens would be expanded to accommodate more gardeners. Additionally, the picnic and group gathering around the contact station would be expanded and improved. The hangar area would be redeveloped as a community activity area and could include a picnic pavilion, trailhead, and community event space. The hangar would be stabilized and new use sought.

Ingress/egress circulation patterns, lot configurations, and wayfinding would be modified to address recurring congestion. Local transit access and bus connections to Staten Island Railway at New Dorp, Eltingville Transit Center, and Saint George/Staten Island Ferry Terminal would be promoted and the NPS would work with partners to develop more direct public transit routes that serve Miller Field. A bike-sharing terminal at Miller Field would encourage bike travel along the NYC Greenway up to Fort Wadsworth and the NPS would work with partners to establish a designated bike route to Great Kills.

Natural Resource Zone

A kayak launch site, kayak instructional zone, and boat rental concessionaire would be developed on Miller Field's coastline. The Miller Field launch site would be an access point to the buoyed interpretive water trail that extends from Fort Wadsworth to Great Kills Park. The dune habitat along Miller Field's shoreline would be protected and maintain. Control access with a well-defined trail from the greenway and parking area to the water.

Developed Zone

The park housing on Miller Field and the Visitor Contact Station would be maintained. Location of maintenance and operations area will be identified upon further study. Maintenance area will be located to complement recreational opportunities.



Great Kills Park

Natural Zone and Sensitive Resources Subzone

At Great Kills Park, the valuable natural resources including maritime forest and shrublands and over wash dunes and beaches would be protected and restored. More extensive habitat enhancement and restoration efforts would take place across the Great Kills park site than in alternative B. NPS would focus resource protection efforts on improving beach/dune habitat on the site and work with neighbors and partners to expand the stretch of protected wetlands and beach/dune habitat up Staten Island's coast. This wetland protection effort would include the reestablishment of saltmarsh. The former ball fields and model airplane would be removed and the area would be restored to restore maritime shrubs, forests, and wetlands as well as beach/dunes. Aggressive invasive species control would also be enacted throughout the Natural Zone and Sensitive Resource Subzones.

The park would also encourage more extensive study of geomorphology and beach erosion than in alternative B. NPS would work with neighbors and partners to implement solutions for improving resiliency of beach/dune habitat Great Kills and further east along Staten Island coastline.

The natural zone offers an abundance of opportunities for nature based recreation and environmental education programming. Within both the Natural Zone and the Sensitive Resources Subzone, volunteer stewards would be engaged in habitat restoration and monitoring projects.

The Great Kills Education Field Station would be enhanced to ~~include more programming and exhibits, an outlying~~ accommodate more programming and teaching aids, an outlying interpretive nature trail network and outdoor classrooms in order to better facilitate environmental education and field learning.

Miles of soft-surface trail and associated nature observation facilities such as blinds, towers, and boardwalks would encourage nature study and self-guided exploration of the park's existing and restored natural environments.

New camping opportunities and overnight accommodations would be developed within the Natural Zone. There would be an emphasis on introductory and intergenerational programs that teach camping skills.

Recreation Zone and Active Beach Subzone

New and improved facilities would expand recreation opportunities at Great Kills Park. Water-based recreation would be expanded at the Great Kills Harbor and marina to support boating and fishing including instructional programming, equipment rental and guided tours.

The popular multi-use pathway would be maintained. Additionally, the multi-use path would connect with the soft-surface trails that traverse the Natural Zone.

The guarded swim beach, beach access, and the beach center would be maintained. Expanded shade and picnic facilities would be developed to complement the beach experience.

Accessing the park would be made more convenient by an NPS shuttle that links surrounding communities and park lands. In addition, the NPS would coordinate with partners to complete missing pieces of on- and off-street trails and bike routes for connecting Great Kills to Miller Field. Finally, improved bike infrastructure, including bike rentals, maps, wayfinding, and bike parking facilities, would encourage park access by bike.

Alternative Considered but Dismissed

Following the presentation of the alternatives to the public and partners in the summer of 2012 and the collection of public comments and partner feedback, the GMP team decided to eliminate what had been alternative D. Titled "Connecting Coastlines," the management concept for alternative D was as follows:

The broad themes of coastal ecology, coastal defense, and coastal recreation link the three park units and their varied resources together. In this alternative, the NPS and its partners emphasize water-based recreation, education, and interpretation and create a seamless coastal experience centered on beaches, marine habitats, and coastal defense resources and stories.

The decision to dismiss alternative D stemmed from a lack of public interest/support and redundancy in key elements. Gateway staff and park partners felt that there were not enough unique components of alternative D to distinguish it substantially from alternatives B and C. Although the alternative was dismissed, it should be noted that certain ideas from alternative D were incorporated into alternative B, including the following management and recreation emphases:

- Expansion and promotion of water-based recreation opportunities and city park connections including water trails, kayak rental, and training opportunities, and boat tours.

- Development of new orientation, programming, and access from water and increased waterborne transportation.

Environmentally Preferable Alternative

In accordance with the NPS NEPA Director's Order 12 Handbook, the NPS identifies the environmentally preferable alternative in its NEPA documents for public review and comment (NPS 2001, section 4.5 E[9]). The environmentally preferable alternative is the

alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative (43 CFR 46.30).

The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources.

Alternative C has been identified as the environmentally preferable alternative based on the analysis of impacts, which identified it as least damaging to the biological and physical environment and best at protecting and enhancing natural and cultural resources. Specifics are outlined below.

Alternatives B and C both propose additional access and activities at many park sites, and this increase in use has the potential for damage to wildlife habitat—including that used by species of special concern—to vegetation, and to soils. However, each alternative also includes measures that would particularly enhance biological resources and that are absent from the no-action alternative. These measures include a commitment to using expanded partnerships with academics, agencies, private entities, and NGOs to jointly research the causes of loss of saltmarsh island habitat and how best to restore it and water quality in the Jamaica Bay; working with neighboring landowners to remove impediments to natural coastal sand transport processes; creating freshwater and saltwater wetlands and open water areas in conjunction with a new wetlands center; and holistically planning and implementing freshwater wetland restoration at multiple locations. Alternative B has substantially greater development of some park sites than alternative C for camping, trails, and visitor recreational facilities and amenities. Particularly at Sandy Hook, and to a lesser extent at Fort Tilden, current unique or undisturbed areas used by imperiled vegetation associations or plant or wildlife species of concern, or by many thousands of individual wildlife such as migrating birds, for example, could be affected by this development and by the presence of humans.

In addition to a smaller scope of development in alternative C, visitor use–related equipment or facilities would be sustainable and easy to remove following the summer season, restoring relatively undisturbed conditions for the remainder of the year. Alternative C also includes additional ~~closures~~ restrictions and protection of sensitive or unique habitat at Sandy Hook, ~~Breezy Point,~~ Plumb Beach, and Fort Tilden, including vegetative communities found only at these sites in the New York City or Monmouth County area, nesting by several species of shorebirds listed as federally or state endangered or threatened, vegetation associations considered globally imperiled, and important migratory bird resting and feeding habitat. ~~While alternative B opens Hoffman Island, Canarsie Pol, and Big Egg Island for day or overnight use, alternative C keeps these areas closed to visitor use. Each is used by birds for feeding, resting, or nesting; alternative C would therefore do a superior job of protecting, preserving, and enhancing this biological resource.~~

Both action alternatives are considerably more beneficial than no action (alternative A) for historic structures, historic districts and cultural landscapes, and museum collections. Reuse would not be nearly as extensive under the no-action alternative as for either action

alternative, and because reuse requires restoration of historic sites which in turn may contribute to historic districts, it has an important beneficial impact on cultural resources. Of the two action alternatives, alternative B offers the widest variety of potential adaptive reuses, particularly in the Sandy Hook Unit. Use of Fort Tilden and Fort Wadsworth in either alternative B or C would also help in stabilizing these districts. Formalizing current policies of allowing some batteries and other damaged or deteriorating structures to continue to decay by applying a Ruins Subzone would have the potential for adverse impacts in alternatives B and C. Historic resources affected are primarily associated with military history and the coastal defense of New York Harbor. Conversely, application of a Historic Zone would help in protecting and preserving cultural resources. This zone is slightly larger in alternative C than alternative B (and is not part of alternative A). Both action alternatives are equally beneficial in finding a safe area to maintain the park's museum collections. The no-action alternative is environmentally preferable in protecting buried archeological resources, as development of trails, roads, visitor facilities, and other infrastructure is minimal. On balance, because activities in alternatives B and C are so similar, the application of a larger Historic Zone in alternative C makes it slightly environmentally preferable for cultural resources.

Consistency with NEPA

The NPS requirements for implementing NEPA include an analysis of how each alternative meets or achieves the purposes of NEPA, as stated in sections 101(b) and 102(1). Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

1. Fulfills the responsibilities of each generation as trustee of the environment for succeeding generations

2. Ensures for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings

3. Attains the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences

4. Preserves important historic, cultural, and natural aspects of our national heritage and maintains, wherever possible, an environment that supports diversity and variety of individual choice
5. Achieves a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities

6. Enhances the quality of renewable resources and approaches the maximum attainable recycling of depletable resources

Alternative A: No Action

Alternative A would minimally meet the six purposes of NEPA. There would be no new sources of park operating funds, such as from friends groups, donations, or volunteers beyond what currently exists, making it increasingly difficult for the declining numbers of park staff to meet the park's mission to manage the park leaving it unimpaired for the enjoyment of future generations (Purpose 1). The NPS would continue to have difficulty adequately protecting natural, scenic, and cultural resources due to limitations in the numbers of park staff, a major maintenance backlog, and an abundance of historic structures in poor condition (Purpose 4). The existing level of programming, activities, and enforcement would be maintained and used, with no construction of new facilities and the addition of only a few new programs, as funds allow (Purposes 2, 3, and 5). The park would not provide additional recreational facilities or recreational and educational programming requested by the public during GMP/EIS scoping (Purposes 2, 3, and 5). Existing resource management actions, particularly water quality monitoring, management planning to improve water quality in Jamaica Bay, and protection of coastal habitats, would continue as they are today, with long-term benefits continuing to be limited due to inadequate staffing and funding (Purpose 6).

Alternatives B and C

Both alternatives B and C would meet the six purposes of NEPA. New sources of funding would become available as the NPS works with its partners, substantially enhancing the park's ability to meet its mission and to support targeted resource protection goals (Purposes 1 through 6). With development of the Jamaica Bay Science and Resilience Institute and the resulting increase in partnerships, collaborations, and scientific study focused on Gateway's natural resources, habitat conditions in Jamaica Bay and elsewhere in the park would be better understood and stewardship would become more effective (Purposes 4 and 6). Historic structures at Fort Wadsworth ~~(Fort Tompkins and Battery Weed),~~ Fort Tilden ~~(Battery Harris)~~, and Sandy Hook Proving Ground (Fort Hancock ~~and the Nike Missile site)~~ would be rehabilitated and leased where appropriate, enhancing their long-term protection and providing a moderate income stream to support their long-term maintenance (Purposes 4 and 5). Additionally, historic structures at Fort Wadsworth (Fort Tompkins and Battery Weed), Fort Tilden (Battery Harris) and Sandy Hook Proving Ground (Fort Hancock and the Nike Missile site) would undergo additional stabilization and rehabilitation and become visitor-ready and interpreted (Purpose 4). In both alternatives, the park would provide some additional recreational facilities and enhanced educational and interpretive programming as requested by the public during GMP/EIS scoping (Purposes 2, 3, and 5).

Partnerships with New York City in alternative B would greatly enhance the park's ability to meet its mission and to support targeted resource protection goals (Purposes 1 through 6). Also, in alternative B, Gateway would provide many more new recreational facilities, including a wetlands center at Floyd Bennett Field and a wide variety of recreational programming (e.g., camping, lessons, environmental education), which would exceed the improvements requested by the public during GMP/EIS scoping (Purposes 2, 3, and 5).

In alternative C, an emphasis on participatory stewardship, increased volunteer programming, and enhanced resource protection would enhance the park's ability to meet its mission and to support targeted resource protection goals (Purposes 1 through 6).

User Capacity Indicators and Standards

Introduction

User capacity is one statutory requirement for the GMP established in the 1978 National Parks and Recreation Act. The act called for the identification and implementation of commitments for visitor carrying capacities. The NPS GMP Sourcebook (2008b) explains that planners have found that "user capacity" is a more appropriate term than visitor carrying capacity because it conveys the concept that capacity is applicable to all park users, including local residents. The NPS defines user capacity as the type and level of use that can be accommodated while sustaining the desired resource conditions, social conditions, and visitor experiences consistent with the purposes of the park. The approach to user capacity is now focused on measuring the success at achieving and maintaining desired resource conditions and visitor experiences as affected by people's use of the parks. The NPS does not solely track and control user numbers, but instead manages the levels, types, behaviors, and patterns of visitor use and other public uses as needed to control the condition of the resources and the quality of visitor experiences.

The GMP planning process requires the development of a monitoring system to test the effectiveness of the management actions taken by identifying indicators and standards that gauge when or if the desired conditions have been achieved.

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The foundations for making user capacity decisions in this GMP are the purpose, significance, special mandates, and management zones associated with the park. The purpose, significance, and special mandates define why the park was established and identify the most important resources and values—including visitor opportunities—that are to be protected and provided. The management zones in each alternative describe the desired resource conditions and visitor experiences, including appropriate types of activities and general use levels, for different locations throughout Gateway. The zones, as applied in the alternatives, are consistent with, and help achieve, the specific purpose, significance, and special mandates for each park. As part of the NPS commitment to the implementation of user capacity, park staff will use these directives to guide the types and levels of visitor use that will be accommodated while sustaining the quality of park resources and visitor experience consistent with the purposes of both parks.

In addition to these directives, in areas where use and past research and study have demonstrated a need, this GMP also includes specific user capacity indicators and standards. Indicators and standards are measurable variables that will be monitored to track changes in

resource conditions and visitor experience. The indicators and standards help the NPS ensure that desired conditions are being attained, supporting the fulfillment of the legislative and policy mandates of the park.

User Capacity At Gateway

Gateway is a popular, heavily visited park located within a major metropolitan area with extensive and diverse visitor opportunities that are in high demand. Visitor use opportunities occur over a large land and water mass with many access points and use areas, which makes regulating use levels, activities, and patterns complex. While the park's natural resources have demonstrated an impressive degree of resiliency, the park contains habitats that are vulnerable to visitor use impacts.

Given these challenges and limited staff and budgets, user capacity management must be strategically implemented through the efficient use of staff time and funding, targeted focus on areas of most concern within the park, and creative approaches to monitoring and developing management strategies. For all areas of Gateway, the management zones provide the most important implementation commitment for user capacity, because they describe the desired resource conditions and visitor experiences—including appropriate types and levels of use, visitor services, and development—for all sites within the planning area. These management zones are consistent with and help achieve Gateway's purpose, significance, and special mandates.

In addition to the implementation commitments for the desired conditions (identified in the zone descriptions) and based on some of the most pressing existing or potential use concerns at sites within Gateway, a set of resource and visitor experience indicators have been identified for the park that may be monitored to assess visitor-related impacts on park resources and the quality of the visitor experience (see table 2-9). The priority resource indicators for Gateway are associated with the issues of habitat and wildlife disruption and wear on the park's cultural resources. The priority visitor experience indicators for Gateway are associated with the issues of crowding and congestion, condition of recreation sites, and satisfaction with visitor services and facilities. Please note that in order to measure some of the visitor experience standards, it will be necessary to institute a parkwide visitor survey or potentially modify an existing annual mail-in survey to include questions related to these visitor experience indicators and standards.

The final selection of any indicators and standards for monitoring purposes or the implementation of any management actions that affect use would comply with NEPA, the National Historic Preservation Act of 1966, and other laws, regulations, and policy, as needed.

Monitoring

Park staff will continue general monitoring of use levels and patterns throughout Gateway. In addition, park staff will monitor these user capacity indicators. The development of specific monitoring protocols is left to a detailed monitoring plan, which is beyond the scope of the GMP/EIS. The rigor of monitoring the indicators (e.g., frequency of monitoring cycles,

Table 2-9. Park User Capacity Indicators and Standards.

Indicators	Assigned Zone/Specific Areas	Standards
Visitor-related Resource Indicators		
Evidence of persistent and/or prohibited use of closed and/or restricted areas.	Historic Zone Natural Zone Developed Zone Recreation Zone	Closure of existing informal, non-designated trails and unauthorized access points Or conversion of informal trails to designated and managed trail Proper signs and access enforcement Signs, fencing, and other measures to prevent unauthorized access to cultural resources
Deterioration in the condition of existing trails (e.g., widening, increased erosion, trampling) and/or development of new, non-designated informal or "social" trails	Natural Zone Sensitive Resources Subzone Recreation Zone Historic Zone	No substantial deterioration of existing, designated trail conditions in which severe erosion is obvious, bare soil is widespread in a widening tread and nearly complete loss of organic littler and/or vegetative cover Zero tolerance for new, undesignated "social trails"
Number of times per day birds are flushed from the roost or nesting colony—applies to tern colonies, heron rookeries, and piping plover nesting areas	Natural Zone Sensitive Resources Subzone	No more than two times in a 12-hour period
Degradation of the condition of marsh and shoreline habitat below baseline conditions	Natural Zone Sensitive Resources Subzone Recreation Zone	Proper signs and access enforcement Removal of social trails and unauthorized access points along shorelines No tolerance of boat landing on marsh islands or unauthorized access in closed areas Enforcement of motorized boating speed limits
Deterioration in the condition of habitat within and immediately surrounding backcountry, beach, walk-in tent, and programmatic camping areas	Natural Zone Recreation Zone Historic Zone	Maintain at least 80% of campsites with no more than moderate vegetation loss and minimal signs of soil erosion and shoreline disturbance
Number of incidents of graffiti and/or vandalism affecting park assets, including cultural resources	All zones (with a focus on cultural resources within the Historic Zone)	No more than one minor incident per month—minor is defined as repairable damage (e.g., new ink / paint graffiti over paintable surface) No major incidents—major is defined as irreparable damage resulting in major resource loss and significance recovery cost

Table 2-9. Park User Capacity Indicators and Standards (continued).

Indicators	Assigned Zone/Specific Areas	Standards
Documented changes in condition of Band 1 and 2 cultural resources (including historic structures and cultural landscapes) from visitors and park management activities	Historic Zone	Visitor impacts do not exceed threshold of changing overall site condition to a lesser condition (e.g., good to fair, fair to poor) No trampling of gardens and/or vegetation contributing to the significance of the cultural landscape Visitor uses, including self-guided access, guided tours, programming, and events, do not threaten character-defining features
Visitor Experience Indicators		
For arrival via car, shuttle, and ferry: Approximate arrival experience time (from park entrance to arrival at a parking lot / unloading zone)	All zones (with a focus on Recreation Zone because most parking lots and transportation infrastructure is within this zone)	Maximum arrival time is 15–20 minutes per individual or group
Recreation site condition assessment: rating of good, fair, poor based on site size, ground cover loss, tree/ vegetation damage, amount of litter / human waste, and evidence of wildlife harassment	Recreation Zone (including Community Activity and Active Beach Subzones) Natural Zone Historic Zone	The condition of recreation sites will be maintained in "good" condition Visitor impacts do not exceed threshold of changing overall recreation site condition to a lesser condition (e.g., good to fair, fair to poor)
Visitor satisfaction with the scale, location, and condition of visitor services and facilities as well as visitor comforts (using random survey instrument)	Recreation Zone (including Community Activity and Active Beach Subzones) Natural Zone	Greater than 75% of all visitors surveyed report "high" levels of visitor comfort and satisfaction with the scale, location, and condition of visitor services and facilities
Visitor satisfaction with opportunities to experience open space and nature (using random survey instrument)	Recreation Zone Natural Zone	Greater than 75% of all visitors surveyed report "high" levels of visitor satisfaction with access to natural areas and the shoreline, dark night skies, natural soundscapes, views, and/or direct sensory experiences with natural elements Less than 10% of visitors reported problems with user conflicts detracting from their experience of open space and nature
Visitor satisfaction with opportunities to experience historic settings (using random survey instrument)	Recreation Zone Historic Zone	Greater than 75% of all visitors surveyed report "high" levels of visitor satisfaction with access to historic settings and opportunities to learn about coastal defense and maritime history at Gateway Less than 10% of visitors reported problems with user conflicts detracting from their experience of historic settings

amount of geographic area monitored) may vary considerably depending on how close existing conditions are to the standards. If the existing conditions are far from exceeding the standard, the rigor of monitoring may be less than if the existing conditions are close to or trending toward the standard.

The initial application of the indicators and standards will determine whether the indicators are accurately measuring the conditions of concern and if the standards truly represent the minimally acceptable condition of the indicator. Park staff may decide to modify the indicators or standards and revise the monitoring program if better ways are found to measure changes caused by visitor use. If use levels and patterns change appreciably, the park may need to initiate additional monitoring of new indicators to ensure that desired conditions are protected. This iterative learning and refining process is the strength of the NPS user capacity management program, in that it can be adapted and improved as knowledge grows.

Mitigation Measures

As a part of the analysis of the GMP/EIS alternatives, mitigation measures that could further improve alternatives in protecting resources have been identified and would be considered by the NPS for implementation as part of the selected GMP/EIS alternative. Although each alternative in the GMP/EIS was designed in part to offer this protection, mitigation measures can further reduce impacts or offer greater protection of resources or values. As is true of all NPS actions, implementing the selected GMP/EIS alternative must be done in a way that protects unimpaired the park's natural and cultural resources and the quality of the visitor experience under the NPS Organic Act. Mitigation can be helpful or even instrumental in ensuring that this happens. In addition, actions described generally in the GMP/EIS often require a more site-specific environmental review under NEPA and other laws before they can be implemented. The mitigation measures described in table 2-10 are a starting point in developing design options for these actions. As an example, the implementation of a compliance monitoring program would be within the parameters of NEPA and National Historic Preservation Act compliance documents, USACE section 404 permits, etc. The compliance monitoring program would oversee these mitigation measures and would include reporting protocols.

As a part of the analysis of the GMP/EIS alternatives, mitigation measures that could further improve alternatives in protecting resources have been identified and would be considered by the NPS for implementation as part of the selected GMP/EIS alternative.

While some of the measures in Table 2-10 are standardized actions or are required by law, others are options that the NPS would consider in its final decision making. These are distinguished by the use of "should" or "consider" or similar language indicating that they are discretionary.



Table 2-10. Mitigation Measures to be Considered and/or Included as part of Action Alternatives.

Impact Topic	Mitigation Measure
Air Quality	If an anaerobic digester is built, consider housing it or otherwise filtering stack emissions to reduce methane.
Vegetation	Site-specific information on vegetation associations should be collected at Fort Tilden and Sandy Hook and used in siting camping and other recreation facilities. Rare or imperiled vegetation associations should be fenced or otherwise protected from visitor use at Fort Tilden and Sandy Hook.
Wildlife	Identify and consider imposing a buffer of approx. 300 feet around Hoffman Island and saltmarsh islands in Jamaica Bay to protect nesting wading birds, including herons, from visitors ~~both on foot and~~ in boats. ~~Consider closing Hoffman Island, Canarsie Pol, and marsh islands where wading birds can or do nest in Jamaica Bay to visitors from March 15 to August 31.~~ Consider limiting visitor access at Plumb Beach during new moon and full moon high tides during May and June to protect horseshoe crab spawning.
Species of Special Concern	Identify and consider imposing a buffer around osprey nests that would be in force during the April through August nesting season to ensure continued nesting success despite more intense or concentrated visitor use. Continue to close Breezy Point Tip, Sandy Hook north area, and portions of Sandy Hook beaches to visitor access to protect piping plover nesting mid-March through September 1. Consider working with USACE to realign the navigation channel into Great Kills Harbor to prevent the loss of horseshoe crab habitat from dredging to maintain the channel. Future implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, would adhere to conservation measures for threatened and endangered species. Camp sites would be appropriately sited to avoid impacts to threatened and endangered species. Access and trails to/from camp site areas would be defined, controlled, and signed, to limit disturbance to threatened and endangered species and other resources.

Table 2-10. Mitigation Measures to be Considered and/or Included as part of Action Alternatives (continued).

Impact Topic	Mitigation Measure
Cultural Resources	• Continue to complete research, risk assessments and inventories for park historic resources including archeological resources, historic structures, cultural landscapes, ethnographic resources, and museum collections to better understand and manage the resources. Continue to complete necessary National Register evaluations and documentation. Incorporate the results of these efforts into the park's resource stewardship strategy and site-specific planning and compliance documents. Continue to manage cultural resources following federal regulations and NPS guidelines and policy, such as Director's Order 24: NPS Museum Collections Management, Director's Order 28: Cultural Resource Management, and NPS 28A: Cultural Resource Management Guideline (NPS 2008, 1998a, 1998c), and the Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1992). • Where demolition or neglect of a historic property is proposed, the adverse effects will be mitigated through a variety of possible measures including (but limited to) graphic and photographic documentation, Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS) documentation, and/or the Secretary's Standards and Guidelines for Historical and Archaeological Documentation. The level of this documentation, which includes photography, archeological data recovery, and/or a narrative history, would depend on significance (national, state, or local) and individual attributes (an individually significant structure, individual elements of a cultural landscape, etc.) and be determined through the ~~section~~ Section 106 process. When demolition of a historic structure is proposed, and following thorough documentation, architectural elements and objects may be salvaged for reuse in rehabilitating similar structures or they may be added to the park's museum collection. Demolished resources may also be incorporated into interpretive displays. • Through the park's interpretive programs, visitors will be encouraged to respect the park's coastal defense and maritime resources and to leave undisturbed any closed and/or inadvertently encountered historic and/or cultural resources. • In the event of new cultural resource discoveries made during the implementation of the GMP, the park will initiate consultation with the appropriate SHPO in compliance with ~~section~~ Section 106 of the National Historic Preservation Act. • Should human remains or funerary or sacred objects be encountered, work will immediately cease and the park staff will notify and consult with appropriate American Indian Tribes as required under the Native American Graves Protection and Repatriation Act of 1990 (NPS 2003c, 51–52). • Unless otherwise stated, the Secretary of the Interior's Standards (NPS 1992) will guide work affecting any historic properties. • Where they exist (also see the "Affected Environment" chapter), cultural landscape reports will be used to provide guidance for work in historic districts / cultural landscapes. These reports contain treatment guidelines for all aspects of the cultural landscape, including spatial organization, natural systems and features, land use, circulation, topography, buildings and structures, vegetation, and small-scale features. • When historic districts and/or structures are left unmanaged and are expected to deteriorate and decay, the appropriate level of documentation will be prepared and consultation conducted as set forth in ~~section~~ Section 106 of the National Historic Preservation Act.

Table 2-10. Mitigation Measures to be Considered and/or Included as part of Action Alternatives (continued).

Impact Topic	Mitigation Measure
Visitor Safety and Visitor Experiences	• Visitor safety concerns would be integrated into NPS interpretive and educational programs. Directional signs would continue to orient visitors, and education programs would continue to promote understanding among visitors. • Measures to reduce adverse effects of construction and building rehabilitation on visitor safety and experience would be implemented, including project scheduling, a traffic control plan, and best management practices. • An accessibility study will be conducted to understand barriers to park programs and facilities. Based on this study, a strategy will be implemented to provide the maximum level of accessibility. • "Managed ruins" sites will be fenced off, signposted, and or/obscured from view to reduce the temptation for unsanctioned and unsafe access.
Soundscapes	• Facilities would be located and designed to minimize objectionable noise. • Standard noise abatement measures would be followed during construction, including a schedule that minimizes impacts on adjacent noise-sensitive resources, the use of the best available noise control techniques wherever feasible, the use of hydraulically or electrically powered tools when feasible, and the location of stationary noise sources as far from sensitive resources as possible. • Options to reduce the sounds of maintenance equipment will be explored.
Visual Quality / Scenic Resources	• Where appropriate, facilities such as trails and fences would be used to route people away from sensitive natural and cultural resources while still allowing access to important viewpoints. • Facilities would be designed, sited, and constructed to avoid or minimize visual intrusion into the natural environment or cultural landscapes. • Vegetation screening would be provided, where appropriate.
Socioeconomic Environment	• During the future planning and implementation of the approved management plan for the park, NPS staff would work with local communities, New York City, and Monmouth County to further identify potential impacts and mitigation measures that would best serve the interests and concerns of both the NPS and the local communities. • Partnerships would be pursued to improve the quality and diversity of community amenities and services.
Transportation	• When the parking lots at Jamaica Bay Wildlife Refuge, Miller Field, or other park sites where space is often inadequate fill, redirecting traffic elsewhere would avoid exceeding the site's carrying capacity, as directed by NPS Management Policies 2006 (NPS 2006a). • Transportation infrastructure projects would be sited in areas, to the greatest extent possible, that were previously disturbed, to minimize impacts to resources. Trails would be defined, controlled, and appropriately signed to lead people away from threatened and endangered species locations. The initial proposed infrastructure options (ferry, shuttle, multi-use pathways), would require further analysis, site planning, consultation and compliance.

Cost Summary of the Alternatives

The future costs of implementing the alternatives were considered as part of the planning process. Future costs would encompass the design, construction, rehabilitation, or adaptive use of historic structures and landscapes, natural areas, visitor orientation, recreation and education facilities, parking areas, museum collection facility, maintenance areas, and other visitor services. In estimating the costs of the alternatives, different types of costs are taken into account, including one-time capital and annual operating costs.

Annual Operating Costs and Staff Levels

Annual operating costs (ONPS) are the total costs per year for maintenance and operations associated with each alternative, including utilities, supplies, staff salaries and benefits, leasing, and other materials. For alternative A, the park's current annual operating costs are $23,758,000. The operating costs for alternatives B and C would remain similar to alternative A and adjusted yearly as part of the federal budget process.

Staffing levels would be consistent for alternatives A, B and C. There are currently 295 FTEs authorized for the park. The staffing figure (total number of FTE employees) is the number of person-years of staff required to provide visitor services, protect resources, maintain the assets of the park, and generally support park operations. The FTE number indicates ONPS-funded NPS staff only, not volunteer positions or positions funded by partners. FTE salaries and benefits are included in the annual operating costs. While the FTE number would remain the same for each alternative, the types and numbers of positions for maintenance, resource management, visitor services and other park functions would likely change by alternative.

One-time Capital Costs

The presentation of capital costs in a general management plan is intended for alternatives comparison purposes only. This plan, however, does not present estimated capital costs for the alternatives beyond a broad conceptual range of $100M to $300M due to the degree of uncertainty in the details required for developing estimates. The costs are not appropriate for budgeting purposes, although they do indicate the level of NPS investment that would be needed to implement the alternatives, and to allow comparison of the costs for each alternative.

A number of alternative actions will require major partner contributions and/or cooperation by other entities in order to accomplish those actions. These actions are considered less certain, and not enough details are known at this time to estimate costs. In addition, implementation planning for many of the proposals in the action alternatives would not proceed until the completion of Hurricane Sandy Recovery projects. The work being undertaken in recovery projects will establish a new baseline for site planning for capital projects proposed in this plan, and cost estimates at this time would be highly conjectural. Actual costs would be determined at a later date and would take into consideration the design of facilities, identification of detailed resource protection needs, and contributions by non-NPS partners.

Future Planning Studies and Implementation Plans

The need for additional studies and implementation plans was identified during the planning process. The studies and plans identified in Table 2-11 are the highest priority for implementation of the preferred alternative. The NPS would develop these plans and studies in coordination with stakeholders, academic institutions, and local governments, and state and other federal agencies.

Table 2-11. Future Planning Studies and Implementation Plans.

Type of Plan or Study	Purpose of Plan or Study
Archeological Coastal Resources Management Plan	Inventory and document threatened archeological resources in coastal areas and develop a management strategy for responding to climate change impacts.
Climate Change Plan	Provide a framework for incorporating technical data related to climate change impacts into natural and cultural resources management and visitor experience and facility planning.
Green Parks Plan	Develop a park strategy for water and energy conservation, alternative energy development, waste stream reduction and green products purchasing. Update information from 1993 Green House Gas Inventory. Implementation strategy for energy conservation measures identified in 2010 energy audit, including completing metering of individual buildings to tract energy usage of structures.
Buildings Sustainability Plan	Develop a park-specific sustainability plan that supports the park purpose, integrates with park strategic documents, ensures that appropriate documentation is completed, and contributes to the overall regional sustainable buildings targets and objectives.
Jamaica Bay Freshwater Wetlands Study	Conduct a system-wide study of freshwater wetlands in Jamaica Bay to understand the relationship of future restoration projects and potential future salt water intrusion.
Marine and Estuarine Resources Management Plan	Identify the conditions and actions necessary to improve the park's management of fisheries and shellfisheries, submerged aquatic vegetation, and marine species.
Floyd Bennett Field Camping Plan/Environmental Assessment	Develop a camping plan including site-specific design of multiple sites and supporting facilities.

Table 2-12. Summary of the Impacts by Alternative.

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Soils and Geology			
Physical character of soils	Adverse from compaction	Additional adverse impact from increased visitor use, facilities	Slightly less adverse than B because of fewer facilities, visitors
Availability of soils/ erosion	Beneficial from beach nourishment	Adverse from excavation, grading for visitor facilities where natural soils exist	Slightly less adverse than B because of fewer facilities
Natural offshore sand transport	Adverse from interruptions of sand transport	Significant beneficial impacts from possible removal of impediments	Same as B
Natural soils	Adverse from unnatural fill, rubble at many sites	Possible significant benefit from created wetlands	Same as B
Air Quality			
Mobile emissions	Adverse from cars, buses at park and in region of air basin	Substantial beneficial impact from increase in alternative transportation, public transportation options	Same as B
Stationary emissions	Adverse from power generation and other sources upwind of park and park operations	Beneficial from increasingly sustainable practices; short term adverse from construction	Slightly less adverse because less construction than B
Greenhouse gases	Adverse from park operations, but beneficial from tree planting	Beneficial from additional sustainable park operation practices, tree planting	Same as B
Water Resources			
Jamaica Bay water quality and hydrology	Significant benefits from collaborative efforts to improve	Additional significant benefits from holistic planning and expanded partnership, scope of research and application of findings to restore water quality and hydrology	Same as B
Infiltration	Adverse from paved areas and facilities; beneficial from maintained open spaces	Localized adverse impacts at several park sites from increased development, hardening.	Slightly less adverse because less construction than B
Open water habitat	N/A	Possible significant benefits from creating open freshwater and marine habitat in the park	Slightly more beneficial as area of created open water habitats would be expanded
Wetlands and Floodplains			
Risk of damage from coastal flooding	Localized benefits from beach nourishment and dune stabilizing efforts	Potentially significant adverse impacts from rebuilding or rehabilitating coastal structures Potentially significant benefits from increased efforts to stabilize dunes, create a positive sediment budget	Same as B

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Wetland resource conditions	Significant benefits from collaborative efforts to improve water quality in Jamaica Bay Substantial benefits from invasive species removal in wetlands	Additional significant benefits from holistic planning and expanded partnership, scope of research and application of findings to restore water quality Possible localized significant benefits from increased focus on invasive species removal in wetlands	Same as B
Saltmarsh wetland habitat	Significant benefits from collaborative efforts to increase saltmarsh Slight benefit from leaving West Pond breached	Additional significant benefits from holistic planning and expanded partnership, scope of research, and application of findings to increase saltmarsh Significant benefits from establishing a reconnection between Jamaica Bay and former saltmarsh at Floyd Bennett Field	Slightly more beneficial as area of saltmarsh at Floyd Bennett Field larger than in B
Freshwater wetland habitat		Significant benefits from holistic planning to create freshwater wetlands, including at West Pond Significant benefits from creating freshwater wetlands at Floyd Bennett Field	Slightly more beneficial as area of constructed freshwater wetlands at Floyd Bennett Field larger than in B
Marine Resources			
Marine borrow pits for sand used to nourish park sites	Adverse impacts to marine life at borrow sites	Same as A	Same as A
Marine and intertidal habitat at park	Benefits by adding habitat from beach nourishment Ongoing adverse impacts from impediments to natural sand transport processes	Adverse impacts from increases in visitor use and development Significant benefits by increasing extent of beach and dune habitat if sand transport processes restored Benefit from restored mudflat, intertidal habitat from increased collaboration to restore Jamaica Bay	Slightly less adverse impacts from less visitor related use and development Same as B for restoration of sand, dune, mudflat, and intertidal habitat
Marine, beach, and dune systems	Adverse impacts – Currently missing essential components and degraded at many park sites	Significant benefit from possibly restoring essential element of system if natural sand transport returned	Same as B

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Vegetation			
Trampling of vegetation	Adverse impacts from off-trail use, horse use, visitor use at beaches and dunes Benefits from maintaining undisturbed and protected areas, including for rare vegetation associations	Localized adverse impacts from increased amenities and visitors Continued benefits by maintaining undisturbed areas where rare vegetation exists	Slightly less adverse impacts from lower levels of increased facilities and visitor use Greater benefits by restricting visitor access for unique vegetation at several park sites
Habitat restoration	Benefits from planting at many park sites, including Pennsylvania and Fountain Avenue park sites, Crooke's Point, Fort Tilden Benefits from invasive species removal Adverse impacts from impediments to natural sand transport causing habitat loss, erosion	Increased benefits from additional efforts to control erosion, remove invasives, and plant native species Possible significant benefits for mudflat, intertidal, and dune vegetation from restoring natural sand transport	Same as B
Restoration of saltmarsh vegetation	Benefits from leaving West Pond breached Significant benefits from partnership restoration of Jamaica Bay saltmarsh	Localized short-term adverse impact from restoring West Pond Significant benefits from increased collaborative efforts to restore saltmarsh at Jamaica Bay Significant benefits from restoring connection between Jamaica Bay and Floyd Bennett Field	Same as B
Restoration of freshwater wetland vegetation	Adverse impacts from losing freshwater wetlands at West Pond	Significant benefits from holistic planning and creation of freshwater wetlands across park sites Significant benefits from creating freshwater wetlands at Floyd Bennett Field	Same as B
Wildlife			
Human disturbance	Adverse impacts from visitor use disturbing wildlife Adverse impacts from presence of humans keeping wildlife from using otherwise suitable habitat Benefits from keeping some areas closed to visitors	Increasing adverse impacts from increased visitor use from disturbance and displacement ~~Possible significant adverse impacts on nesting wading birds from allowing visitation at some Jamaica Bay Islands and Hoffman Island~~ Adverse impacts from night use Adverse impacts from loss of habitat due to development	Similar impacts from disturbance No visitation on islands, same as alternative A Less adverse impacts than B from night use (less camping) Less adverse impacts than B from development Benefits from additional closures to visitors where wildlife is sensitive

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Wildlife habitat	Benefits from maintaining grassland habitat by mowing Benefits by improving habitat conditions through invasive species removal Possible significant adverse impact from keeping West Pond breached as freshwater habitat is rare Possible significant benefits from collaborative efforts to restore Jamaica Bay saltmarsh habitat	Benefits by improving habitat with increased erosion control, wetland protection, and invasive species removal Possible significant benefits for freshwater wetland species from holistic planning to create wetlands at several park sites Significant benefits from increased collaborative research and stewardship of Jamaica Bay saltmarsh habitat Significant benefits from creation of freshwater and saltmarsh habitat at Floyd Bennett Field Localized benefits to intertidal wildlife from restored natural sand transport if it occurs	Same as B
Species of Special Concern			
Trampling listed plants	Adverse impacts from visitor use Benefits from fencing and signs	Adverse impacts increased from increased visitor use	Same as B
Human or other disturbance	Adverse impacts from visitor use Potential significant benefits for shorebirds, terrapins, colonial nesting wading birds from fencing and signs, buffers, education, predator management, and/or closures	Adverse impacts increased from increased visitor use, with harassment and significant impacts possible Continued restrictions would provide potential significant benefits ~~Possible significant adverse impacts from disturbance of state-listed nesting wading birds if islands open to visitors~~ No visitors to islands, with beneficial impacts the same as in alternative A as a result	Similar to B, although alternative C anticipates additional closures and fewer visitor amenities with fewer areas of disturbance No visitors to islands, with beneficial impacts the same as in alternative A as a result
Habitat improvement, loss or gain	Benefit for horseshoe crabs, piping plovers, and other beach wildlife from sand nourishment Adverse impacts from loss of otherwise suitable habitat related to disturbance	Increased potential for adverse impacts from habitat lost to disturbance or development that is otherwise suitable, including at Sandy Hook Significant benefits from creating saltmarsh habitat through collaboration at Jamaica Bay or reestablishing a connection at Floyd Bennett Field Substantial benefits from possible restoration of natural sand transport processes	Similar to B, although less habitat lost to development and more saltmarsh at Floyd Bennett Field created

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Cultural Resources – Historic Districts and Historic Structures			
Historic Districts containing Fundamental Resources	Benefits from maintenance, stabilization and preservation of some historic structures (coastal defense and marine resources) within Fort Hancock and Sandy Hook Proving Ground and Fort Wadsworth Significant adverse impacts from lack of maintenance for some historic structures (batteries and/or Nike Missile sites) at Fort Hancock and Sandy Hook Proving Ground, Fort Tilden, Fort Wadsworth)	Benefits to Fort Hancock and Sandy Hook Proving Ground, Fort Tilden and Fort Wadsworth from stabilization, rehabilitation/re-use, preservation, interpretation of some coastal defense and maritime resources; protection of individual resources designated as part of the Historic Zone; and protection of some historic structures from threats of future storm surges/flooding. Significant adverse impacts from loss of individual fundamental resources designated as part of the Ruins sub-zone (less severe than under alternative A).	Similar to alternative B
Other Historic Districts	Beneficial impacts from continued rehabilitation of historic structures and re-establishment of cultural landscape vegetation at Floyd Bennett Field.	Benefits from preservation and interpretation of the cultural landscape at Floyd Bennett Field Historic District; appropriate improvements to park facilities at Jacob Riis Park Historic District; and stabilization of historic structures at Miller Army Airfield Historic District, Breezy Point Surf Club Historic District, Silver Gull Beach Club Historic District and Far Rockaway Coast Guard Historic District Adverse impacts possible from outcome of converted structures in historic districts (Floyd Bennett Field) Significant adverse impacts to historic districts from application of Ruins Subzone (Floyd Bennett Field Historic District, Jacob Riis Park Historic District, Far Rockaway Coast Guard Historic District)	Benefits from preservation of the cultural landscape and adaptive re-use of structures at Floyd Bennett Field Historic District,(to a greater degree than alternative B); otherwise, same as alternative B. Significant adverse impacts to districts from application of Ruins Subzone similar to alternative B
Historic structures	Significant adverse impacts from lack of maintenance of many coastal defense resources (batteries) and other historic structures	Beneficial impacts from maintaining, stabilizing, restoring, and adaptive reuse of prioritized structures noted above in fundamental resources and other historic districts Adverse impacts from possible inappropriate conversion of historic structures and loss of historic structures in Ruins Subzone as noted above in Fundamental Resources and Other Historic Districts	Beneficial impacts similar to alternative B. Adverse impacts from loss of historic structures in Ruins Subzone as noted above in Fundamental Resources and Other Historic Districts

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Cultural Resources – Archeological Resources			
Ground disturbance from walking or similar uses	Beneficial impacts from management of Hoffman and Swinburne Islands as natural areas (no park visitors)	Benefits related to visitor restrictions (established trails) on Swinburne and Hoffman Island ~~(fewer benefits than under alternatives A or C)~~	Beneficial impacts from management of Hoffman and Swinburne Islands as natural areas--no park visitors (similar to alternative A)
Ground disturbance from excavation, grading and/or filling	N/A	Adverse impacts from grading, excavating, filling associated with construction of visitor amenities/facilities and O&M facilities; impervious surface removal; rebuilding of structures lost/ damaged in Hurricane Sandy; landscape modifications to protect some historic structures from threats of future storm surges/flooding (increased adverse impacts than under alternative A)	Similar to alternative B
Ground disturbance from natural resources management actions	Adverse small-scale impacts from invasive species removal or tree planting, environmental restoration possible	Increased adverse impacts possible with greater efforts with invasive species removal, tree planting, wetland enhancement/creation, etc. (greater impacts than under alternative A) Adverse impact to submerged archeological resources from off-shore beach nourishment activities possible (greater impacts than under alternative A)	Similar to alternative B
Management strategies	Adverse impacts to archeological resources associated with deteriorating/decaying historic structures possible	Benefits related to preservation of archeological resources--primarily left intact and undisturbed (greater benefits than under alternative A) Adverse impacts to archeological resources associated with deteriorating/ decaying historic structures within the Ruins Subzone possible (effects less intense than under alternative A)	Similar to alternative B

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Cultural Resources – Museum Collections			
Collection security and safety	Adverse impacts from substandard conditions	Beneficial impact from locating and moving collection to a suitable and sufficient archival facility	Same as B
Social and Economic Environment			
Use of park for enjoyment and recreation	Social benefits for community and other visitors	Increased benefits from increased access to Gateway and between park sites	Same as B
Visitor spending in community	Beneficial impacts for community from purchase of goods and services	Increased visitor numbers would result in increased spending and community economic benefits	Benefits would be similar to but less than in B because of fewer expected visitors
Jobs created	Benefits from park and concessioner related jobs	Increased facilities and opportunities for recreation may increase jobs with benefits for employment	Benefits would be similar to but less than in B because of fewer visitor facilities
Transportation			
Parking and traffic	Adverse impacts from insufficient parking at Sandy Hook and other sites Adverse impacts from congestion when sites reach capacity	Benefits from building new or redesigning existing park lots and providing non-car options Benefit possible if park chooses to redirect traffic away from filled lots	Same as B
Public transportation	Adverse impacts from few public transportation options to access park	Possibly significant benefits from transportation hubs and multiple public transportation options, including new buses, shuttles and ferries	Same as B
Access between sites	Adverse impacts from few signs or other means of locating and traveling between park sites	Benefits from wayfinding and hubs with location information Benefits from creating paths between park sites, and between neighborhoods and park sites	Same as B
Alternative transportation	Adverse impacts from inadequate bike lanes, footpaths, or water access ways (blueways)	Possible significant benefits from increasing bike lanes, footpaths, and blueway options	Same as B

Table 2-12. Summary of the Impacts by Alternative (continued).

	Impacts under Alternative A	Impacts under Alternative B	Impacts under Alternative C
Park Management, Operations, and Facilities			
Facility maintenance and condition	Significant adverse impacts on park facilities because of inadequate budget to maintain all buildings and facilities; backlog and deterioration would continue to increase Short-term benefits from using repair money from Hurricane Sandy	Significant benefits from prioritizing key facilities for maintenance and allowing others to degrade; reduction in deferred maintenance Significant benefits possible if revenue-generating programming implemented	Same as B Significant benefits possible if preservation partners assist with rehabilitation of structures
Staff and budget	Significant adverse impact on park staff and budget from inadequate funds to maintain facilities	Adverse impacts from increased need for visitor programming and management, especially if funding inadequate to ensure staff levels Significant benefits possible from co-management with partner agencies on both staffing and budget, especially if revenue-generating programming implemented	Same as B Significant benefits possible from co-management with partner agencies to eliminate overlap and provide additional staff and budget
Energy efficiency/ resource conservation	Benefits from ongoing efforts to adopt LEED standards, reuse existing structures, increase fuel efficiency of fleet, and provide alternative transportation for visitors	Significant benefits on park objectives and budget from increased efforts to incorporate sustainability into operations	Same as B
Operational efficiency	NPS staff, budget are tasked with all aspects of management and operations	Significant benefits in improved operational efficiency from partnering with New York City to eliminate duplicative programming and management	Same as B

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Chapter 3: Affected Environment



The information in the "Affected Environment" chapter describes resources and values that may be changed if an action alternative is implemented. In addition to describing the resources, available data on existing conditions is included.





Natural Resources

Soils and Geology

Geology and Physiography

Gateway National Recreation Area (Gateway or the park) is spread out in three units in the boroughs of Brooklyn, Queens, and Staten Island, New York, and in Monmouth County, New Jersey. The park is generally considered part of the Atlantic Coastal Plain province. Coastal plain materials are from formations of sand and gravel characterized by a relatively high degree of weathering. Most of the park in New York City is covered by deposits from an ice age that began about 1.6 million years ago; Sandy Hook (in New Jersey) was not glaciated (NRCS et al. 2001). Stratification or layering is common in outwash deposits from glaciers and is displayed in metropolitan surface materials.

The park is generally considered part of the Atlantic Coastal Plain province. Coastal plain materials are from formations of sand and gravel characterized by a relatively high degree of weathering.

The area geology includes crystalline bedrock, sedimentary rocks, and igneous intrusive rocks. In many places, these are covered with human-deposited fill. The bedrock for the Jamaica Bay and Staten Island Units consists of Cretaceous age rocks, including the Raritan Formation, the Monmouth Group, and the Matawan Group, and in some places unconsolidated Cretaceous sediment of the Magothy Formation (Fisher et al. 1970, as cited in Edinger et al. 2008a). The surficial geology of these two units is primarily outwash sand and gravel with small amounts of till moraine at Fort Wadsworth and significant areas of artificial fill (e.g., at Floyd Bennett Field and Great Kills Park). The surficial geology of the Sandy Hook Unit is Holocene age (Stanford 2000, as cited in Edinger et al. 2008a). The original sedimentary and igneous rocks have been folded, faulted, and in some places melted and recrystallized during several cycles of mountain building. Although bedrock exposures are common in Manhattan and the Bronx, for the most part they are buried beneath younger deposits. Serpentine, a green metamorphic rock, forms the backbone and highest point on Staten Island (NRCS et al. 2001). Most of the park's landscapes are characterized by relatively flat to slightly undulating topography, with elevations ranging from sea level to less than 50 feet above mean sea level (NRCS et al. 2001).

Soils

The Jamaica Bay Unit contains the greatest proportion of tidal marsh inside the park, which is underlain in large part by poorly drained glacial outwash soils in the Ipswich series. In some areas, considerable amounts of organic materials have accumulated since the retreat of the glaciers. The unit also contains urban land, which is a mix of human-deposited materials (NRCS et al. 2001). For example, Floyd Bennett Field in the Jamaica Bay Unit was constructed on saltmarsh now covered by dredged materials, rubble, fly ash, and wastes (see "Soils and Geology" impacts common to both action alternatives section for more information) and in some cases paved to create space for runways, hangars, and historically for the railroad across Jamaica Bay. The Fountain Avenue and Pennsylvania Avenue former landfills occupy space on the northern edge of Jamaica Bay. Each is about 80 feet high and covers 100 acres of former saltmarsh habitat.



Areas covered by glacial outwash south of the terminal moraine on Staten Island include Miller Field and Great Kills Park. These are either sand or well-drained soils of the Bernardston series, the latter covering most of the park sites in the Staten Island Unit (Edinger et al. 2008a). Pockets of windblown sediment can also be found blanketing the surface in some areas. The red sand of Great Kills Park is human deposited from hydraulic dredging of glacial deposits from offshore sandbars (NRCS et al. 2001).

The Sandy Hook Unit is covered with beach sands and less well-drained depressions of the Hooksan series, as well as urban land and other human-deposited fills (Edinger et al. 2008a).

Shorelines and Coastal Processes

Although the three units of the park total only about 8,300 acres in land area (and a total of 21,680 acres of land and National Park Service [NPS]-managed waters), they include 75 miles of shoreline. The Sandy Hook Unit's shoreline on the Atlantic Ocean and Raritan Bay (to the west) covers more than 6 miles, but it is the park sites in the Jamaica Bay Unit that compose the majority of the park's shoreline (NRCS et al. 2001).

Coastal processes include marine processes such as tides, coastal currents, storm surges, and shoreline dynamics. These forces are some of the most significant drivers of geomorphological processes (which relate to the origin and development of landforms) at the park. Humans have also shaped landforms at the park, starting with historical uses such as agriculture and progressing to more recent ones such as urbanization, dredging and filling, diverting freshwater flows, and hardening of the shores with development and massive sand stabilization efforts.

Coastal Sediment Supply and Movement

Ocean shores at the park are fed by sediment carried along the coast by the longshore current in a process called littoral drift. Longshore transport provides material that contributes to a natural development of the barrier island profile, including the formation of offshore bars, beach slopes, beach berm, dunes, and foredune habitat. The strength of waves and currents, the angle at which waves strike the shore, tidal cycles, and the size and weight of sand grains the current carries all help define how and where the sediment will be deposited. At Gateway, the longshore current travels from east to west along Long Island and from south to north along the northern New Jersey coast. The dominant wave action is from the southeast, a function of prevailing winds and storms in the tropics and the South Atlantic. The sources of material carried by the longshore currents offshore of park sites vary as described below, but sources include Headlands in New Jersey and remnants of glacial moraines in New York Bay (see the "Marine Resources" section of this GMP/EIS for distinctions between New York Bay, New York Bight, and New York Harbor).

The amount of sediment input (sources), deposition (sinks), and transport out of the system is the sediment budget. Usually, the sediment budget is expressed in terms of some volume of sand gained or lost per year for a given area. Whether the sand is lost to an offshore sink,

inland to a bay, or transported to the next area downdrift is not important to the potential for accretion (adding of sediment) or erosion (removal of sediment) of a coastline (Psuty et al. 2009). In general, most park sites at Gateway are experiencing a long-term negative sediment budget. However, there are portions of the park that are expanding while others are eroding; this is true of the Sandy Hook Unit, for example.

When natural conditions prevail, the topography of the ocean shoreline is a broad beach backed by a vegetated foredune. The beach, dunes, and island core exchange sediment with each other and with the nearshore environment in different measure during the seasons. Sand is moved from offshore to onshore at different times of year by a variety of mechanisms, including tides, waves, and storms. In general, sand is stored offshore in sandbars during storms and migrates back to the beach during quieter times. Coastal dunes accumulate sand in the upper margin of the beach; their growth depends on wind transport and water moved during storms. Foredunes are dynamic, and can become steepened or scarped when storms erode beaches, or be pushed inland by storm surge and sand transported by strong waves. Very strong storms such as hurricanes or nor'easters can transport sand across the spit and into bays in a process called "overwash," or can cut a channel from ocean to bay, creating inlets and shoals in the bays. The back beach area is only flooded during winter storms and the highest spring tide surges. Winter coastal winds redistribute some of the sand to the back dunes, which can reach 20 to 30 feet above mean sea level in undisturbed areas.

Storms can cause the erosion or accretion of large quantities of sediment over a relatively short time. This was the case with Hurricane Sandy, which resulted in more than 160,000 cubic meters of sand moved across parking lots, roads, and buildings, and erosion substantial enough in some spots to uncover historic batteries and blockades that had been buried several feet deep.

Although sand transported by the longshore current can be sequestered naturally along the route—in inlets, for example—human activity also interrupts littoral drift. Dredging and stabilizing of inlets for navigation interrupts the magnitude of sediment transported; this is true of areas of Raritan Bay and Rockaway Inlet in the study area. Groin fields and jetties block and redirect longshore flows, resulting in the accumulation of material on the updrift side of these structures. The long-term impact of these structures varies based on local sediment transport regimes and on the size, effectiveness, and integrity of the structure. Whereas the structures that influence longshore transport are local, their impacts can be both local and regional in effect. More information on jetties and groins at specific park sites and their effects is presented below.

When a sediment budget is positive, the shoreline will migrate seaward; the opposite is true in a negative sediment budget, as the dune beach system will be displaced landward as sand is eroded and transported downdrift. As sea-level rise accelerates over time, the amount of sand in the sediment budget available for deposition will define an important element in the vulnerability of a coastline to increasing erosion and loss.

Storms can cause the erosion or accretion of large quantities of sediment over a relatively short time. This was the case with Hurricane Sandy, which resulted in more than 160,000 cubic meters of sand moved across parking lots, roads, and buildings, and erosion substantial enough in some spots to uncover historic batteries and blockades that had been buried several feet deep.

Coastal Processes at Park Beaches

The two major coastal landform components of Gateway are the barrier spits that compose Sandy Hook on the New Jersey coast and the Jacob Riis Park–Breezy Point stretch of the New York coast (Psuty et al. 2009). These are both products of the longshore transport of sand, which has extended the two barrier features toward Lower New York Bay. In other parts of the park, Plumb Beach was formed as a remnant of the eastern terminus of the Coney Island barrier, and Great Kills Park is located on the remnant of a barrier spit that formerly extended southwesterly along the ocean-facing margin of Staten Island.

Breezy Point Tip is the westernmost extension of the Rockaway Peninsula. East of Breezy Point Tip are two additional park sites that also lie on the Rockaway Peninsula: Fort Tilden and Jacob Riis Park. Each is supplied by eastern Long Island longshore transport of sediments originally deposited as glacial outwash.

Coastal Processes at the Jamaica Bay Unit

Rockaway Peninsula

Breezy Point Tip is the westernmost extension of the Rockaway Peninsula. East of Breezy Point Tip are two additional park sites that also lie on the Rockaway Peninsula: Fort Tilden and Jacob Riis Park. Each is supplied by eastern Long Island longshore transport of sediments originally deposited as glacial outwash. The Rockaway Peninsula is at the end of this sediment pathway, which transports sand along the south shore of Long Island at a rate of about 450,000 cubic yards/year (344,000 cubic meters/year) (Hess and Harris 1987, as cited in Psuty et al. 2009).

East of the park sites (i.e., further updrift in the longshore transport chain), sand is dredged at Little Rockaway Inlet and deposited downdrift to nourish beaches in the Rockaway communities. In addition, starting in 1975 and continuing to 2004, 17 million cubic yards (13 million cubic meters) of sediment were dredged from offshore to help supply these same beaches (USACE records; Yasso and Hartman 1976 and Neresian 1977, as cited in Psuty et al. 2009). Despite these beach nourishment efforts, a long and effective groin at the eastern end of Jacob Riis Park prevents longshore transport of sand to NPS-managed lands. Instead, a sand-starved, highly mobile beach profile exists at Jacob Riis Park, preventing the development of a stable foredune that could otherwise help reduce coastal erosion during storms. Further west, a foredune has formed at Fort Tilden despite riprap and wooden bulkheads along this site's entire length. At Breezy Point Tip, a jetty built in 1933 to prevent longshore transport from filling in the Rockaway navigation channel has resulted in the accretion of sand seaward for a distance of 2.8 miles. The accumulation has reached its maximum and filled the area between the point and the jetty, although an increase in height could occur (Psuty et al. 2009).

Hundreds of thousands of cubic yards of sand was blown and washed ashore by an 11- to 13-foot storm surge in each of these three areas during Hurricane Sandy in 2012, resulting in damage to buildings, roads, and other structures. Although dunes were overwashed and eroded at Breezy Point Tip and Fort Tilden, and buildings and facilities flooded and covered in sand at Jacob Riis Park, only debris removal was recommended to help restore coastal resources in NPS assessment documents (NPS 2012c). The exposure of wooden bulkheads at Fort Tilden is considered a human safety hazard and this area is closed to the public until an access plan is developed by the NPS. Although the rubble and debris trapped by the

bulkheads and exposed after the hurricane is increasingly reburied by sand, it is considered part of the hazard. Sediment washed onto the upland area of Fort Tilden, including on roads and parking lots, was placed near dunes in protective berms (NPS 2012c).



Plumb Beach

Plumb Beach is an access point to the shore along the outer bay area of Rockaway Inlet. It is a remnant of the eastern end of the Coney Island barrier island and its associated tidal inlet delta, but it is isolated from the general barrier evolution by the western extension of the Rockaway Peninsula (Psuty et al. 2009). Plumb Beach is also separated from longshore sediment supply through the dredging of the navigation channel into Sheepshead Bay west of the site. The effect of these changes and the completion of the inlet jetty at Rockaway Point in 1933 to stabilize Rockaway Inlet has been to switch net sediment transport at Plumb Beach from westward to eastward (NPS 2010a). Creation of the Belt Parkway in the 1930s resulted in a large amount of fill placed on the shoal inland of Plumb Beach and the establishment of a reformed shoreline at the seaward margin of the fill (Psuty et al. 2009). Because there was no natural source of sand coming into this area, net erosion displaced the shoreline inland toward the Belt Parkway.

Several episodes of beach nourishment and riprap placement in the central portion of Plumb Beach, including efforts by both New York City Department of Parks and Recreation and the U.S. Army Corps of Engineers,were observed in aerial photo evidence, as was the severe erosion and loss of the existing pathway near the Belt Parkway in 1985 (Psuty et al. 2009). However, sand deposited in the central portion of the park site continues to be transported from west to east, adding to the eastward-extending spit. The western margin of Plumb Beach is stabilized with a bulkhead structure and an offshore breakwater of old tires that was constructed in the early 1980s to intercept incident waves and reduce the wave energy reaching the remaining beach.

Recognizing the need for more consistent intervention, the park and the USACE analyzed options for stabilization of the shoreline to protect the Belt Parkway in a 2010 planning document and environmental assessment (NPS 2010a) and began to implement the first phase in 2011 by adding 150,000 cubic yards of sand. The next phase of the project begins in 2013 and consists of the construction of two terminal groins and an offshore breakwater to help reduce wave energy and retain sand.

Coastal Processes in the Staten Island Unit

The three coastal areas of the park shoreline on Staten Island—Great Kills Park, Miller Field, and Fort Wadsworth—are each situated where glacial deposits are being reworked by waves and currents but little of the natural topography remains. Large amounts of beach nourishment and dredged sediment and multiple shore structures have altered these sites. Each site is eroded somewhat by longshore transport from the northeast moving southwest. Although the transport does not add sand to these sites because of updrift groins, it does create a depositional spit at Crooke's Point on the western edge of Great Kills Park (Psuty et al. 2009).



Great Kills Park

Great Kills Park was constructed at least in part by excavation of sediment to create the Great Kills Park Harbor; dredged materials were used to build up the surrounding land, including a connection from the mainland to Crooke's Point Island. The cumulative effect of the groins deliberately installed to trap sediment from the longshore current was doubled when a very long outfall pipe installed in 1975 effectively stopped the remaining sediment from reaching Great Kills Park (Psuty et al. 2009). A jetty at Crooke's Point on the western edge of Great Kills Park keeps the harbor from filling in, but the beach immediately to the west (downdrift) is eroding. Sanitary landfills in the 1940s covered the saltmarsh behind the beach and increased its elevation by 35 feet. Nonetheless, the beach is a popular visitor destination. Portions of the Great Kills Park site north of the harbor have been closed recently due to the discovery of radium ~~radon~~ from medical waste in the early landfills. The accreting Crooke's Point was at one point a sand spit, which was separated by a storm in the early 1900s to become an island. Crooke's Point was reconnected using the dredge material from the harbor, which was used to fill in the saltmarshes and three creeks.

Miller Field

The shoreline of Miller Field extends between two groins for about 2,000 feet (630 meters), about 1,600 feet (500 meters) of which is within park boundaries. The shoreline is completely composed of artificial fill and is manipulated by the placement of this fill and the sand-capturing ability of the two groins. Sand trapped by the groins and held by a sand dike is used to nourish this small beach (Psuty et al. 2009).

Fort Wadsworth

A beach on the seaward-facing side of Fort Wadsworth is a product of fill placed in the 1950s. The northern 250 feet (75 meters) is lined by riprap and bounded by an offshore breakwater. Otherwise, the beach gently slopes toward a sand dike. No new sand is being transported to this site; it is exposed to waves entering the bay between Sandy Hook and Breezy Point and will continue to erode over time.

Coastal Processes at the Sandy Hook Unit

Sandy Hook is located at the intersection of the New Jersey shore with the ancient valley of the combined Raritan and Hudson Rivers, now flooded as Raritan Bay. It extends in width from several hundred feet to a mile. Several saltmarshes lie along the western side of the spit. Sand dunes line its eastern side, protecting grasslands, shrublands, woodlands, and forest vegetation from overwash flooding during most storms. Although the barrier spit extends northward 11.2 miles from its origin at the coastal headlands in Monmouth Beach, only the distal end (farthest from shore) is part of the park. Sandy Hook derives its sediment from northerly transport along the New Jersey shoreline; the source of this sediment is eroding headlands immediately updraft of Sandy Hook, which is considered insufficient to maintain the current shoreline in the long term (NRCS et al. 2001). Sand that makes up the spit is transported north by longshore current along the New Jersey coast and the east



side of Sandy Hook, and is supplemented by sediments derived from the Shrewsbury and Navesink River estuaries (USGS n.d.a). Plum Island, in Raritan Bay on the bayside of Sandy Hook, is a remnant of an old overwash fan formed by several intense storms that also separated Sandy Hook from the mainland in the 1800s (USGS n.d.a).

The supply and availability of sediment changes along the length of Sandy Hook, in some part due to its orientation but also because of built groins. Caldewell (1966, as cited in Psuty et al. 2009) estimated the volume of sand moved along the shoreline through longshore transport at about 500,000 cubic yards (382,000 cubic meters) per year. The southern portion of Sandy Hook is nearly north–south in its orientation, which means it is eroded by wave energy to a greater degree than it is fed by the longshore current. The natural source of sediment to supply the basal portion of Sandy Hook is more limited than for its northern portion (Psuty et al. 2009). About halfway into the NPS-managed lands, the shoreline changes to a north-northwest direction, where wave energy and deposition of sediment balance. This continues for 1.6 miles (2.5 kilometers), when orientation changes to due northwest, further lowering the wave energy and resulting in a positive sediment budget and accretion area north of Sandy Hook. Because there is a limited natural source of sediment to supply the basal portion of Sandy Hook, at times during the period from 1733 to 1900 it was detached from the mainland, making it an island. During this same time it has also reconnected to the mainland in two places—at the Highlands and at Long Branch, where it is connected now (Psuty et al. 2009).

This portion of the coast shows signs of erosion, both because sand supplies are inadequate to buffer continuous loss, and because of the presence of a 7.5-mile-long seawall and several groins. The groins were built over several decades in Monmouth Beach and Sea Bright south of the park, and the seawall was constructed from Monmouth Beach to the southern boundary of the park (NPS 2004c). Immediately north of the seawall, accelerated erosion developed after 1950 and increased through 1976 (Psuty et al. 2009), with loss rates that peaked at 230,200 cubic yards/year (176,000 cubic meters/year) (Psuty and Namikas 1991, as cited in Psuty et al. 2009). This area north of the seawall was dubbed the "critical zone" by Sherman et al. (1976, as cited in Psuty et al. 2009).

Although the town replenishes the sand on the beach side of the wall, it has been eroded away several times by strong storms (USGS n.d.a). In addition, the NPS has placed more than 5.2 million cubic yards (4 million cubic meters) of sediment in the vicinity of the critical zone since 1975 (Psuty and Ofiara 2002, as cited in Psuty et al. 2009). A 2004 environmental assessment of options to maintain the beaches in this portion of Sandy Hook (NPS 2004c) found that 1.5 million cubic yards of sand was needed every five to seven years, although beach nourishment efforts by Sea Bright and the U.S. Army Corps of Engineers (USACE) offset this estimate by about half. The source of sediment was identified in the environmental assessment as sand in the longshore, swash bars, and migratory shoals offshore of the northern accreting end of Sandy Hook (NPS 2004c), and a pipeline to transfer sand slurry from Gunnison Beach to the critical zone was put in place. The result of the slurry and beach nourishment has been to reduce the net rate of sediment loss and to increase available sediment in the critical zone.

In the northern part of Sandy Hook, a series of dune ridges representing earlier stages of accretion is now stranded inland as this portion continues to grow. In addition to the seawall and groins south of the park site, a few groins were built on what is now NPS-managed land at Sandy Hook. These structures, at Battery Gunnison and North Beach, are usually covered in sand and are not considered important in sand transport processes (Psuty et al. 2009).

As a result of the 2012 Hurricane Sandy, sand was blown or washed from the beaches west over much of the spit, covering vegetation and park facilities such as roads and parking lots. As noted above, this cross-peninsula transport of sand from the ocean to the interior and bay shoreline is a natural process resulting from storm surge that increases the elevation of dunes and sometimes of inland areas of the spit, making it more resilient to future storm events.

Jamaica Bay and its saltmarsh islands form one of the most recognizable and striking features in New York City.

The bayshore at Sandy Hook also shows signs of erosion. At one point just north of Spermaceti Cove, the wooden posts of a seawall built in 1912 are now nearly 150 feet from the shoreline standing in bay waters. The NPS returned the 160,000 cubic yards of sand cleared from roads and parking lots at Sandy Hook to the beach.

Shoreline of Jamaica Bay

Jamaica Bay and its saltmarsh islands form one of the most recognizable and striking features in New York City. Tidewater grasslands colonized postglacial outwash plains at the ends of many creeks and streams on Long Island to form these islands. In addition to the saltmarsh islands, many more hundreds of acres of "fringing marshes" once adjoined the mainland. Much of this habitat is now gone because of development, dredging, and pollution, as described below and in other sections of this GMP/EIS (see the "Wetlands and Floodplains" and "Vegetation" sections, for example). Benthic soils in the bay are more likely to be sandy in the western portion (east to the Rockaway Inlet) and silty in the eastern portion (NYCDEP 2007).

In 1878, the secretary of war and New York City began a major landscape modification to establish the bay as a major seaport. Broad channels were dug and the dredge spoils were used to fill in marsh areas and to create raised land for docks and piers. Later, marshland was filled in the construction of Floyd Bennett Field and what is now John F. Kennedy International Airport. The Marine Parkway Bridge, which connected Flatbush Avenue to the Rockaways, was completed in 1937, hastening the development of the protective barrier islands. Large landfills and sewage sludge disposal removed additional marshland. As a result, soils in the Jamaica Bay Unit, including those in the bay itself, are altered. The inorganic mass of marsh sediments has decreased in Jamaica Bay marshes since European settlement, while organic matter has increased over the same period (Peteet et al. 2004 and 2008, as cited in Rafferty, Castagna, and Adamo 2011). The upland areas adjacent to the marsh are largely underlain by urban fill or dredged materials. The primary sources of freshwater into the bay are four wastewater treatment facilities and numerous combined sewer overflow (CSO) pipes, although eight large and several smaller tributaries also empty into the bay. All of the tributaries have been altered by channelization and tend to have

little or no freshwater flow other than that conveyed by the CSO and/or storm sewers (NYCDEP 2007). Combined with wastewater effluent, they have increased nitrogen loading by more than 400 percent in the last 110 years (Rafferty, Castagna, and Adamo 2011) and changed the composition of nutrients in bay soils. Total organic carbon, a measure of organic material in sediments, was greater than 3.5 percent across nearly 40 percent of bay soils tested in 1998, a condition associated with decreased abundance of benthic aquatic species and biomass (Hyland et al. 2000, as cited in NYCDEP 2007). Soils along the northern and eastern portions of Jamaica Bay were also found to be contaminated with heavy metals and pesticide and other hydrocarbon residues such as polychlorinated biphenyls (PCBs), dichloro-diphenyl-trichloroethane (DDT), and chlordane in studies conducted from the 1970s through the 1990s.

By the 1960s, when the true ecological value of the saltmarshes was realized, the original 25,000 acres of Jamaica Bay saltmarsh and surrounding freshwater wetlands had diminished to about 13,000 acres (USGS n.d.a). A panel of experts convened by the NPS in 2001 investigated possible causes and identified relevant research needs. The panel theorized that increases in wave energy from waves and tides, a sediment deficit from dredging, the westward extension of the Rockaway Peninsula and eight terminal groins reducing sediment movement from the ocean into the bay, and sea-level rise were possible contributors.

By the 1960s, when the true ecological value of the saltmarshes was realized, the original 25,000 acres of Jamaica Bay saltmarsh and surrounding freshwater wetlands had diminished to about 13,000 acres.

Air Quality

Introduction

Gateway is located in New York City, New York, and Monmouth County, New Jersey, and air quality in the park is typical of that found in an urban area. Ambient air quality is affected by stationary, mobile, and area source emissions. Six air pollutants are regulated by National Ambient Air Quality Standards (NAAQS) under the Clean Air Act and are called "criteria" pollutants. These include carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM2.5 and PM10 combined), ozone, sulfur oxides (SOx), and volatile organic compounds (VOCs).

Air quality is an integrating resource that often affects numerous resources and values including the health of ecosystems, viewsheds, and visitor health and visitor experience.

National Ambient Air Quality Standards and Public Health

Carbon Monoxide

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Because CO is a reactive gas that does not persist in the atmosphere, concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages (NYCPC 2012b).

Ozone, Volatile Organic Compounds, and Nitrogen Oxides

Ozone is formed through a series of reactions between NOx and VOCs that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants move downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NOx and VOC emissions from all sources are therefore generally analyzed on a regional basis. Both stationary and mobile sources contribute to the combined total of these pollutants. The total vehicle miles traveled by cars, shuttles, buses, and other vehicles that bring visitors to the park are all considered sources of mobile emissions (FHWA 2006).

In addition to being a precursor to the formation of ozone, nitrogen dioxide (NO2; one component of NOx) is also a federally regulated criteria pollutant. NO2 is formed from the transformation of nitrogen oxide (NO) in the atmosphere. This pollutant is mostly generated by large stationary point sources and has not traditionally been considered a local concern. However, with the promulgation of a new 1 hour average NAAQS for NO2, local mobile sources such as vehicle emissions have become more important to managing this pollutant.

Particulate Matter

PM is a broad class of air pollutants that includes particles of a wide range of sizes and chemical compositions, either as liquid droplets (aerosols) or as solids suspended in the atmosphere. Fine particulate matter (PM2.5) is smaller, less than or equal to 2.5 microns in size, whereas coarse particulate matter (PM10) is less than or equal to 10 microns. The constituents of PM are numerous and varied and they are emitted by a wide variety of sources (both natural and human-made). Natural sources include salt particles resulting from the evaporation of sea spray; windborne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; and particles eroded from beaches, soil, and rock. Naturally occurring PM is generally greater than 2.5 microns in diameter. Major human-made sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, construction and agricultural activities, ship traffic, and wood-burning stoves and fireplaces (NYCPC 2012b). PM10 is often part of dust, soot, and ash.

PM2.5 has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is extremely persistent in the atmosphere.

Sulfur Oxides

SOx (primarily sulfur dioxide [SO2]) emissions are mostly associated with the combustion of sulfur-containing fuels (e.g., oil and coal). Monitored SO2 concentrations in New York City are lower than the current NAAQS, largely due to federal restrictions on the sulfur content in diesel fuel for on-road vehicles. Federal limits on stationary sources have also greatly reduced SO2 emissions in the east.

NPS Air Quality Conditions and Current Trends

The NPS Management Policies 2006 clarifies that the NPS will seek to "perpetuate the best possible air quality in parks" (NPS 2006a, section 4.7.1). This means establishing desired conditions for air quality that are consistent with the Clean Air Act, NAAQS, and other policy goals. Currently, the NPS focuses on three primary measures and associated desired conditions to evaluate natural resource-based air quality conditions in national parks: ozone concentrations, wet deposition of acidic compounds or nitrogen, and visibility.

Ozone

The NAAQS for ozone is set by the U.S. Environmental Protection Agency (EPA) and is based on human health effects. However, studies show that some plant species are more sensitive to ozone than humans are. Accordingly, the NPS Air Resources Division (ARD) recommends a desired condition for ozone that is lower than the human health-based NAAQS.

Currently, ozone conditions at Gateway are not meeting NPS ARD–recommended desired future conditions. The estimated ozone level from 2005–2009 at Gateway was 82.1 parts per billion (ppb), much higher than the reference condition of 60 ppb and a condition that warrants significant concern. Table 3-1 describes and assesses ozone conditions and trends at Gateway in more detail.

Deposition

Nitrogen and sulfur compounds deposited from air pollution can harm soils, vegetation, lakes, and streams through acidification or fertilization. Deposition is measured in kilograms per hectare per year (kg/ha/yr) of wet nitrogen or sulfur deposition. The NPS ARD–recommended desired condition for deposition is determined to be protective of all ecosystems based on current scientific understanding.

For 2005–2009, estimated wet sulfur deposition at Gateway was 5.2 kg/ha/yr, substantially higher than the reference condition of 1 kg/ha/year and one that warrants significant concern. Table 3-1 describes and assesses nitrogen and sulfur deposition conditions and trends at Gateway in more detail.

Visibility

Visibility is a measure of how far and how well a person can see a distant and varied scene. Pollutant particles in the atmosphere scatter and absorb light, creating a haze that impairs scenic views. The deciview (dv) metric measures visibility changes as perceived by the human eye (analogous to the decibel scale) and is used by the air regulatory community to track visibility conditions and trends. The Clean Air Act established a national goal to return visibility to "natural conditions" in Class I areas. Natural visibility conditions are those estimated to exist in a given area in the absence of human-caused visibility impairment (EPA-454/B-03-005). The NPS ARD recommends a visibility desired condition that is consistent with this Clean Air Act goal. Based on the Organic Act mandates, the NPS ARD recommends the same desired conditions for Class I and Class II parks. Gateway is a Class II park.

Currently, visibility conditions at Gateway are not meeting NPS ARD–recommended desired conditions and therefore warrant "significant concern" as indicated by the NPS ARD standards. For 2005–2009, estimated average visibility in Gateway was 12.0 dv above estimated natural conditions, whereas desired conditions are less than 2 dv above natural conditions. This is a condition status that also warrants significant concern. Table 3-1 describes and assesses visibility conditions and trends at Gateway in more detail. As detailed in the analysis of impacts on air quality in chapter 4 of this GMP/EIS, the great majority of pollutants, including those that affect visibility, come from sources outside the park.

Table 3-1. Air Quality Conditions and Trends at Gateway.

Indicators of Condition	Specific Measures	Condition Status/ Trend[a]	Rationale	Reference Condition
Ozone	Annual 4th-highest 8-hour concentration		**Condition:** The estimated ozone level from 2005 to 2009 at Gateway was 82.1 parts per billion (ppb); therefore, condition status warrants significant concern. Gateway falls within a county designated by the EPA as "nonattainment" for the ground-level ozone standards of an 8hour average concentration of 75 ppb. A risk assessment that considered ozone exposure, soil moisture, and sensitive plant species concluded that plants at Gateway were at high risk for ozone damage. Ozone-sensitive plants in the park include quaking aspen *(Populus tremuloides)* and chokecherry *(Prunus virginiana).* **Trend:** During 2000–2009, ozone levels at Gateway monitor improved. **Confidence:** The degree of confidence at Gateway is high because there is a nearby or on-site ozone monitor.	NPS ARD Benchmarks: Resource is in Good Condition: ≤ 60 ppb Warrants Moderate Concern: 6175 ppb Warrants Significant Concern: ≥ 6 ppb
Deposition	Sulfur wet deposition		**Condition:** For 2005–2009, estimated wet sulfur deposition was 5.2 kilograms per hectare per year (kg/ha/yr)[b]; therefore, the condition status warrants significant concern. Although Gateway receives among the highest measured sulfur wet deposition of all monitored parks, a risk assessment evaluating ecosystem sensitivity ranked Gateway's ecosystems as having low sensitivity to acidification effects relative to all Inventory and Monitoring parks. Acidification effects include changes in water chemistry that impact aquatic vegetation, invertebrate communities, amphibians, and fish. **Trend:** No trend information is available because there are no on-site or nearby wet deposition monitors. **Confidence:** The degree of confidence at Gateway is medium because estimates are based on interpolated data from more distant wet deposition monitors.	NPS ARD Benchmarks: Resource is in Good Condition: < 1 kg/ha/yr Warrants Moderate Concern: 13 kg/ha/yr Warrants Significant Concern: > 3 kg/ha/yr

Table 3-1. Air Quality Conditions and Trends at Gateway (continued).

Indicators of Condition	Specific Measures	Condition Status/ Trend[a]	Rationale	Reference Condition
Deposition	Nitrogen wet deposition		**Condition:** For 2005–2009, estimated wet nitrogen deposition was 4.4 kg/ha/yr[b]; therefore, the condition status warrants significant concern. Gateway receives among the highest measured nitrogen wet deposition of all monitored parks. A risk assessment evaluating ecosystem sensitivity ranked Gateway's ecosystems as having moderate sensitivity to nutrient enrichment effects relative to all Inventory and Monitoring parks. Nitrogen deposition may disrupt soil nutrient cycling and affect biodiversity of certain vegetative communities, including wetland plant communities. **Trend:** No trend information is available because there are no on-site or nearby wet deposition monitors. **Confidence:** The degree of confidence at Gateway is medium because estimates are based on interpolated data from more distant wet deposition monitors.	NPS ARD Benchmarks: Resource is in Good Condition: < 1 kg/ha/yr Warrants Moderate Concern: 13 kg/ha/yr Warrants Significant Concern: > 3 kg/ha/yr
Visibility	Haze index[c]		**Condition**: For 2005–2009, estimated average visibility in Gateway was 12.0 dv above estimated natural conditions[d]; therefore, the condition status warrants significant concern. **Trend:** No trend information is available because there are no on-site or nearby visibility monitors. **Confidence:** The degree of confidence at Gateway is medium because estimates are based on interpolated data from more distant visibility monitors.	NPS ARD Benchmarks: Resource is in Good Condition: < 2 dv above natural conditions[d] Warrants Moderate Concern: 28 dv above natural conditions[d] Warrants Significant Concern: > 8 dv above natural conditions[d]

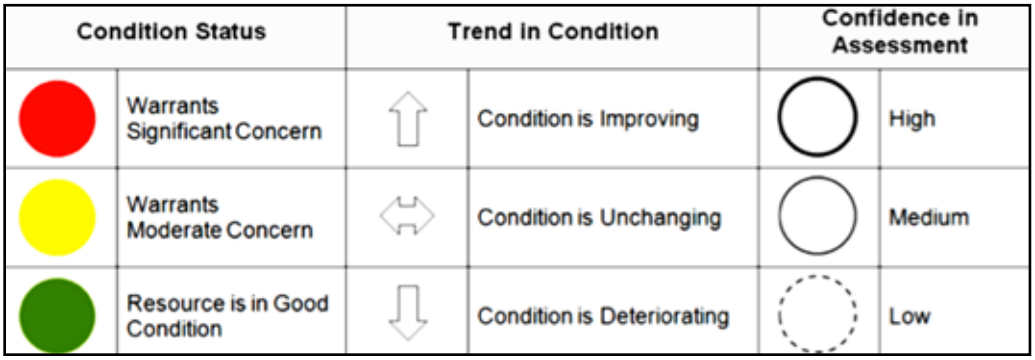
Sources: Kohut 2004; NPS ARD 2013; Sullivan et al. 2011a, 2011b.

[a]Interpolations of air quality monitoring data averaged over a five-year period (2005–2009) are used to evaluate conditions. Trend analyses are completed using 10 years (2000–2009) of data from on-site or nearby monitors.

[b]Reporting units for wet deposition conditions and trends are different. Wet deposition trends are evaluated using pollutant concentrations in precipitation (micro equivalents/liter) so that yearly variations in precipitation amounts do not influence trends analyses. Wet deposition conditions are based on nitrogen and sulfur loading (kilograms per hectare per year) to ecosystems.

[c]Visibility trend and condition calculations are expressed in terms of a haze index in deciviews (dv); however, the benchmark metrics are different. Condition assessments are based on interpolation of the five-year average current visibility minus estimated average natural visibility, where average visibility is the mean of visibility between 40th and 60th percentiles. Visibility trends are computed from the haze index values on the 20 percent haziest days and the 20 percent clearest days, consistent with visibility goals in the Clean Air Act.

[d]Natural visibility conditions are those estimated to exist in a given area in the absence of human-caused visibility impairment. The Clean Air Act established a goal of restoring visibility in all Class I areas to natural conditions. Estimated annual average natural condition equals 8.1 dv at Gateway.



NAAQS and Current Conditions

The New York Department of Environmental Conservation maintains an air quality monitoring system that includes the Jamaica Bay Unit. Data from the early 2000s indicate that the pollution levels for CO, NOx, and PM10 were below the NAAQS (FHWA 2006). The ozone concentrations exceeded the NAAQS for both the 1-hour and 8-hour averaging period. The PM2.5 concentration for the 24-hour averaging period met the NAAQS, but the annual concentrations continued to violate the standard. Table 3-2 shows measured concentrations at or near the park in assessment of the impacts of possible transportation methods at Jamaica Bay studied in 2005 and 2006 (FHWA 2006). For this table, data were taken from several sources, including Jamaica Bay Transportation Studies (FHWA 2006) and two recent New York City EISs (NYCPC 2012a, 2012b).

Table 3-2. Concentrations of Regulated Pollutants Compared to NAAQS.

Pollutant	Averaging Period	Concentration Measured at Gateway or Nearby	NAAQS (Federal Standard)
CO	8-hour	2.5 ppm	9 ppm
CO	1-hour	3.2 ppm	35 ppm
NO_x	Annual	47 µg/m^3	100 µg/m^3
NO_x	1-hour	126 µg/m^3	0.1 ppm or 188 µg/m^3
SO_2	1-hour	67.7 µg/m^3	0.075 ppm or 196 µg/m^3
Ozone	8-hour	0.086 ppm	0.075 ppm
Ozone	1-hour	0.116 ppm	0.12 ppm
PM_{10}	Annual	20 µg/m^3	50 µg/m^3
PM_{10}	24-hour	50–53 µg/m^3	150 µg/m^3
$PM_{2.5}$	Annual	16.3 µg/m^3	15 µg/m^3
$PM_{2.5}$	24-hour	36.5 µg/m^3	35 µg/m^3

Sources: FHWA 2006; NYCPC 2012a, 2012b.
CO = carbon monoxide; ppm = parts per million; NOx = nitrogen oxides; µg/m3 = micrograms per cubic meter; SO2 = sulfur dioxide; PM10 = particulate matter ≤ 10 microns; PM2.5 = particulate matter ≤ 2.5 microns

As mentioned in the "National Ambient Air Quality Standards and Public Health" section, the EPA has recently finalized a new 1 hour NO2 standard (February 29, 2012). The measured NO2 amount reported in table 3-2 is less than the new standard, but does not yet meet the criteria for attainment. This is because additional monitoring is required to determine whether concentrations are met over several years of data collection. Therefore, the EPA has designated the entire state of New York as "unclassifiable/attainment" for the new 1-hour NO2 standard.

The EPA also established a new 1-hour SO2 standard, replacing the 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties had met the 1-hour standard as of 2011, but additional data were needed to make attainment designations.

Attainment

As noted in the "NPS Air Quality Conditions and Current Trends" section, Gateway is designated a Class II air quality area. This designation protects air quality by allowing only limited increases over baseline concentrations for NOx, SO2, and PM. These pollutants are characteristic of the EPA's New York-New Jersey-Connecticut Air Quality Control Region, an area that includes the park. Table 3-2 shows concentrations of pollutants and table 3 3 summarizes the air quality attainment status for the six criteria pollutants in the region. Those pollutants for which Gateway and the surrounding area meet the NAAQS are designated as "attainment" status. For those pollutants that are still above the levels allowed by the NAAQS, Gateway and the surrounding area is designated as "non-attainment," and for those pollutants for which the park and regional area had been in non-attainment but has improved to meet attainment standards, the park is listed as a "maintenance area."

Table 3-3. Gateway Air Quality NAAQS Attainment Status (2006).

Pollutant		Averaging Period	Attainment Status
CO		8-hour	Maintenance area
NO_x		Annual	Attainment
Ozone		1- and 8-hour	Non-attainment
PM	PM_{10}	Annual and 24-hour	Attainment
	$PM_{2.5}$	Annual and 24-hour	Non-attainment
Pb		Quarterly	Attainment
SO_2		Annual/24-hour and 3-hour	Attainment

Source: FHWA 2006.
CO = carbon monoxide; NOx = nitrogen oxides; PM10 = particulate matter ≤ 10 microns; PM2.5 = particulate matter ≤ 2.5 microns; Pb = lead; SO2 = sulfur dioxide

Gateway-specific CO Measurements

The Jamaica Bay Transportation Studies document (FHWA 2006) also measured CO, which is indicative of vehicle use, at Floyd Bennett Field and Jacob Riis Park and predicted how this would change over time assuming reasonably foreseeable future changes in EPA regulations and park compliance with the new regulations. At Floyd Bennett Field, the Federal Highway Administration found that 1-hour CO concentrations under the 2005 existing conditions ranged from 6.1 to 6.3 ppm (NAAQS is 35 ppm). The 2005 existing condition 8-hour CO concentrations ranged from 4.3 to 4.4 ppm (NAAQS is 9 ppm). Under the 2025 no-action alternative in the environmental assessment, the analysis predicted that the 1-hour CO concentrations would range from 5.8 to 6.0 ppm and the 8-hour CO concentrations from 4.1 to 4.2 ppm (FHWA 2006).

Jacob Riis Park 1-hour CO concentrations under the 2005 existing conditions ranged from 5.7 to 6.3 ppm. The 2005 existing condition 8-hour CO concentrations ranged from 4.0 to 4.4 ppm. Under the 2025 no action alternative in the environmental assessment (FHWA 2006), the predicted 1-hour CO concentrations would range from 5.4 to 5.8 ppm and the 8-hour CO concentrations would range from 3.8 to 4.1 ppm. The predicted CO scenario was similar at the adjacent Fort Tilden.

Water Resources

Groundwater

Groundwater is subsurface water stored in aquifers (bodies of permeable rock or sediment capable of storing or transmitting water) and is a primary source of freshwater for a variety of human uses, including drinking water, agriculture, and commercial or industrial use (NRCS et al. 2001). The Sandy Hook and Staten Island Units overlie the New Jersey Coastal Plain aquifer system (EPA 2010). One of its constituent aquifers, the Sandy Englishtown aquifer, is at or near the surface of the southern portion of Sandy Hook (Herman et al. 1998). The Jamaica Bay Unit lies over the Brooklyn–Queens System composed of the Upper Glacial, Jameco, Magothy, and Lloyd aquifers. The Upper Glacial aquifer, composed of glacial moraine deposits up to 300 feet thick, is exposed at the surface throughout all of Kings and Queens Counties and overlies the three lower aquifers, which are generally composed of sands and gravels (EPA 2012).

Natural recharge to both aquifer systems is primarily through surface water derived from precipitation that percolates through natural habitats or restricted porous urban surfaces such as lawns and parks.

Natural recharge to both aquifer systems is primarily through surface water derived from precipitation that percolates through natural habitats or restricted porous urban surfaces such as lawns and parks (EPA 2010; NYCDEP 2007). Some seepage also occurs from the bottoms of lakes, ponds, and streams; however, most freshwater sources in the watersheds surrounding Gateway have been filled, diverted into the storm sewer system, or altered by channelization (NYCDEP 2007). Natural discharge in the New Jersey Coastal Plain aquifer is primarily to the surface through streams and springs that ultimately flow into bays or the ocean. Some surface discharge also occurs in the Brooklyn–Queens aquifer; however, much of the groundwater that is not pumped for human uses discharges laterally into surrounding saltwater bodies (EPA 2012). Groundwater pumping reduces the rate and volume of freshwater discharge to surrounding saltwater bodies, which can lead to saltwater intrusion at the freshwater/saltwater interface (NYCDEP 2007), although this in not currently occurring in the aquifers supplying Gateway.

Brooklyn–Queens and New Jersey Coastal Plain aquifer systems underly park sites. Historically, the Brookly-Queen aquifer supplied fresh water to meet the expanding growth of the New York City area in the late 1800s and into the 20th century. Pumping groundwater in Brooklyn ended in 1947 over concerns from saltwater intrusion and fell to 10 million gallons per day in Queens as water from upstate New York was increasingly used (NYCDEP 2007). The New Jersey Coastal Plain aquifer system has experienced a regional decline which has resulted in saltwater intrusion into many of its aquifers (EPA 2010). The EPA has defined as the New Jersey Coastal Plain system as a sole-source aquifer (SSA), an administrative designation that requires the EPA to review certain proposed projects in the designated area to protect groundwater resources from contamination. Areas that receive an SSA designation must use the aquifer to supply at least 50 percent of its drinking water needs and demonstrate that alternate sources would be physically, legally, or economically infeasible to use. Much of the surface water that would normally recharge the aquifers is intercepted by the impervious surfaces of the highly urbanized watershed or channeled into storm sewers and CSOs that flow to the bays before they have an opportunity to percolate (USACE and PA 2009; NYCDEP 2007). Thus Gateway, with its open spaces, natural habitats,

and soils with coarse particles that allow for rapid movement of water into the soil (NRCS et al. 2001), is an important resource for groundwater recharge to sustain the region's important aquifers.

Surface Water

More than half of Gateway's area is composed of 16,200 acres of surface water systems, including the Atlantic Ocean, estuarine wetlands and bays (Jamaica, Sandy Hook, and Lower New York Bays), creeks and tributaries, and freshwater wetlands and ponds (NRCS et al. 2001). Lower New York Bay provides deeper marine habitat, while Sandy Hook and Jamaica Bays have shallower waters, generally less than 20 feet deep (USACE and PA 2009). The characteristics of these water bodies are discussed in more detail in the "Marine Resources" section of this GMP/EIS. For much of the surface waters of the bays, including the extensive saltmarshes and mudflats, the most important hydrologic features are the semidiurnal tides of the bays and ocean (Edinger et al. 2008b). The Hudson and Raritan Rivers are the primary natural sources of freshwater to the regional estuary system, with the Navesink and Shrewsbury Rivers contributing locally to the Sandy Hook Bay estuary. However, Hudson and Raritan River flows have been reduced by upstream reservoirs, impoundments, and water treatment facilities. Contributions by natural tributaries, now mostly filled or diverted, have been replaced in importance throughout most of the region by outflows from water treatment plants, CSOs, and stormwater runoff, which cause localized increases in freshwater flow that reduce natural salinity gradients (USACE and PA 2009).

Dredging has increased the overall water volume in Jamaica Bay, for example, which was historically 11 feet deep on average but has increased to an average depth of 16 feet, in part from shipping channels and borrow pits up to 50 feet deep. This has resulted in an overall 350 percent increase in water volume (NYCDEP 1994, as cited in NYCDEP 2007). The deeper waters created by dredging act as a sediment sink (NYCDEP 2007), which has consequences for sediment accretion important to saltmarsh development throughout much of the region (USACE and PA 2009); however, in Jamaica Bay, factors such as excess nitrogen loading and phytotoxins (e.g., hydrogen sulfide [H_2S]) appear to be more important contributors to saltmarsh loss (Renfro et al. 2010). Shoreline alterations and dredged sediment sinks also affect natural flows and flushing, resulting in decreased water quality (USACE and PA 2009). Dredging and other engineering modifications in Jamaica Bay have also expanded tidal ranges to increase the maximum elevation of high tides, which is further amplified by rising sea levels (Swanson and Wilson 2008). These hydrological changes have contributed to saltmarsh losses in Jamaica Bay.

Compared to estuarine and marine waters, freshwater wetlands and ponds (deepwater habitats) as defined by Cowardin et al. (1979) are few in number at Gateway. Freshwater wetlands cover approximately 24 acres, including forested swamps, marshes, swales, and wetlands created as part of mitigation projects (Edinger et al. 2008b). Most permanent ponds in Gateway were created by artificial dredging. Three large permanent ponds were created in the Jamaica Bay Wildlife Refuge to improve wildlife habitat. The two largest ponds, East Pond (118 acres) and West Pond (45 acres), are artificially controlled by drainage valves to Jamaica Bay and have brackish water, whereas the smaller Big John's Pond is a

dredged freshwater pond (NRCS et al. 2001). The West Pond was breached by the Hurricane Sandy storm surge and is currently freely mixing with saltwater from Jamaica Bay. Nike Pond, Round Pond, and North Pond are small permanent ponds at Sandy Hook. Other ponds at the park are seasonal and dry up during drought conditions; these ponds include one artificially created pond in Great Kills Park on Staten Island, and several in the Floyd Bennett Field, Fort Tilden, and Breezy Point sections of the Jamaica Bay Unit (NRCS et al. 2001).

Water Quality

Water quality in bays, estuaries, and tributaries has been gradually improving since the Clean Water Act and other environmental legislation spurred the implementation of regulations and abatement programs to control the discharge of contaminants and pollutants from municipal and industrial sources.

Water quality in bays, estuaries, and tributaries has been gradually improving since the Clean Water Act and other environmental legislation spurred the implementation of regulations and abatement programs to control the discharge of contaminants and pollutants from municipal and industrial sources. The Staten Island and Sandy Hook Units have better water quality than Jamaica Bay because they receive a greater volume of freshwater from the Hudson and Raritan Rivers, resulting in greater mixing of freshwater and saltwater, which helps regulate pH and salinity, dilute contaminants, and lower bacterial counts. During the summer monitoring season, waters off Staten Island and Sandy Hook only occasionally exceed limits for bacterial counts set by state water quality standards (NPCA 2007a).

In contrast, Jamaica Bay suffers from water quality issues because it is relatively enclosed. Tidal flushing is limited to the Rockaway Inlet, whereas freshwater flows are primarily contributed by urban runoff and sewer outflows. Overall, recent water quality trends in Jamaica Bay show improvement, including increased dissolved oxygen (DO) and decreased fecal coliform counts. However, the 240–340 million gallons per day of treated sewage effluent flowing into Jamaica Bay continues to be a major source of pollution, including treatment byproducts such as chlorine, and heavy metals and other contaminants that are not eliminated by water treatment facilities (NPCA 2007a). In addition, large rain events can overwhelm the sewer system capacity, resulting in untreated wastewater and raw sewage entering the bays of the Hudson-Raritan estuary system (USACE and PA 2009).

The four wastewater pollution control plants (WPCPs) that flow into Jamaica Bay are the most important source of nitrogen, phosphorous, silica, and carbon loads, while CSOs concurrently contribute the highest quantity of pathogens (e.g., fecal coliform) (NYCDEP 2007). Sewage effluent also carries the largest concentrations of nickel, zinc, copper, and cadmium, heavy metals that are not eliminated by treatment in WPCPs. Landfill leaching is a smaller source of heavy metals, and atmospheric deposition is the most important source of lead contamination (NPCA 2007a). Other contaminants include pharmaceuticals, soaps, floating debris (e.g., trash), and stormwater ~~toxic~~ runoff from the John F. Kennedy International Airport (USACE and PA 2009). Although WPCP and CSO outflows and other overland runoff are a well-understood source of pollution and contaminants, groundwater discharge into the estuary from subterranean zones of the surrounding aquifer system are another potential source of dissolved metals, nitrogen, and other compounds, and requires further study (Beck et al. 2009; Benotti et al. 2006).

Nitrogen and phosphorous are typically limiting nutrients in estuarine ecosystems, keeping algal growth in check. An estimated 36,600 pounds per day of nitrogen are discharged into

Jamaica Bay from WPCP outflows, accounting for 95 percent of the nitrogen load (NYCDEP 2007). Excess nutrient loading, a condition known as eutrophication, stimulates the growth of invasive plants and causes phytoplankton and algae blooms. Counts of chlorophyll a, a photosynthetic pigment produced by algae and used in water quality monitoring to indicate eutrophication, have been increasing in Jamaica Bay over time (NYCDEP 2007). High nitrogen levels can decrease root production in saltmarsh plants, decreasing their ability to accumulate organic material and hold sediments together and leading to saltmarsh loss as plants and sediments are washed away by the erosive force of storms (Rafferty, Castagna, and Adamo 2010; Kolker 2006, as cited in JBWPPAC 2006). High nitrogen levels also increase microbial decomposition, reducing the accumulation of organic matter and limiting the ability of saltmarshes to maintain an elevation that keeps pace with rising sea levels (Rafferty, Castagna, and Adamo 2010).

High nutrient loads from WPCP outflows are a major contributor to low DO levels in Jamaica Bay. DO ranges from 3.5 to 18.5 milligrams per liter (mg/L), sometimes falling below the 5.0 mg/L threshold specified by state water quality standards for waters suitable for recreation and fishing. Long periods of low DO can harm or kill larval fish and shellfish, and lead to odor problems from production of H2S gas in oxygen-deficient sediments. High concentrations of DO in the water column can also indicate poor water quality, and typically occur when algal blooms near the surface create very high to supersaturated DO concentrations as a byproduct of photosynthesis. While there is high year-to-year variability in measured DO concentrations, long-term monitoring suggests DO levels are trending toward improvement (NYCDEP 2007).

In addition to reducing infiltration and recharge of groundwater aquifers, the increase in hard or impervious surfaces from urbanization causes excess sediment to be conveyed by runoff. This sediment-laden runoff can reduce water clarity, impacting sensitive organisms and habitats including oyster reefs, eelgrass beds, fish, and aquatic invertebrates. Runoff can also increase erosion through scouring, which has deteriorated interior islands and shorelines over time (USACE and PA 2009). Water clarity in Jamaica Bay has declined by more than 20 percent over the past 30 years (JBWPPAC 2006).

Subaqueous Sediments

Contaminants dissolved or suspended in water adhere to organic compounds and settle into sediments. Before pollution regulations were put in place, large quantities of chemicals, including heavy metals, pesticides, PCBs, DDT, and dioxin, were discharged into the waters of Jamaica Bay, polluting the sediments of the bay and its wetlands. Contaminated sediments are difficult to remove; therefore, these "legacy chemicals" persist and exceed acceptable levels in many areas of the bay. In addition to these historical sources, chemicals from modern sources including industrial discharges, WPCP discharges, CSOs, stormwater runoff, non-point source discharges, landfill leachates, atmospheric deposition, and chemical and oil spills continue to contaminate Jamaica Bay sediments. Many chemicals that taint sediments are readily absorbed into animal fat cells, where they can accumulate to dangerous levels. As a result, consumption advisories are in place for some of the region's fish and shellfish species (USACE and PA 2009).

Coastal wetlands and eelgrass beds, marine plant ecosystems once extensive throughout the estuary, perform a variety of water quality functions, including stabilizing sediments and retaining and recycling nutrients.



Wastewater discharge into Jamaica Bay and other estuarine waters includes trace organic compounds from contaminants such as household and industrial products, personal care products, pharmaceuticals, detergents, and pesticides. Some of these compounds and their chemical breakdown products have hormone-like properties (e.g., "estrogenic compounds") that disrupt reproduction, development, and other endocrine-mediated processes in aquatic organisms (Furlong et al. 2010; JBWPPAC 2006). These compounds can affect the reproduction of some fish populations by skewing the male-to-female sex ratios (Furlong et al. 2010); for example, winter flounder from Jamaica Bay, which also show reduced hatch rates and delayed development (McElroy 2006, as cited in JBWPPAC 2006). Water treatment processes can influence the amount of endocrine-disrupting trace organics discharged into bay waters. A recent study showed aerobic digestion of activated sludge removed 90 percent of estrogenic compounds, while anaerobic treatment of biosolids actually increased the amount of estrogenic compounds (Furlong et al. 2010). Because biosolids are sometimes used as a soil amendment, more research is needed to investigate groundwater discharge from biosolid-amended soils as a potential source of contamination (Furlong et al. 2010).

Coastal wetlands and eelgrass beds, marine plant ecosystems once extensive throughout the estuary, perform a variety of water quality functions, including stabilizing sediments and retaining and recycling nutrients. Coastal wetlands can capture and attenuate high levels of nitrogen, reducing the effects of eutrophication and nitrogen loading that contribute to low DO levels. Coastal wetlands can effectively capture up to 95 percent of chemical substances discharged into the saltwater ecosystem (Ringenary, pers. comm. 2013a). In addition to continued controls on municipal and industrial outflows, restoration of coastal wetlands and eelgrass beds is an essential component of effective water quality improvement plans in the region of Gateway (USACE and PA 2009). While eelgrass beds have been virtually eliminated from the Gateway's vicinity and are absent within the boundaries of the park, much of Jamaica Bay and the bayside coastal areas of Sandy Hook may provide suitable restoration sites (USACE and PA 2009). Wetland restoration projects could also expand the 1,200 acres of saltmarsh in Gateway, which are concentrated mostly in Sandy Hook and Jamaica Bays (Edinger et al. 2008b).

Wetlands, Floodplains and Flooding

New York City and the adjacent region of New Jersey are built around a complex of narrow rivers, estuaries, islands, and waterways that are strongly influenced by tides and weather. Much of the metropolitan region, including most of Gateway, is low in elevation and is at risk from strong storm surge flooding for both tropical systems and nor'easter cyclones (Colle et al. 2008). The complex coastal geometry and bathymetry surrounding the New York City metropolitan region can increase the water levels and create difficult coastal flood forecasts. Storm surge is enhanced in this region by the relatively shallow continental shelf and the southward bend in the coast from Long Island to New Jersey, which can funnel water toward the New York City harbor area when there are low-level easterly winds (Bowman et al. 2005, as cited in Colle, Rojowsky, and Buonaiuto 2010). Although coastal flooding from strong storms is most likely and potentially most damaging, the coastal marsh and back-bay areas of the region can also lead to localized flooding (Colle, Rojowsky, and Buonaiuto 2010).

Floodplains



As demonstrated in October 2012 when Hurricane Sandy struck, the area is also vulnerable to flooding from hurricanes, although by the time Sandy made landfall in New York City, it had been downgraded to post-tropical cyclone status.

Coastal Flooding—*Extreme Storms*

As demonstrated in October 2012 when Hurricane Sandy struck, the area is also vulnerable to flooding from hurricanes, although by the time Sandy made landfall in New York City, it had been downgraded to post-tropical cyclone status. Nonetheless, the cyclone brought winds of up to 85 mph and total rainfall of about 1 inch across the city. Some of the heaviest damage in the area was in the New York Harbor and included Gateway and other NPS properties (NPS 2013a). A combination of high tides, wind-blown waves, and the enormous circulation of the superstorm pushed water to a peak surge of nearly 14 feet (Fleshler and Nolin 2012). Its amplified wave height and reach, along with strong winds, pushed sand across roads, parking lots, and structures, flooded structures and destroyed machinery, and took beach sands with it as it receded, resulting in a patchwork of coastal erosion and inland areas covered in sand.

Hurricane Sandy is not an isolated event. For example, in 1992 a winter storm—or "nor'easter"—caused water levels at the southern tip of Manhattan to peak at about 8 feet above mean sea level (Colle, Rojowsky, and Buonaiuto 2008). Hurricanes have struck New York City, including memorable storms in 1821 and 1938 and several in the mid-twentieth century (NYCOEM 2013). A major hurricane could result in storm surges of 30 feet in some parts of the city (NYCOEM 2013). Sea-level rise may also be increasing flood risk in the region and along the entire coastline.

Although tropical cyclones like Sandy primarily flood coastal areas where the storm comes ashore, winter storms or nor'easters can cause much wider-ranging damage and major coastal erosion (Colle et al. 2010). Climatologists have found there is an average of 12 winter storms along the eastern coast of the United States each year. A 2000 study (Zhang et al., as cited in Colle, Rojowsky, and Buonaiuto 2010) found no significant trends in the number and intensity of these storms or accompanying large wave surge events over the last several decades, although variability occurs from year to year or even decade to decade.
Flooding from storm surge, high tides, and wind during Hurricane Sandy occurred in the following locations:

In the Jamaica Bay Unit (NPS 2012f):

- Flooding damaged the Canarsie Pier shoreline and the structures on the pier.
- Some of the islands in Jamaica Bay (east islands and hassocks) were flooded.
- Jamaica Bay Wildlife Refuge East and West Ponds were breached, and the West Pond remains breached.
- Lower-elevation vegetative communities were flooded.
- All of Fort Tilden was flooded from both the ocean and bay side with enough force to diminish dunes by several feet on the beach side.



Storm surge in the New York/New Jersey area usually varies from 0.5 to 1 meter, but has reached 2 meters, as it did in 1985 during Hurricane Gloria.

- In Fort Tilden, the Shore Road and fisherman's parking lot were covered in sand, and a significant portion of the road was reduced to rubble, indicative of high waves and strong winds from south to north.

- At Jacob Riis Park, coastal flooding removed a massive amount of beach, but winds also covered much of the park north of the beach in sand. Ocean waters flowed through the first floor of the bathhouse and protective dunes adjacent to it were destroyed.

In the Staten Island Unit (NPS 2012c):

- At Fort Wadsworth, the shoreline south of the Verrazano-Narrows Bridge was flooded, although steep grading helped protect the rest of the fort.

- Wind and storm surge carried sand to cover parking lots and block roads at Great Kills Park.

In the Sandy Hook Unit, considered by the NPS as the park unit mostly heavily affected by Hurricane Sandy (NPS 2012c):

- Flooding damaged most NPS infrastructure and rendered water and wastewater systems inoperable (NPS 2012d).

- Much of the interior areas of the cedar/holly forest were flooded, as were other interior areas of maritime shrub lands (NPS, pers. comm. 2013e). Dunes here normally protect these areas from overwash flooding during storms.

- In the vicinity of the Sandy Hook Visitor Center, structures were swamped by floods, destroyed by wind, and covered in sand.

- Roads were covered in sand and substantial loss of beach occurred in some areas (notably the area near Sea Gull's Nest).

Coastal Flooding—*Average Storms*

Storm surge in the New York/New Jersey area usually varies from 0.5 to 1 meter, but has reached 2 meters, as it did in 1985 during Hurricane Gloria. Fortunately, Gloria made landfall during a low tide cycle; as noted earlier, Hurricane Sandy came ashore during a high tide cycle. In analyzing storm surge for the years 1959 to 2007, Colle, Rojowsky, and Buonaiuto (2010) found 253 data points for storm surges between 0.5 and 0.6 meter and only 4 data points for storm surges greater than 1.5 meters. For these years, this study found between 0 and 14 minor (less than 1 meter) events and on average between five 5 and 7 per year. Wind direction was not correlated with the size of a storm surge, but wind speed was. Wind speeds associated with larger surge (greater than 1 meter) were 44 percent stronger than those for minor storm surge. High tide combined with storm surge and wind speed also increased flooding, and is associated with a coastal flood advisory and/or warning depending on the storm surge.

Wetlands

Localized Flooding in Wetlands

As noted earlier, localized flooding can occur in low-lying areas, such as wetlands or former wetlands. The Jamaica Bay Unit contains the largest proportion of tidal marsh in Gateway—a landscape that is naturally gently sloping and subject to tidal flooding. Although wetlands are low lying and can experience flooding, they are also important as floodwater storage areas, as well as for floodwater conveyance, wave attenuation, and erosion control (USDA et al. 2001). Gateway also has several fringing estuarine or saltmarsh wetlands subject to coastal or tidal flooding, and inland floodplains include the swamp white oak forest and parts of Floyd Bennett Field.

Wetland Ecosystems

Wetland ecosystems are characterized by saturation, with water as the dominant factor influencing substrate or soil development (hydric soils). Vegetation in wetlands is dominated by hydrophytes, or plants with physiological adaptations to saturated conditions. Wetlands are classified according to characteristics of their hydrology, soil, and vegetation (Cowardin et al. 1979).

Wetlands at the park are the natural legacy of Pleistocene glacial scouring, followed by thousands of years of dynamic coastal processes such as wave action, longshore currents, erosion, and sediment accretion.

Wetlands at the park are the natural legacy of Pleistocene glacial scouring, followed by thousands of years of dynamic coastal processes such as wave action, longshore currents, erosion, and sediment accretion. Human disturbances including historical land uses, dredge and fill activities of the bays and marshes, hard-edged constructed shorelines, ongoing urban development, sewage and wastewater outflows, and the introduction of nonnative, invasive species have altered the natural extent, function, and type of wetland habitats at Gateway, contributing to the overall "poor" rating of natural resource conditions at the park (NPCA 2007a). In addition to the value of wetlands in storing and conveying floodwater discussed earlier, wetlands also reduce erosion by protecting coastlines from wave action, improve water quality by removing sediments and contaminants, and provide habitat for fish, wildlife, and unique plant communities (NRCS et al. 2001). These ecosystem services are diminished when wetland systems are degraded, fragmented, or lost, spurring the effort by regional managing agencies including the NPS to mitigate and restore wetlands in the New York Harbor region (NYCDPR 2010; USACE and PA 2009; NYCDEP 2007; JBWPPAC 2006; NPS 2004d).

Wetland Types: Estuarine

Estuaries are nearshore aquatic habitats where ocean water mixes with freshwater runoff from the land (the watershed), creating a gradient of salinities (Lawrence, Roman, and Frame 2010). Fluctuating water levels, salinity gradients, mixing of warm and cold waters, and sediment and nutrient loads contribute to the productivity and biodiversity of estuarine ecosystems (Levinton and Waldman 2006). The hydrology, water chemistry, vegetation, and soil development in estuarine wetlands are affected by factors such as tides, wind and low-energy wave action, and mixing of saltwater with freshwater from runoff or precipitation (Cowardin et al. 1979). The Hudson and Raritan rivers and outflows from urban water

treatment facilities are the primary sources of freshwater, sediment, and nutrients to the park's estuarine ecosystems (Lawrence, Roman, and Frame 2010).

Within the park, the significant estuarine areas are Jamaica Bay and Sandy Hook Bay (Lawrence, Roman, and Frame 2010), with some additional smaller areas along the coastline of the Great Kills section of the Staten Island Unit. Most of the over 11,700 acres of estuarine wetland communities within park boundaries are intertidal marshes and mudflats (Edinger et al. 2008b), including the numerous islands and "hassocks" (islands of peaty or mucky soil saturated by high tides) of the Jamaica Bay Wildlife Refuge (Rowan 2012). These wetlands range from North Atlantic high saltmarshes at the high-water mark, to North Atlantic low saltmarshes near open water in the regularly flooded intertidal zone, to North Atlantic Coast estuarine intertidal mudflats that are completely exposed only during low tides. Other tidally influenced wetlands, including salt panne marshes and brackish meadows, occur within the complex of saltmarshes and mudflats, whereas non-tidal wetlands such as coastal salt pond marshes occur in the splash zone on beaches and behind dunes.

North Atlantic Coast estuarine intertidal mudflats are saline habitats characterized by a silty mud substrate rich in organic matter, with moderate fluctuations in salinity and moisture due to low-energy wave action.

North Atlantic Coast estuarine intertidal mudflats are saline habitats characterized by a silty mud substrate rich in organic matter, with moderate fluctuations in salinity and moisture due to low-energy wave action. At the park, they are located at Great Kills in the Staten Island Unit and in Jamaica Bay at the Jamaica Bay Wildlife Refuge and Plumb Beach. Intertidal mudflats typically lack vegetation, although some are densely covered by sealettuce *(Ulva lactuca),* a green algae (Edinger et al. 2008b). Historically, mudflat vegetation was dominated by eelgrass, a species that is extirpated here but that once formed extensive beds throughout Jamaica and Sandy Hook Bays (Lawrence, Roman, and Frame 2010).

North Atlantic low saltmarsh, dominated by smooth cordgrass, is flooded twice daily by tides, allowing the development of deep, poorly drained soils, sometimes with thick organic deposits, ranging from mucky peat to mucky fine sandy loam in the Ipswich, Pawcatuck, and Sandy Hook series (Edinger et al. 2008b; NRCS et al. 2001).

Further inland, **North Atlantic high saltmarsh** vegetation is irregularly flooded by high and spring tides along the coastlines of the Sandy Hook Unit and the Breezy Point, Fort Tilden, Floyd Bennett Field, Canarsie Pier, and Jamaica Bay Wildlife Refuge sections of the Jamaica Bay Unit. Soils range from mucky peat to coarse sand in the Matunuck, Sandy Hook, Bigapple, Breeze, Ipswich, and Jamaica series, and the characteristic vegetation includes cordgrass and inland saltgrass (Edinger et al. 2008b; NRCS et al. 2001).

Cordgrass-dominated saltmarshes are maintained by annual accretion of sediment, anchored by the roots of vascular vegetation. These habitats are rapidly disappearing from the park, with losses as high as 50 acres per year. They erode or lose vascular vegetation and transform into mudflats due to a combination of factors including pollution, excess nutrient enrichment, reduced sediment deposition from dredging and constructed coastlines, and sea-level rise (NPS 2010b; NPCA 2007a). Since colonial times, an estimated 80 to 95 percent of the New York Harbor saltmarshes have disappeared (NRCS et al. 2001). In addition to rapid saltmarsh losses, many habitats have been invaded by a nonnative strain of common reed *Phragmites australis,* which responds to disturbance and forms dense colonies that exclude most other plant species. *Phragmites* is also present in much of the park's freshwater

wetland habitat and covers about 1,120 acres of wetlands in the park (Mellander, pers. comm. as cited in Lawrence, Roman, and Frame 2010).

Approximately 12 acres of **salt panne** marshes occur in shallow, poorly drained depressions within or at the margins of high and low saltmarsh communities in Sandy Hook and Jamaica Bay. These impounded depressions are created by ice-scouring, rafting flotsam, peat compaction, mosquito ditch levees, or erosion of tidal creek banks. Evaporation during low tides results in hypersaline conditions, resulting in a prevalence of bare peat or muck substrate. Vascular plants are typically sparse or absent, although some pannes may be characterized by dense stands of salt-tolerant glasswort species (Edinger et al. 2008b). The mucky peat to finer-grained sandy soils were formed from deep sediments derived from the Sandy Hook, Matunuck, Hooksan, Bigapple, and Jamaica soil series (NRCS et al. 2001).

Between high saltmarshes or beaches and more upland communities, **brackish meadows** are wetland grasslands dominated by switchgrass and saltmeadow cordgrass that occur on freely draining, shallow, sandy peat overlying glacial till. Soil moisture is maintained by groundwater seepage and irregular tidal flooding, usually during spring tides or storm surges. Most of the 26 acres of brackish meadow occur in the Sandy Hook Unit, with some communities near Canarsie Pier in Jamaica Bay (Edinger et al. 2008b). Brackish meadows are considered imperiled in New York State and may be at high risk of extinction (Lawrence, Roman, and Frame 2010).

Less than 4 acres of one non-tidal estuarine wetland type, **coastal salt pond marsh,** occur in the Breezy Point and Floyd Bennett Field sections of the Jamaica Bay Unit, separated from the ocean by surrounding beaches, dunes, and maritime shrub lands. Overland flow and precipitation contribute freshwater, whereas storm overwash, tidal breaches, and seepage across the barrier beach provide an infrequent source of saltwater. Vegetation is most abundant in mudflat areas of the ponds that occasionally become exposed when water levels draw down. These mudflats are typically dominated by dwarf spikerush or smooth cordgrass (Edinger et al. 2008b).

Wetland Types: Palustrine

Palustrine wetlands are fed by freshwater sources including groundwater, overland runoff, and precipitation. They include all non-tidal wetlands, and wetlands in tidal areas that have less than 0.05 percent salinity derived from ocean salts (Cowardin et al. 1979). Historically, freshwater wetlands were extensive in the region as a result of the numerous drainage basins created by complicated glacial topography. However, 95 percent of these wetlands have been lost to centuries of urban development (Lawrence, Roman, and Frame 2010). Today, about 24 acres of freshwater and brackish palustrine wetlands remain in the park (Edinger et al. 2008b), including forested swamps, marshes and swales, wetlands along the margins of artificial ponds, and wetlands created as part of mitigation projects.

Three large **artificial ponds** in Jamaica Bay Wildlife Refuge were created to improve wildlife habitat diversity. East Pond (118 acres) and West Pond (45 acres) are brackish ponds overlying former saltmarshes that were impounded when shallow channels feeding the ponds were



Between high saltmarshes or beaches and more upland communities, brackish meadows are wetland grasslands dominated by switchgrass and saltmeadow cordgrass that occur on freely draining, shallow, sandy peat overlying glacial till.

filled with dredged sediments. Big John's Pond, between the two brackish ponds, is a smaller excavated freshwater pond that supports floating aquatic vegetation. Over time, the salinity of brackish water in East Pond and West Pond diminished to create a freshwater marsh community. Both East Pond and West Pond were breached because of storm surge from Hurricane Sandy. Although East Pond has been repaired, West Pond remains in a breached condition and open to tidal influence and Jamaica Bay. Water level in West Pond never exceeds that of high tide (NPS, pers. comm. 2013e; Rowan 2013).

Two unique wetland communities, **woolgrass marsh** and **mixed forb marsh,** have grown up in and around the ponds, particularly East Pond, and are not found elsewhere in Gateway. Artificial maintenance of East Pond regulates the hydrology of both irregularly flooded marshes. The 1 acre woolgrass marsh, dominated by eastern marsh fern with woolgrass bulrush and *Phragmites*, occurs on deep, poorly drained sandy soil in the Jamaica series. The 0.3-acre mixed forb marsh occurs on Jamaica gravelly sand and is characterized by a diverse assemblage of characteristic species including fox sedge, spotted joepyeweed, common boneset, and chairmaker's bulrush (Lawrence, Roman, and Frame 2010; Edinger et al. 2008b).

The **Northeastern Atlantic brackish interdunal swale** community occurs between coastal sand dunes on very deep sands in the Hooksan and Jamaica series. In Gateway, these swales are at Sandy Hook and in the Breezy Point section of the Jamaica Bay Unit. Hydrology and salinity levels vary due to the seasonally high groundwater table, sporadic tidal overwash, and salt spray. Vegetation is dominated by saltmeadow cordgrass with common threesquare and chairmaker's bulrush (Edinger et al. 2008b).

Similar to estuarine wetlands, most palustrine communities at Gateway have been invaded by an alien genotype of *Phragmites*. Japanese knotweed is another nonnative invasive species associated with disturbed areas that tends to form dense monocultures that exclude other plant species. The Japanese knotweed gravel bar wetland type occurs on fill derived from Greenbelt loam and Bigapple coarse sand. It can be found at Sandy Hook and in the Fort Wadsworth section of the Staten Island Unit (Edinger et al. 2008b).

Forested wetlands at Gateway include red maple/blackgum basin swamp and southern New **England red maple seepage swamp** vegetation associations, and swamp white oak forest. The 3 acre Southern New England red maple seepage swamp occurs only on the east side of East Pond in the Jamaica Bay Wildlife Refuge. Soils are Barren series sand transported to the site as fill, and the forest canopy is co-dominated by red maple and gray birch over a sparse understory (Edinger et al. 2008b). **Red maple/blackgum basin swamp** is an imperiled community with only 20 to 30 forests known in New York state, including one 0.3-acre patch in the north-central interior portion of the Sandy Hook Unit (Lawrence, Roman, and Frame 2010; Edinger et al. 2008b). This acidic, nutrient-poor wetland type dominated by blackgum occurs on very deep, poorly drained Jamaica sand (Edinger et al. 2008b).

The **swamp white oak forest** occurs only at Miller Field in the Staten Island Unit as a 12-acre remnant of undeveloped habitat surrounded by dense urban development (Lawrence, Roman, and Frame 2010). This forest occurs on very deep Pompton loam soils formed over

glacial outwash that are seasonally flooded in late winter and may contain vernal pools (Rowan 2013; Edinger et al. 2008b). The site was likely wetter in the past before storm sewer diversions were built in the 1980s, and the resulting drier conditions may contribute to the decline of swamp white oak, which can compete with other trees due to its tolerance of seasonal flooding. The swamp white oak forest is managed as a wetland under the 1979 GMP, but the community does not meet the criteria for wetland classification because it does not have hydric soils. More research is needed to determine whether hydric soils occur and what the historical hydrological regime of this forest is (Rowan 2013).

Marine Resources

This section describes general characteristics of soils, water, vegetation, and wildlife that are key to understanding the marine zone, an area that includes ocean waters and benthic (bottom or subaqueous) habitat and onshore to the intertidal community. Backdune and more inland vegetation or wildlife that occupy these habitats are discussed in the "Vegetation" or "Wildlife" sections of the GMP/EIS. Gateway includes approximately 27,025 acres of coastal lands and waters in New York and New Jersey. Nearly two-thirds of the park is estuarine and ocean waters. Approximately 1,700 acres of these waters are ocean and another nearly 16,000 acres are estuarine. The park has about 75 miles of shoreline (including islands) parkwide, including 31 miles of ocean beaches (Lawrence, Roman, and Frame 2010).

Figure 3-1 New York Bight.



The marine habitats of Gateway lie primarily in the nearshore zone of the New York Bight (see figure 3-1), a great expanse of shallow ocean between Long Island to the north and east and the New Jersey coast to the south and west. The term "bight" is a mariner's term for a bend or curve in the shoreline, and the New York Bight is outlined by the east/west-trending coast of Long Island and north/south-trending coast of New Jersey, which create a right angle where they intersect (USGS n.d.b). The average salinity of ocean areas is about 32 parts per thousand (ppt), subject to input from extreme periods of flooding rains. Winter water temperatures can be below 37°F, while summer temperatures can exceed 77°F (USFWS 1997c). This coastal zone is dominated by tides that influence horizontal movement and transport of water, sand, and other sediments.

The New York Bay (see figure 3-2) lies generally north of the Bight and is divided into the upper and lower New York Bay. Sandy Hook and Breezy Point Tip frame the entrance to Lower New York Bay. New York Harbor lies at the mouth of the Hudson River, which feeds the Upper New York Bay. Although the mix of saltwater and freshwater in the harbor and upper bay vary seasonally, tidally, and during and after storm events, average flow from the Hudson River to the harbor is 683 cubic meters per second. High and low tides occur twice daily (NPCA 2007b).

Figure 3-2. New York Bay and Harbor.



The Nearshore Ocean Zone

The nearshore zone is defined as that area of open water from the mean low-water line offshore to the 66 foot depth contour line (USFWS 1997c). The nearshore zone of the New York Bight is located between the boreal waters of New England and the semitropical region to the south; this intersection of habitat types is important to marine species diversity. The New Jersey nearshore zone, which extends from Sandy Hook to Cape May, is characterized by a high-energy sandy beach to the north and an extensive estuary system protected by barrier islands to the south. The underwater topography includes scour troughs and ridges formed by storm currents (USFWS 1997c).

More than 100 species of marine and anadromous boreal, temperate, and semitropical migratory fish use this productive ecosystem as a feeding area (Frame, pers. comm. 2013a). A number of these species are commercially important or caught by sport fishers, including weakfish *(Cynoscion regalis),* striped bass *(Morone saxatilis),* summer flounder *(Paralichthys dentatus),* and winter flounder *(Pseudopleuronectes americanus).* Atlantic menhaden *(Brevoortia tyrannus)* also provide an important food source for marine wildlife, including fish, birds, and marine mammals. Anadromous species that use the Hudson or other coastal rivers to spawn include Atlantic sturgeon *(Acipenser oxyrinchus)*, blueback herring *(Alosa aestivalis),* and Atlantic tomcod *(Microgadus tomcod)* (USFWS 1997c). The shallow nearshore area off the park sites along the Rockaway Peninsula is habitat for the endangered Atlantic sturgeon and is an important recreational fishery (Lawrence, Roman, and Frame 2010).

Because Gateway's boundaries extend to one-quarter mile offshore, it is likely that most of its managed ocean waters are in the nearshore zone. Historically, these ocean waters and bottom were populated by diverse species of marine mammals and sea turtles, but today they are best known for recreational fishing (Lawrence, Roman, and Frame 2010). Marine mammals continue to use the nearshore habitat of the New York Bight, however, and a number of porpoises, seals, and whales migrate along the coast (USFWS 1997c). Seals also haul out on park sites, including Hoffman and Swinburne Islands, during the winter months (Ringenary, pers. comm. 2013b).

The "benthos" is collectively all the organisms that live on the bottom or in the bottom sediments. Invertebrates, including clams and other shellfish, crustaceans (crabs and lobster), annelids (worms), shrimp, gastropods, and echinoderms (e.g., starfish) occupy benthic habitat in the nearshore. Although a brief survey in 2009 recorded at least 42 species of benthic invertebrates at the park (Ecology and Environment Inc. 2009, as cited in Lawrence, Roman, and Frame 2010), other longer-term studies of the bight have recorded 699 species of benthic macrofauna (USFWS 1997c).

Farther out to sea and not usually within the one-quarter mile offshore considered to be park waters is the continental shelf ecosystem. This is a vast zone of shallow water, which in

the New York Bight is adjacent to estuary systems that nurture or protect a number of fish species, contributing to the area's biodiversity (USFWS 1997c).

Like other aquatic systems, the nearshore marine environment is a ladder or pyramid of trophic levels of plants, herbivores, and carnivores, ultimately converting inorganic chemicals and the sun's energy into living matter. At each higher trophic level, total biomass decreases. The primary producers are plankton (small or single-celled plants or photosynthetic and cyanobacteria that serve as food for a number of animals), including zooplankton (very small, free-floating invertebrate animals), and filter-feeding benthic species. Zooplankton in turn serves as food for a wide spectrum of larger animals. Primary production is regulated by water temperatures and mixing, and there are sharp seasonal differences in plant growth and availability of phytoplankton (USFWS 1997c).



The center of Jamaica Bay is dominated by subtidal open water and extensive low-lying islands with areas of saltmarsh, intertidal flats, and uplands important for colonial nesting waterbirds.

Marine Environment at Gateway Park Sites

As noted above, the NPS manages waters out to one-quarter mile from its lands. These waters include the nearshore environments off lands on the Rockaway Peninsula (Breezy Point, Jacob Riis Park, and Fort Tilden), Plumb Beach, Sandy Hook and Raritan Bay, and the southeast shore of Staten Island, as well as Rockaway Inlet and Jamaica Bay. The geomorphology of beaches or shorelines at these sites is described in the "Soils and Geology" section of this chapter of the GMP/EIS.

Jamaica Bay and the Rockaway Inlet

Although Jamaica Bay is brackish (30 ppt or less salt) and not marine (greater than 30 ppt and less than 50 ppt salt), it is directly open to the Lower New York Bay and Atlantic Ocean via Rockaway Inlet and is discussed in this section because of the connection. Breezy Point Tip is located on the tip of the south edge of this inlet. Salinity in Jamaica Bay is 20–26 ppt. It is located adjacent to the confluence of the New York Bight and New York Bay where the right angle between the New Jersey and Long Island coasts intersect (USFWS 1997b). Freshwater input directly to Jamaica Bay is primarily from polluted sources, such as four wastewater treatment plants.

Historically, Jamaica Bay was shallow, averaging 11 feet deep on average. Because of dredging for shipping channels, and borrow pits to produce material to build up John F. Kennedy International Airport and other development, the average depth has increased to 16 feet (NYCDEP 1994, 2007). The center of Jamaica Bay is dominated by subtidal open water and extensive low-lying islands with areas of saltmarsh, intertidal flats, and uplands important for colonial nesting waterbirds. Because Jamaica Bay is located at the intersection of not only cooler ocean waters from the north and warmer currents from the south but also of the Hudson River–Raritan Bay estuary, it is considered part of a regionally important fish, wildlife, and plant habitat complex that also includes Breezy Point Tip (USFWS 1997b). Shorebirds, raptors and other land birds, waterfowl, and various migratory insects are concentrated near the coastlines. These migratory species are further massed into the remaining open space and waters of Jamaica Bay by the lack of habitat in surrounding urban land.



Atlantic ribbed mussels are a major biomass component of the park's saltmarsh and mudflats, and other shellfish species such as northern quahog (Mercenaria mercenaria), intertidal soft clam (Mya arenaria), and Atlantic surf clam (Spisula solidissima) occupy the nearshore and Rockaway inlet area.

Between them, the marine environments of Jamaica Bay and Breezy Point Tip support seasonal or year-round populations of over 200 rare or listed species, including 48 species of fish and 120 species of birds (USFWS 1997b). Listed species in the waters in and around these two park sites include Kemp's Ridley and loggerhead sea turtles *(Lepidochelys kempii, Caretta caretta),* piping plovers *(Charadrius melodus)*, seabeach amaranth *(Amaranthus pumilus),* and roseate terns *(Sterna dougallii).* Dozens of the species of fish found in Jamaica Bay (including many that are commercially important, such as winter flounder) use the bay as a nursery. A few islands in the bay support waterbird nesting colonies for species including glossy ibis *(Plegadis falcinellus),* great egret *(Ardea alba)*, snowy egret *(Egretta thula),* cattle egret (Bubulcus ibis), black-crowned night-heron *(Nycticorax nycticorax),* and tricolored heron *(Egretta tricolor).* The bay is also considered an important migratory stopover site for shorebirds; although these species use much of the bay, they focus on the intertidal areas during low tide and the East and West Ponds during higher tides for feeding. The benthic environment of Jamaica Bay provides habitat for many invertebrates, fish, and diving ducks. Sandy beaches and intertidal mud flats throughout Jamaica Bay and especially the beaches at Plumb Beach support a large population of horseshoe crabs *(Limulus polyphemus).*

Atlantic ribbed mussels are a major biomass component of the park's saltmarsh and mudflats, and other shellfish species such as northern quahog *(Mercenaria mercenaria),* intertidal soft clam *(Mya arenaria),* and Atlantic surf clam *(Spisula solidissima)* occupy the nearshore and Rockaway inlet area. Jamaica Bay hosts significant waterfowl concentrations, averaging about 11,000 birds in ground counts from 1980 to 1992. Species include greater scaup *(Aythya marila),* American black duck *(Anas rubripes),* brant *(Branta bernicla),* Canada goose *(Branta canadensis)*, and bufflehead *(Bucephala albeola).* Harbor seals *(Phoca vitulina)* are found in Jamaica Bay and at Breezy Point Tip, and humpback whales *(Megaptera novaeangliae)* and bottlenose dolphins *(Tursiops truncatus)* occasionally feed in the area adjacent to Rockaway inlet. Breezy Point Tip supports some of the largest nesting sites for rare or endangered shorebirds, including least terns *(Sterna antillarum),* black skimmers *(Rynchops niger),* roseate terns (very rarely), American oystercatchers *(Haematopus palliatus),* and piping plovers. It is also a concentration area for migratory shorebirds, raptors, waterfowl, and land birds, especially during summer and fall.

Raritan Bay including Sandy Hook and Staten Island

Parts of the Raritan Bay are brackish, receiving direct inflow from the Raritan, Shrewsbury, and Navesink Rivers and other small tributaries along the shoreline of Staten Island and New Jersey, as well as indirectly from the Hudson River through the New York Bay. Dredged channels in the bay are up to 35 feet deep, but otherwise the bay is shallow—less than 20 feet deep for the most part. The area is subject to a wide range of fluctuations in temperature, salinity, and DO (USFWS 1997a).

The Staten Island shoreline along Raritan Bay from New Dorp Beach to Tottenville includes beach and intertidal and subtidal mudflats extending about one-quarter mile from the shoreline. Great Kills Park includes large areas of disturbed marsh ingrown with *Phragmites* and coastal shrub thicket at Crooke's Point.



Sandy Hook divides Raritan and Sandy Hook Bays from the New York Bight. On its wide northern end it supports an extensive foredune vegetated with American beachgrass *(Ammophila breviligulata).* The western side of the spit consists of extensive tidal mudflats, sandflats, and saltmarsh dominated by low marsh cordgrass. There are more than 200 rare or listed species using the waters and shorelines of Raritan Bay and Sandy Hook, including piping plover, two species of sea turtles, and three whale species. More than 90 species of fish have been counted in Raritan Bay and Sandy Hook Bay, including brackish-water species like mummichog *(Fundulus heteroclitus)* and white perch *(Morone americana)* (USFWS 1997a). In the larger bay, ocean fish species as well as lobster *(Homarus americanus),* blue crab *(Callinectes sapidus),* and horseshoe crab are taken in a dredge fishery. Spawning habitat for horseshoe crab on Sandy Hook provides an important food source for migrating shorebirds, which are abundant. Like Jamaica Bay and Breezy Point Tip, Sandy Hook and Raritan Bays provide a variety of habitats for migrating and wintering waterfowl, waterbirds, and shorebirds, with counts of 20,000 birds per season in the summer and fall to 60,000 in the winter. Sandy Hook is also home to beach-nesting piping plovers.

Offshore of Staten Island lie Hoffman and Swinburne Islands, constructed in the 1800s using dredged sand, rock, and concrete. The islands were initially used to quarantine immigrants, but the buildings have since turned to ruins and grass was planted in the 1960s. In the absence of human disturbance, both islands have become wooded and are important habitat for colonial nesting waterbirds, wading birds, and seabirds. In 2007, Hoffman Island was home to 567 nests of seven wading bird species and 188 nests of herring gulls *(Larus argentatus)* and great black-backed gulls *(Larus marinus)* (Bernick et al. 2007, as cited in Lawrence, Roman, and Frame 2010). Adjacent Swinburne Island had 264 double-crested cormorant *(Phalacrocorax auritus)* nests and 310 gull nests. Swinburne and Hoffman Island are also used as a haul-out location for seals (Lawrence, Roman, and Frame 2010).

Vegetation at Ocean Beaches at Gateway Park Sites

Although the park manages nearshore ocean waters, no surveys or other information about vegetation in these marine areas is available. Besides this submerged habitat, only one vegetation association is considered by Edinger et al. to be truly marine; that is, it grows between the high tide line and the sea (Edinger et al. 2008b). This is the North Atlantic Coast estuarine intertidal mudflat, a vegetative community that covers over 9,000 acres of park lands and tidal areas. However, because they grow on the ocean side of the foredune (the first dune landward of the beach) or exist only where storm surge reaches, other vegetative communities are discussed along with the North Atlantic Coast estuarine intertidal mudflat in this section of the GMP/EIS. These are the North Atlantic upper ocean beach, North Atlantic coastal plain vine dune, northern beachgrass dune, beachgrass/panicgrass dune grassland, and overwash dune grassland.

The intertidal zone is the area between the land and sea that is covered by water at high tide and uncovered at low tide and is immediately landward of the nearshore zone. The intertidal areas in estuaries like Jamaica Bay include hundreds of acres of mudflats and low and high saltmarsh and are rich in food resources for a variety of wildlife. Ocean shores in the park are otherwise covered in beaches, most of them sandy and used for recreation.

North Atlantic upper ocean beach is the formal name of beach habitat just above mean high water. While this vegetation type is not considered rare and is found throughout the park, it nonetheless provides habitat for a number of protected plant and animal species.

Beaches are the most dynamic habitats in the park, changing continuously with the wind and tides and sometimes changing radically during hurricanes and nor'easters. Animals and plants that thrive on beaches are well adapted to its changing nature. The beaches on the Rockaways and at Sandy Hook are called "barrier beaches" because they lie on barrier peninsulas that are separated from the mainland by an estuary or bay. A description of the beaches and coastal processes in the park is available in the "Soils and Geology" section of this GMP/EIS.

In the descriptions of vegetation associations taken from Edinger et al. (2008b), the name of the association is in bold type.

North Atlantic coast estuarine intertidal mudflat is the only vegetation association (i.e., a community of associated plants) considered by Edinger et al. (2008b), the team that comprehensively inventoried park vegetation most recently, to be a truly marine or intertidal community. Intertidal mudflats cover more than 9,000 acres of park lands and waters, making it the most abundant of all vegetation associations at Gateway. This vegetation type is found on saline mudflats, is completely exposed at low tide, and is tidally flooded twice daily. The substrate consists of silt and mud that is rich in organic matter and poorly drained at low tide. It is subject to moderate fluctuations in salinity and moisture and is washed by low-energy waves. The mudflats are nearly devoid of vegetation, although the marine alga sealettuce *(Ulva lactuca)* can cover 40 percent or more of the exposed area. Smooth cordgrass *(Spartina alterniflora)* can occur sporadically, colonizing from adjacent low saltmarsh communities. This community occurs in the Great Kills Park section of the Staten Island Unit and the Floyd Bennett Field and Jamaica Bay Wildlife Refuge sections of the Jamaica Bay Unit.

North Atlantic upper ocean beach is the formal name of beach habitat just above mean high water. While this vegetation type is not considered rare and is found throughout the park, it nonetheless provides habitat for a number of protected plant and animal species. At the park, it is characterized by native plant species American searocket *(Cakile edentula)* and seaside sandmat *(Chamaesyce polygonifolia).* Rare plants include the federally threatened seabeach amaranth as well as the globally vulnerable seaside knotweed (*Polygonum glaucum)* and state imperiled sanddune sandbur *(Cenchrus tribuloides)* (Edinger et al. 2008b). Invasive plants include Russian thistle *(Salsola kali).* Rare birds in this ocean beach area include piping plover, least tern, common tern, and black skimmer (Lawrence, Roman, and Frame 2010).

Foredune Habitat

Plants and animals that thrive in the foredune environment are well adapted to the winds and waves, and this dynamic environment promotes biological diversity. Vegetation upland from the beach and foredune is described in the "Vegetation" section of the GMP/EIS; marsh and wetland vegetation is described in the "Wetlands and Floodplains" section.

Edinger et al. (2008b), who described 35 vegetative communities at Gateway, named the plant association on active foredunes the **northern beachgrass dune** community. Although this vegetation grows on dynamic, active foredunes, it also occupies more protected

interdune areas (Edinger et al. 2008b). The dominant grass is American beachgrass, but there may also be other grasses and forbs. Rare plants documented in this community at Gateway include sanddune sandbur and Oakes' evening primrose *(Oenothera oakesiana),* both of which are New York state-listed threatened plants. The northern beachgrass dune community is found along the upper edge of ocean beaches throughout the park.

The **beachgrass/panicgrass dune grassland** community at Gateway occurs on active foredunes, but in areas mostly outside the influence of storm tides and only in combination with the northern beachgrass dune community. While the beachgrass/panicgrass dune community is characterized primarily by bitter panicgrass *(Panicum amarum),* many other native plants such as American beachgrass, field sagewort *(Artemisia campestris),* and pink fuzzybean *(Strophostyles umbellata)* are also present. Several species of lichens of the genus *Cladonia* are found in this community. This community is globally imperiled, at a high risk of extirpation, with only an estimated 65–100 communities remaining. The vegetation is particularly vulnerable to trampling or off-road vehicle use because it is very fragile and does not easily recover from disturbance (Edinger et al. 2008b). In Gateway, beachgrass/panicgrass dune grassland is documented only at the northernmost end of Sandy Hook (Edinger et al. 2008b).



The **overwash dune grassland** is dependent on overwash sand that is deposited during storm surges. It is usually not more than a few acres in size and its highly ephemeral nature requires a large dune system to survive. It often is in a mosaic with the northern beachgrass dune community. In the park, overwash dune grassland is also found on dredge fill deposits, where it is dominated by saltmeadow cordgrass *(Spartina patens).*

The **North Atlantic coastal plain vine dune** community occurs on foredunes up to the crest, exposed to wind, salt spray, and occasional overwash by storm tides. Eastern poison ivy *(Toxicodendron radicans)* shrubs dominate at the park, often accompanied by native Virginia creeper *(Parthenocissus quinquefolia)* and nonnative, invasive Japanese honeysuckle *(Lonicera japonica).* The community is globally imperiled and at risk of extinction. The soil is Hooksan series sand, a substrate characteristic of the rarest plant communities at Gateway. The North Atlantic coastal plain vine dune community is found at Sandy Hook, Fort Tilden, and in the Jamaica Bay Wildlife Refuge (Edinger et al. 2008b).

Threats to the Marine Zone

The New York Bight is in a heavily urbanized watershed supporting the largest coastal population of people in the United States (USFWS 1997c). Major threats affecting the bight include coastal urbanization, wetland and coastal use modifications, ocean dumping and waste disposal, port development and maintenance, agricultural practices and development, transportation, energy production, marine mineral mining, and cumulative nonpoint sources of pollutants. The ocean area of the New York Bight has traditionally been used for the disposal of waste, including sewage sludge, dredged materials, chemical wastes, and radioactive materials. This use has degraded the habitats and associated organisms in the waters. Organic loading of riverine, estuarine, and coastal waters is an emerging problem.

Symptoms of this loading are the increasing prevalence of excessive algae blooms, shifts in algal species composition, high sediment biological oxygen demand at affected sites, and anoxic events in near coastal and estuarine waters. Domestic waste discharge and other household nonpoint source contaminants are major sources of the contaminant burden to the nearshore waters and benthos. Domestic waste includes fecal contaminants, heavy metals, agricultural runoff, leachate from landfills, highway and urban runoff, chemical and oil spills, and contaminated (with PCBs and polycyclic aromatic hydrocarbons [PAHs]) sediment movement in some of the riverine and bay areas. Atmospheric contaminants are another domestic nonpoint source (USFWS 1997c).

Urban sprawl and suburbanization have exerted tremendous pressure on the integrity and health of the coastal ecosystem, including those of Raritan Bay and its watersheds, as well as some of the upland and wetland buffer areas around the shoreline of Jamaica Bay. Intense demand for home sites, resorts, marinas, and commercial development has resulted in the loss of valuable wetland resources through filling, dredging, ditching, diking, and shoreline modification. Increased population intensifies recreational uses of the coastal areas, including the demands for boating facilities and access to the water (USFWS 1997b).

Sea-level rise and warming temperatures most experts attribute to climate change (NY Academy of Sciences 2010) are also forces that currently affect marine resources and would increasingly do so in the future. Sea level rise can increase shoreline erosion along beaches and in Jamaica Bay, inundate vegetation or nests of shorebirds or terrapins and cause saltwater intrusion into groundwater aquifers that then contaminate fresh or brackish water habitat (Columbia University 2009). Warming temperatures increase evaporation of brackish or freshwater habitat and are known to be associated with increased competitive advantage of invasive vegetation.

Mining for sand and gravel, as well as exploration and production drilling for oil or minerals of the outer continental shelf, affect marine biota and their habitats. Sand and gravel mining can result in loss of benthic organisms that live in the sediment; mining modifications of the substrate in the plume area can sometimes be measured in miles. Oil spills and spills of other hazardous materials are a major threat to marine waters in the area. Deep borrow pits in areas of minimal flushing can have decreased DO and may become seasonally or permanently anaerobic where mixing does not occur regularly (USFWS 1997b, 1997c).

Extensive recreational use of Gateway beaches has resulted in disturbance of wildlife like nesting birds and has increased demand for parking, access, and other facilities that could further disturb wildlife or eliminate habitat (USFWS 1997a).

The nonnative, invasive Japanese sand sedge *(Carex kobomugi)* is an aggressive, invasive colonizer of dunes on the beaches of the North Atlantic Coast. It successfully outcompetes native grasses and herbs such as American beachgrass, field sagewort, and seaside goldenrod. It grows on dynamic, shifting sand dunes, usually beyond the influence of storm tides. Edinger et al. (2008b) report it only at Sandy Hook, where it has a large enough presence to be classified as a separate vegetative community and is spreading exponentially (Lawrence, Roman, and Frame 2010).

Vegetation

Vegetation at the park is classified by its location and present assemblage of species. Many of these plant communities are highly altered due to urban influences; approximately 45 percent of Gateway's 700 identified plant species are nonnative to the New York City maritime environment (Frame, pers. comm. 2013b). Generally, the beaches and mudflats at the park are not vegetated, or if they are, coverage is sparse. Adjacent to the intertidal area or beach are the dunes, which begin with the foredune. The processes that form and shape the dunes are described in the "Soils and Geology" section of this chapter of the GMP/EIS. Behind the foredune are the dunes and interdunes (swales between the dunes), where the vegetation includes more than 260 native vascular plants, including 12 that are rare (NPCA 2007c). Moving farther inland and away from the influence of salt spray and wind, dune vegetation gives way to shrubs and then to maritime forest. On the inland side of beaches, such as along the western side of Sandy Hook and throughout Jamaica Bay, are expansive saltmarshes composed primarily of grasses *(Spartina)*, as well as sandy hills and shores.

On the inland side of beaches, such as along the western side of Sandy Hook and throughout Jamaica Bay, are expansive saltmarshes composed primarily of grasses (Spartina), as well as sandy hills and shores.

Vegetation at Gateway has been surveyed recently (Edinger et al. 2008b) and classified into 35 associations. Of these, 20 are maintained by maritime influence including strong salt spray, high winds, and coastal processes such as dune deposition, shifting, and overwash. Edinger et al. (2008b) divides these maritime communities into marine associations, estuarine associations, and terrestrial associations. Most of the remaining communities are classified as human-modified associations.

Marine, intertidal beach, and foredune vegetation associations are discussed in the "Marine Resources" section of this chapter. These include the North Atlantic Coast estuarine intertidal mudflat, the North Atlantic upper ocean beach, North Atlantic coastal plain vine dune, northern beachgrass dune, beachgrass/panicgrass dune grassland, and overwash dune grassland.

Estuarine associations are those that grow in habitat that is semi-enclosed but with access to open ocean or tidal flows and that are at least occasionally diluted by freshwater runoff. Seven estuarine vegetation associations grow at the park, including brackish meadow, mid-Atlantic salt shrub, North Atlantic low saltmarsh, North Atlantic high saltmarsh, salt panne, coastal salt pond marsh, and Northeastern Atlantic brackish interdunal swale. These associations are discussed in the "Wetlands and Floodplains" section of this chapter of the GMP/EIS.

The grasslands, shrublands, and forests of terrestrial maritime communities, as well as human-modified associations, are the focus of this section of the document, although maps and descriptions of park sites in the last subsection include a synopsis of the types and conditions of all vegetation. Terrestrial maritime associations described by Edinger et al. (2008b) include North Atlantic Coast backdune grassland, northern beach heather dune shrubland, northern bayberry dune shrubland, northern tall maritime shrubland, mid-Atlantic maritime salt shrub, maritime red-cedar woodland, maritime holly forest, and successional maritime forest. Terrestrial maritime vegetation associations are made up of "salt-pruned" trees and shrubs with contorted branches and wilted leaves; they also usually

have a dense vine layer. Often, they grow in narrow bands parallel to the shoreline (Edinger et al. 2008b). Descriptions of each of these associations are taken primarily from Edinger et al. (2008b). Human-modified associations (whose descriptions are also primarily from Edinger et al. 2008b) are discussed in the "Invasive Species and Human-modified Associations" subsection.

Terrestrial Maritime Vegetative Communities

Backdune Associations

North Atlantic Coast Backdune Grassland. This community occurs in a natural setting on deep, stabilized sands of old interdunes and backdunes. It can also occur in disturbed settings following clearing of maritime shrubland and other backdune communities or on sandy dredge spoil. The substrate can be fine sand, coarse sand, gravelly fine sand, or (less commonly) loamy sand. Soils are derived from various natural and nonnatural sediments, including household landfills capped with sand, sandy dredge fill, eolian (windblown) and marine sediments, and sandy fill mixed with demolished construction debris. The vegetation of this association is variable and depends on landscape setting and land-use history. It is dominated by gray clubawn grass *(Corynephorus canescens)* in more disturbed settings and by little bluestem *(Schizachyrium scoparium).* This association occurs in the Great Kills Park section of the Staten Island Unit, in the Sandy Hook Unit, and in all sections of the Jamaica Bay Unit.

Northern Beach Heather Dune Shrubland. This is a dwarf shrubland association that occurs in well-developed sand dune systems on stable secondary dunes. Conditions are xeric; plants must be adapted to low moisture, high surface temperature, and high light intensity. The substrate is fine sand in the Hooksan series. The natural setting for this community is in flat openings within northern tall maritime shrubland, maritime red-cedar woodland, and mid-Atlantic maritime salt shrub. At Gateway, it can also be found in a disturbed setting surrounded by Japanese black pine *(Pinus thunbergii)* forest. This dwarf shrubland is characterized by woolly beachheather *(Hudsonia tomentosa)* occurring with other low-growing shrubs, including eastern red cedar *(Juniperus virginiana)*, beach plum *(Prunus maritima),* flameleaf sumac *(Rhus copallinum),* Japanese black pine, northern bayberry *(Myrica pensylvanica),* and black cherry *(Prunus serotina).* This association occurs in the Sandy Hook Unit and in the Fort Tilden and Floyd Bennett Field sections of the Jamaica Bay Unit. Northern beach heather dune shrubland is globally vulnerable and at risk of extinction.

Northern Bayberry Dune Shrubland. This association occurs on protected slopes and hollows of dry, stabilized maritime backdunes. The substrate is coarse to fine sand consisting of very deep, excessively drained soils formed in eolian sands, sandy marine sediments, or sandy dredge spoils. The vegetation of this dense, short maritime shrubland is dominated by northern bayberry with flameleaf sumac. Northern bayberry dune shrubland is at risk of extinction in New York State (Edinger et al. 2008b, as cited in Lawrence, Roman, and Frame 2010). This association occurs in the Sandy Hook Unit and in the Breezy Point, Fort Tilden, Floyd Bennett Field, Canarsie Pier, and Jamaica Bay Wildlife Refuge sections of the Jamaica Bay Unit.

Northern Tall Maritime Shrubland. This community is usually very dense and often occurs inland of northern bayberry dune shrubland in sheltered settings. The substrate is most commonly coarse to fine sand originating from marine sediments, eolian deposition, or dredge fill. Vegetation is dominated by northern bayberry, flameleaf sumac, black cherry and many associates, including autumn olive *(Elaeagnus umbellata),* multiflora rose *(Rosa multiflora),* white poplar *(Populus alba),* and others. Vines are commonly draped in and over shrubs. This association occurs in the Sandy Hook Unit; the Great Kills and Miller Field sections of the Staten Island Unit; and in all sections of the Jamaica Bay Unit.

Mid-Atlantic Maritime Salt Shrub. This shrubland usually forms an ecotone between high saltmarsh and adjacent upland vegetation, but it also occurs in patches on areas of slightly higher elevation within maritime dunes. It occurs above mean high tide but can be flooded by storm tides. The substrate is primarily fine sand to mucky, fine, sandy loam consisting of very deep, excessively drained to very poorly drained soils formed in eolian sands, sandy marine sediments, dredge fill, or thick sandy deposits with a thin organic surface layer. This tidal shrubland is dominated by a fairly dense cover of Jesuit's bark *(Iva frutescens)* and eastern baccharis *(Baccharis halimifolia).* Associated tall and short shrubs include northern bayberry, flameleaf sumac, and black cherry. This association occurs in the Sandy Hook Unit and in all sections of the Jamaica Bay Unit.

Maritime Forests

Maritime forests are situated on barrier islands and peninsulas, which are subjected to wind-driven salt spray and occasional inundation by storm-driven ocean surges. Stands may represent seral stages of the barrier island forest, perhaps held in stasis for a century or longer by specific site conditions, including soil depth or nutrients, temperature, or intense storms. Much of the barrier island forest along the New Jersey and New York coasts has been lost to urban development, and two types of barrier island forest—maritime red-cedar woodland and maritime holly forest—are globally imperiled. In the park, both of these occur only at Sandy Hook, on the deep, non-glacial sediments of Hooksan soil series.

Maritime Red-cedar Woodland. This association occurs on inactive old sand dunes in association with maritime holly forest or maritime dunes or on the upper edge of low saltmarsh. Most commonly, the substrate is fine sand consisting of very deep, excessively drained soils formed in eolian sands or sandy marine sediments. The community has also formed on sandy dredge spoils. Tall shrubs and saplings are moderately abundant (nearly 30 percent cover) and consist of a mix of species, many of which are also represented in the canopy. This maritime woodland community has an open canopy (just over 50 percent cover) that is strongly dominated by eastern red cedar. The most abundant associated canopy species are black cherry, American holly *(Ilex opaca),* and common hackberry *(Celtis occidentalis).* Occasionally, individual trees will also extend up above the canopy into a sparse emergent layer. Additional tree species are Japanese black pine, blackjack oak *(Quercus marilandica),* black oak *(Q. velutina),* northern red oak *(Q. rubra),* black locust *(Robinia pseudoacacia),* and red maple *(Acer rubrum).* In Gateway, this association is only found in the Sandy Hook Unit. It is globally imperiled and considered to have a high risk of extinction.

Maritime forests are situated on barrier islands and peninsulas, which are subjected to wind-driven salt spray and occasional inundation by storm-driven ocean surges. Stands may represent seral stages of the barrier island forest, perhaps held in stasis for a century or longer by specific site conditions, including soil depth or nutrients, temperature, or intense storms.

Maritime Holly Forest. The rarest association in the park is the maritime holly forest, which is located only on the west shore of Sandy Hook. At 231 acres, it is the largest one of only two known occurrences in the world, with the other, coincidentally, located on NPS land at Sunken Forest on Fire Island National Seashore. This association occurs on old, inactive dunes with undulating topography. Some patches show evidence of past fire in charred stumps and multi-trunked American holly. The substrate is a variable mix of loamy/organic sand and medium sand with a covering of litter and duff. Soils within this community are in the very-deep-to-bedrock and excessively drained Hooksan series formed in eolian sands or sandy marine sediments. Maritime holly forest at Gateway is strongly dominated by American holly with black cherry, eastern red cedar, common hackberry, red maple, and common serviceberry *(Amelanchier arborea).* Holly trees at Sandy Hook range in age from 15 to 162 years old (Forrester et al. 2004, as cited in Lawrence, Roman, and Frame 2010). Holly survival is very high, particularly relative to co-occurring species like black cherry or American hackberry, as is its reproductive success in the park (Lawrence, Roman, and Frame 2010). The maritime holly forest at Sandy Hook is considered the finest example of this vegetative community in the world (Art 1992, as cited by Lawrence, Roman, and Frame 2010). It is globally imperiled and at high risk of extinction. The height of the trees, the low profile of the dunes, and a coastline geography that heightens storm surges all make the Sandy Hook maritime holly forest highly susceptible to storm damage (Forrester et al. 2008, as cited in Lawrence, Roman, and Frame 2010). The Sandy Hook holly forest has experienced strong winds that caused blowdowns and gaps approximately 11 times since 1788 (Boose et al. 2001, as cited in Lawrence, Roman, and Frame 2010), including from Hurricane Sandy in 2012, which caused flooding but no significant blowdown of trees noticeable in the immediate aftermath. Large numbers of holly trees appear now to be dead, apparently from being flooded for an extended period of time (Lane, pers. comm. 2013). Longer-term changes may have occurred, but they are yet unknown (Rowan 2012, as updated by NPS 2013e).

Successional Maritime Forest. This maritime forest community occurs most often on stabilized backdunes, generally leeward of secondary maritime dunes or in protected hollows. It can also be found farther inland in association with tall maritime shrubland. Substrates are somewhat poorly drained to excessively drained, coarse to fine sands originating from marine- or eolian-derived sand or sandy dredge fill. The somewhat open tree canopy (to 50 feet [15 meters] tall) of this successional maritime forest is strongly dominated by black cherry with common hackberry. Associated canopy species include red maple, American holly, white poplar, black locust, and lesser amounts of eastern red cedar, Japanese black pine, and eastern cottonwood (Populus deltoides). This association occurs in the Sandy Hook Unit, in the Great Kills Park section of the Staten Island Unit, and in the Fort Tilden, Floyd Bennett Field, Canarsie Pier, and Jamaica Bay Wildlife Refuge park sites of the Jamaica Bay Unit. The present plant composition in the North Forty of Floyd Bennett Field is very diverse (Greller 1984 and Wijesundara 1997, as cited in Lawrence, Roman, and Frame 2010), with 125 plant species in three separate forest communities, including successional maritime forest. This association is considered rare although it includes nonnative tree species.

Invasive Species and Human-modified Associations

Much of the natural vegetation at the park has been disturbed or altered by humans, either historically or recently (NRCS et al. 2001). Forests have been cut for use as firewood or building materials, and formerly forested lands have been converted to pasture or agricultural uses. Saltmarshes have been filled to create tracts of housing or other development or dredged for substrate on which to build them. Floyd Bennett Field, Jamaica Bay Wildlife Refuge, and Great Kills Park all contain land that was created from material dredged from what are now park waters and neighboring bays or marine environments as well as from areas outside park boundaries (NRCS et al. 2001). In addition, as described in the "Soils and Geology" section of this chapter of the GMP/EIS, humans have altered shoreline dynamics along the length of Sandy Hook and most of Breezy Point to change the availability of sand, which not only supports beach vegetation but is moved inland by water and wind to supply inland and even nearshore saltmarsh habitats.



Nonnative plants are common throughout the park, composing from one-third to nearly all species at some park sites (NPCA 2007c). Although some nonnative plants became established as a result of disturbance and disruption of native habitats by the historical activities described above, others were deliberately planted. Much of the Staten Island Unit is landscaped, for example, using nonnative species such as bluegrass *(Poa pratensis).* Other nonnative species, like Russian or autumn olive *(Elaeagnus angustifolia, E. umbellata),* red chokeberry *(Aronia arbutifolia),* and buckthorn *(Rhamnus frangula),* were planted to supplement wildlife habitat, especially for migratory birds (NPCA 2007c).

Like many other eastern locations, several Japanese species have found habitat at the park, including Japanese sand sedge, Japanese honeysuckle, Japanese black pine, and Japanese knotweed *(Polygonum cuspidatum).* The Japanese sand sedge is an invasive colonizer of dunes of the North Atlantic Coast and successfully outcompetes a number of native dune species, including American beachgrass. An alien strain of *Phragmites* (common reed; *Phragmites australis)* has infested fresh and brackish wetland communities so that it now covers an estimated 1,120 acres, or nearly 5 percent of the park lands and waters (Mellander, pers. comm. 2005, as cited in Lawrence, Roman, and Frame 2010).

Human-modified Vegetation Associations

Human-modified vegetation associations include early successional woodland/forest, Japanese black pine forest, Japanese sedge maritime dunes, little bluestem old field, northeastern modified successional forest, northeastern old field, and reed/grass tidal marsh. Very small patches of two additional associations—hardwood plantation and Japanese knotweed gravel bar—also grow in the park but are not described in this GMP/EIS because of the limited area they occupy. Much of the Japanese black pine in the park has been lost to disease.

Early Successional Woodland/Forest. This successional shrubland or open woodland or forest includes northern hardwoods occurring in various settings following disturbance such as clearing, fragmentation, and deposition of fill material. The substrate is coarse sand formed from sandy dredge fill. The community often occurs in a mosaic with other disturbed or successional communities, such as successional maritime forest and reed/grass tidal marsh, or even with paved areas. In the forests or woodlands, the open canopy is composed of a mix of early-successional species, including white popular, quaking aspen *(Populus tremuloides),* gray birch *(Betula populifolia),* and black cherry. The shrubland expression of this community is characterized by a dense layer of tall shrubs that are strongly dominated by white poplar, with northern bayberry and black cherry. This association occurs in the Great Kills Park section of the Staten Island Unit and in the Fort Tilden, Floyd Bennett Field, Canarsie Pier, and Jamaica Bay Wildlife Refuge sections of the Jamaica Bay Unit.

Japanese Black Pine Forest. This association occurs on old, inactive, undulating dune deposits; some patches may be natural and others were probably planted intentionally. The substrate is well-drained, sandy fill, which can be moist below 4–6 inches (10–15 centimeters), covered by a layer of pine needles, duff, and loamy sand. Nonnative Japanese black pine is the dominant canopy and subcanopy tree of this vegetative community, with black cherry the only documented associated tree species. Shrub cover is sparse and usually shorter than 3.3 feet (1 meter) in height. This association occurs in the Sandy Hook Unit and in the Fort Tilden, Floyd Bennett Field, and Jamaica Bay Wildlife Refuge sections of the Jamaica Bay Unit. As noted above, most of the park's Japanese black pine has been lost to disease.

Japanese Sedge Maritime Dunes. This association occurs on coastal sand dunes with sandy, unstable substrates with no soil profile development. Eolian processes cause active sand deposition and erosion. The sand substrate is usually visible, and litter accumulation from plant debris is nearly absent. This community occurs on foredunes that receive the force of wind and salt spray, but it is generally beyond the influence of most storm tides. Vegetation is dominated by nonnative Japanese sedge in association with (and outcompeting) typical maritime dune species, including field sagewort and American beachgrass. This association is limited to the Sandy Hook Unit, New Jersey.

Little Bluestem Old Field. This association occurs on coarse sand to sandy loam and consists of well-drained to somewhat poorly drained soils formed in sandy dredge fill and loamy fill over sandy sediments. The vegetation association occurs in disturbed areas and is generally maintained by mowing. Adjacent communities include northern tall maritime shrubland, northern bayberry dune shrubland, northeastern old field, and North Atlantic Coast backdune grassland, as well as parking lots and airstrips. This successional vegetation is dominated and characterized by little bluestem. Associated species vary widely according to land-use history and adjacent vegetation; they can include weeping lovegrass *(Eragrostis curvula),* purple lovegrass *(E. spectabilis),* gray clubawn grass, or a host of other grass or forb species. This association occurs in the Great Kills section of the Staten Island Unit and the Fort Tilden, Floyd Bennett Field, and Spring Creek sections of the Jamaica Bay Unit.

Northeastern Modified Successional Forest. This is an early-successional woody vegetative community that occurs on sites that have been cleared of vegetation or otherwise heavily modified. The environmental characteristics of sites where this vegetative community grows in the park are highly variable. Substrates can range from coarse sand derived from sandy dredge fill to loam that developed over either glacial till or loamy fill material. Vegetation is characterized by dominance of successional and/or invasive species in all layers. The tree canopy and subcanopy are composed of a mix of species, including tree of heaven *(Ailanthus altissima),* black locust, white mulberry *(Morus alba)*, and black cherry. In the park, this association occurs on artificial, newly created uplands, such as the species-rich forest in the North Forty area of Floyd Bennett Field, and is present in all three units of Gateway.

Northeastern Old Field. This association occurs in an extremely variable assortment of sites, from mowed fields to disturbed maritime dunes. Substrates range from coarse sand and sandy loam to mucky peat. The vegetation of these successional old fields is extremely variable and depends on past and current land use as well as surrounding vegetation. The herbaceous layer is often dominated by common wormwood *(Artemisia vulgaris)* with a variety of grasses and forbs. This association occurs in the Great Kills section of the Staten Island Unit and in the Fort Tilden, Floyd Bennett Field, and Canarsie Pier sections of the Jamaica Bay Unit.

Reed/Grass Tidal Marsh. This association is often adjacent to and commonly intermingled with mid-Atlantic maritime salt shrub. It occurs in a range of tidal wetland habitats, and substrates range from coarse to fine sand or (less often) mucky peat or mucky, fine, sandy loam. Soils can be derived from eolian sands or dredge fill. The association is characterized by dense stands of Phragmites, which tends to grow in colonies of tall, stout, leafy plants, often to the exclusion of all other vascular plant species. This association occurs in the Sandy Hook Unit, the Great Kills section of the Staten Island Unit, and in all of the sections of the Jamaica Bay Unit.

Rare or Unique Vegetation

Rare, state-listed species or species listed as threatened or endangered under the federal Endangered Species Act are discussed in the "Species of Special Concern" section in this chapter of the GMP/EIS.

Of the vegetation associations described here and in the "Marine Resources" and "Wetlands and Floodplains" sections in this chapter of the GMP/EIS, several are locally and/or globally vulnerable or imperiled. Those communities ranked S1 (5 or fewer occurrences) or S2 (6–20 occurrences) by the New York and/or New Jersey Heritage Programs include the following:

- American holly forest—S1 New York and New Jersey; G1
- Successional maritime forest—S1, S2 New Jersey
- Maritime red-cedar forest—S1 New York and New Jersey
- Northern bayberry dune shrubland—S1, S2 New Jersey
- Beachgrass/panicgrass dune—S1, S2 New Jersey
- Northeastern Atlantic brackish interdunal swale—S1, S2 New York and New Jersey



- Brackish meadow—S1, S2 New York
- Coastal salt pond marsh—S1, S2 New York
- North Atlantic upper ocean beach—S1, S2 New Jersey

North Atlantic upper ocean beach also supports several listed species, including seaside amaranth (a New York endangered and federal threatened plant), sanddune sandbur (a New York threatened plant), piping plover (a New York endangered and federal threatened bird), seaside knotweed (a New York rare plant), black skimmer (a New York bird of special concern), and common tern (a New York threatened bird).

Northern beachgrass dune supports species of special concern as well, including sanddune sandbar and Oakes' evening primrose (a New York threatened plant).

Globally rare associations that occur at the park include the following:

- American holly forest—S1 New York and New Jersey; G1
- North Atlantic coastal plain vine dune—G1, G2
- Successional maritime forest—G2, G3
- Maritime red-cedar woodland—G2

G1 (5 or fewer occurrences) indicates the association is critically imperiled globally because of rarity, habitat, or biology; G2 (6–20 occurrences) indicates it is globally imperiled because or rarity, habitat, or biology; and G3 (21–100 occurrences) indicates it is rare and local throughout its range. A ranking of G1, G2, or G3 indicates the community or species is vulnerable to extinction.

Vegetation at Park Sites

A recently prepared assessment (Rowan 2012) of plant communities across the park is summarized in these sections to show their current condition. Updates on conditions after Hurricane Sandy were provided by NPS staff (February 2013). When an additional source is used, it is cited.

Jamaica Bay Unit

Plumb Beach. Plumb Beach has beach and dune areas, as well as saltmarsh and upland shrub/forest communities. The shrublands are in poor condition from foot traffic, which has worn several pathways into this area between the bike path and the dunes or saltmarsh. Although the marsh supports native saltmarsh species with no apparent invasive species, it is highly disturbed in many places. Many areas of the dunes are no longer vegetated due to heavy foot traffic and social paths that crisscross them. Coastal erosion at the western end of the beach periodically threatens the bike path and the Belt Parkway. An effort by the USACE, New York City Department of Parks and Recreation (NYCDPR), and NPS to nourish the beach on the west shoreline added 150,000 cubic yards of sand, which helped it withstand the storm surge from Hurricane Sandy. The east shoreline was not substantially eroded by Hurricane Sandy and remains in relatively good condition.



Floyd Bennett Field/Bergen Beach. Floyd Bennett Field consists of filled saltmarshes between former Jamaica Bay islands and what was once a shallow embayment. Bergen Beach is also a filled saltmarsh. Much of the planted lawns in the center and on the southeastern side of Floyd Bennett Field are now reverting to grasslands. This is a result of a partnership between the New York City Audubon and the NPS in the 1980s and 1990s to create habitat for grassland birds on 140 acres of Floyd Bennett Field. The grasslands provide butterfly and some bird habitat. Very large areas of Floyd Bennett Field, including grasslands on the southeastern side of the site, as well as Bergen Beach and shoreline of Dead Horse Bay between Plumb Beach and Floyd Bennett Field, are dominated in large part by a nonnative, invasive genotype of *Phragmites*. Hardened areas of the Floyd Bennett Field coastline associated with development alternate with eroding mudflats or sandy beaches. Bergen Beach is heavily used, especially by horses, as indicated by bare areas of sand. Many of these paths, as well as an area where restoration of a wetland was attempted, are flooded and at negative grade. Other than some erosion on the north shoreline of Floyd Bennett Field, this area was not substantially affected by Hurricane Sandy.

Canarsie Pier Coastal Area. This portion of Jamaica Bay includes the pier, Fountain Avenue and Pennsylvania Avenue former landfills, and Spring Creek Park and stretches for several kilometers of coastal frontage between them. Much of this land area is now filled, but it once was tidal freshwater or saltwater marsh. The shoreline is now largely dominated by *Phragmites*, particularly in Spring Creek Park. Vegetation here and elsewhere in these park sites shows evidence of heavy use, including bare areas and a network of social trails. Hurricane Sandy resulted in some flooding of the areas east and west of Canarsie Pier. Although the pier was overwashed by storm surge, it did not experience structural damage. The Fountain Avenue and Pennsylvania Avenue former landfills were not affected substantially by the storm.

Frank Charles Memorial Park. This very small community park is vegetated with recreational fields, lawns, and shrubs in the upland and has some saltmarsh and mudflat/intertidal communities interspersed with a cobble/gravel coastline. The site is affected by CSOs (a combination of stormwater and wastewater collected when treatment plants are at capacity) and heavy use. Vegetation here was not substantially affected by Hurricane Sandy.

Hamilton Beach Park. This very small community park is bisected by the Rockaway subway line and is affected by effluent from treated wastewater from an adjacent outfall pipe. Some areas of the park shoreline support saltmarsh vegetation, but it is dominated by *Phragmites*. This site was not substantially affected by Hurricane Sandy.

Jamaica Bay Fast Islands. "Fast" islands are those with dry land; fast islands in Jamaica Bay include Canarsie Pol, Ruffle Bar, Little Egg, and Subway Islands. These islands are primarily human created from dredge spoils, sand, and gravel added to saltmarshes. Upland areas include maritime shrublands and dunes. Intertidal zones are saltmarsh and beach, and there are some freshwater wetlands on the islands. *Phragmites* has invaded some of Canarsie Pol. Habitat on the fast islands is diverse, and a variety of animal species use it. Some of these islands were flooded by storm surge during Hurricane Sandy. Longer-term impacts from the flooding are yet unknown.



Jamaica Bay Hassocks. "Hassocks" are islands that are submerged at a minimum of once a month during the spring high tide; most are submerged twice each day by normal tides. Vegetation is nearly all low or high saltmarsh, although some shrubs or trees grow where fill material keeps them out of the brackish water. *Phragmites* has adapted to grow in higher salinities than it would in other areas at many park sites, but it cannot survive in saltmarshes and so has not invaded the hassocks. The hassocks are an important habitat for wildlife. Like the fast islands, hassocks in Jamaica Bay were flooded by storm surge during Hurricane Sandy.

Jamaica Bay Wildlife Refuge. The land area of this park site was created by filling and excavating various areas, including marsh islands, sand beaches, and submerged habitat in the northern portion of Jamaica Bay. Portions of Grassy Bay, Rulers Bar Hassock, Goose Pond Marsh, Goose Pond, Big Egg Marsh, Broad Creek Marsh, and three other unnamed islands were reconfigured to create the refuge land and water masses. As described in the "Wetlands and Floodplains" section in this chapter of the GMP/EIS, two large water bodies were artificially created at the refuge—both with the intention of making freshwater habitats. A third water body, Big John's Pond, is an excavated freshwater pond covered with floating aquatic vegetation during the warm season. Over time, the salinities of the ponds have changed. A woolgrass marsh and a mixed forb marsh both grow near the ponds (see "Wetlands and Floodplains" in this chapter for more information). The refuge also supports brackish and saltwater wetlands, as well as shrubland, woodland, dunes, and beaches. *Phragmites* covers a large area along the edges of the water bodies on the refuge.

Jacob Riis Park. This park site on the Rockaway Peninsula is bounded to the north by Jamaica Bay and to the south by the Atlantic Ocean. The land area is mostly developed for parking lots and recreational uses; a large beach and dune system on the ocean side is unvegetated. A small area of the northeastern side of the site supports a maritime shrubland; otherwise, vegetation is planted lawn. Hurricane Sandy substantially overwashed and eroded the dunes.

Fort Tilden. Much of the vegetation at this park site, particularly in the back fort area (following Hurricane Sandy), is in relatively undisturbed condition. Plant communities include shrublands and forest, as well as old field associations. Before Hurricane Sandy, dunes were vegetated with North Atlantic coastal plain vine dune association species, including eastern poison ivy and Virginia creeper. However, the storm substantially affected the bayshore and the ocean shore of Fort Tilden. Primary and secondary dunes on the ocean side were eroded and the dune vegetation lost over much of the park site.

Breezy Point. Breezy Point Tip is the terminus of the Rockaway barrier island. The habitat is a unique and relatively undisturbed combination of exposed beach and foredune with secluded backdune and a variety of wetland types, including palustrine, coastal salt pond marsh, brackish interdunal swales, and salt panne pools.

Staten Island Unit

Because of the location of the Staten Island Unit, Hurricane Sandy blew directly onshore rather than alongshore as it did at many other park sites. As a result, extensive flooding and loss of trees and habitat for other vegetative communities took place.

Fort Wadsworth. The shoreline of Fort Wadsworth is located along the New York Harbor at the western terminus of the Verrazano-Narrows Bridge. The bridge terminus is hardened, but otherwise the shoreline is undeveloped near the fort. A beach lies along one shore; the other is vegetated with shrub and successional forest species (Edinger et al. 2008b). Vegetation is characterized by dominance of successional and/or invasive species in all layers. The tree canopy and subcanopy are composed of a mix of species, including nonnative tree of heaven, black locust, white mulberry, and black cherry. Much of this vegetation was blown down or removed by winds and waves during Sandy. Upland of the shore, vegetation is primarily planted lawns, shrubs, and trees.

Miller Field. Most of Miller Field is either planted lawn or developed, although a line of dunes faces the ocean. However, a rare relict swamp white oak forest grows in the farther inland portion of the site. In addition to a few swamp white oaks, the site supports pin oak *(Quercus palustris),* northern red oak, and other tree species. The understory is populated with a suite of invasive species, including multiflora rose, Japanese honeysuckle, and garlic mustard *(Alliaria petiolata).* These species particularly occur along disturbed sites such as the multitude of pathways through the forest. Although Hurricane Sandy did not affect the forest, it did diminish and flatten the dunes.

Great Kills Park, Including Crooke's Point and Associated Coast. The "Soils and Geology" section in this chapter describes natural coastal processes, human-caused changes to them, and historical efforts to alter the configuration and elevation of this part of the park. The beach at Crooke's Point naturally accumulates sand, and vegetation in this area includes that typical of upper ocean beach. Crooke's Point includes overwash habitat and dunes vegetated with American beachgrass along its shore, as well as inland associations such as successional maritime forest and northern tall maritime shrubland. Much of Crooke's Point is covered in invasive vines, the removal of which is a target of an NPS partnership project with volunteers and NYCDPR. Mudflats and vegetation as described in the" Marine Resources" section in this chapter of the GMP/EIS for North Atlantic Coast estuarine intertidal mudflat occupies a portion of the coast at Great Kills Park. In Great Kills, *Phragmites* dominates the majority of the area, particularly north of the Great Kills Harbor and along the northern NPS property line, although additional successional forests grow west of this infestation.



Hoffman Island and Swinburne Island. Hoffman Island is a 14-acre and Swinburne Island a 4-acre artificial island; each was each previously developed and ruins of the buildings remain. The islands are wooded with a variety of deciduous trees and shrubs. Island shores are stone bulkheads and nonnative plant species are common, as are open areas from former human use (Frame, pers. comm. 2013b).

Sandy Hook Unit

The Sandy Hook Unit is unique at Gateway in that it is a larger continuous and contiguous park site. The vegetation is described by habitat type rather than location.

Beaches and Dunes. Dunes at Sandy Hook are vegetated with species (described in the "Marine Resources" section in this chapter of the GMP/EIS), including American beachgrass, American searocket, seaside sandmat, and bitter panicgrass, typical of the upper ocean beach, beachgrass dune, beachgrass/panicgrass dune, and dune shrubland communities. The swales of the dunes are often brackish and support vegetation dominated by saltmeadow cordgrass, although Japanese sedge maritime dune species, including Japanese sedge, has invaded many of the dunes. Sandy beach in the northern end of the island is accreting and the extensive foredune here is vegetated with American beachgrass (USFWS 1997a). Extensive areas of backdune habitat also occur toward the northern end. Beaches at the southern end of Sandy Hook are narrow for reasons described in the "Soils and Geology" section in this chapter. Hurricane Sandy caused extensive damage to NPS facilities and infrastructure through strong winds and a 13-foot storm surge. Sand movement from dunes and beaches was extensive, with overwash moving sediment from the dunes and beaches across the peninsula to cover the unit's main access road with drifts as much as 8 feet deep. Unvegetated dunes were particularly vulnerable.

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Grassland Vegetation. Although most of the Fort Hancock area is developed, Rowan (2012) noted a relatively undisturbed area of grassland in the vicinity, indicating that it was in good condition and provided habitat for insects, butterflies, and ground-nesting birds.

Internal Shrublands, Woodlands, and Forests. Red cedar and holly forests cover about half of the Sandy Hook Unit. In some areas of these forests, springs or possible bogs or wet depressions occur. From the backdunes to the highest and most interior part of Sandy Hook, shrublands grow that are typical of the successional maritime forests described previously, dominated by bayberry, beach plum, and tree of heaven (USFWS 1997a). The backdune and interior maritime shrublands are relatively intact but have been invaded in some cases by Japanese sedge. Although the interior maritime shrublands were flooded by the storm surge associated with Hurricane Sandy, trees remained standing for the most part and long-term impacts are yet unknown.

Bay Coasts, Including Spermaceti and Horseshoe Coves and Plum Island. The bay side of Sandy Hook consists of extensive mudflats, sandflats, and saltmarsh dominated by smooth cordgrass. There are a few small inland brackish marshes or intertidal areas; many of these, as well as much of the bay shorelines, are dominated by *Phragmites*. Spermaceti and Horseshoe Coves have Phragmites along the shorelines in some cases, as does the interior wetland of Plum Island. Horseshoe Cove shows both erosion and accretion in some locations, which may be due to the presence of a battery that acts like a jetty to collect sand on one side. The Hurricane Sandy storm surge increased the erosion of these shorelines.

Wildlife



Despite the generally urbanized nature of the region, Jamaica, Raritan, and Sandy Hook Bays encompass important breeding and juvenile nursery habitat for fish. These estuaries and adjacent terrestrial habitat are also important for nesting, foraging, and roosting birds, including waterfowl, shorebirds, colonial-nesting waterbirds, and seabirds like gulls and terns.

Other sections of this GMP/EIS describe the meeting of currents, waters, and climate from the north and south in the vicinity of Gateway. Jamaica Bay and Breezy Point on one side and Sandy Hook on the other frame the entrance into New York Bay and Harbor. Park sites in the Jamaica Bay Unit receive an influx of migrating species from the east–west-oriented coastline of New England and Long Island and the Sandy Hook and Staten Island Units from the north–south coastline of the mid-Atlantic coast. This intersection, along with the influence of substantial inflow of freshwater primarily from the Hudson River, concentrates species migrating between the New York Bight portion of the North Atlantic and the Hudson/Raritan Estuary in both directions, and makes for a regionally significant wildlife habitat (USFWS 1997c).

Despite the generally urbanized nature of the region, Jamaica, Raritan, and Sandy Hook Bays encompass important breeding and juvenile nursery habitat for fish. These estuaries and adjacent terrestrial habitat are also important for nesting, foraging, and roosting birds, including waterfowl, shorebirds, colonial-nesting waterbirds, and seabirds like gulls and terns. Upland sites in this area provide rare habitat in the area for grassland bird nesting and foraging and butterfly concentrations (USFWS 1997b). Habitat at Sandy Hook includes ocean beaches populated by listed plant and animal species; inland rare dune, shrub, and forest habitat; and the estuarine shoreline that faces the Raritan and Sandy Hook Bays. This section of shoreline is exposed to intertidal and subtidal influences and is considered important to shellfish and marine, estuarine, and anadromous fish, as well as for its significant migratory and wintering waterfowl concentrations (USFWS 1997a). Like Jamaica Bay, the shoreline provides important fish nursery areas, and its wetlands and uplands provide migratory and wintering spots for waterfowl, shorebirds, waterbirds, and landbirds like songbirds and raptors. The shore is also used as nesting and foraging areas for terrapins. Portions of the Staten Island shoreline also provide wildlife tidal mudflat, dune, and some remnant freshwater wetland and forest habitat.

The park is continually inventorying its wildlife species, and as of 2010 had found 326 bird species, 101 fish species, 30 mammal species, 25 reptile and amphibian species, and over 500 invertebrates, including aquatic macroinvertebrates, butterflies, moths, dragonflies, beetles, and other insects (Lawrence, Roman, and Frame 2010). At least 73 bird species nest in the park.

Mammals

The most common mammals at the park include opossum *(Didelphis virginiana),* raccoon *(Procyon lotor*), eastern cottontail *(Sylvilagus floridanus),* eastern gray squirrel *(Sciurus carolinensis),* white-tailed deer *(Odocoileus virginianus),* red fox *(Vulpes vulpes),* and species of rats, mice, and voles including white-footed mouse *(Peromyscus leucopus)* and meadow vole *(Microtus pennsylvanicus).* Migratory bats found at the park include little brown *myotis (Myotis lucifugus),* silver-haired bat *(Lasionycteris noctivagans),* red bat *(Lasiurus borealis),* and hoary bat *(Lasiurus cinereus)* (USFWS 1997b). Although not rare in the region, small



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mammals are rare in the urban core of the city and serve as an important food base for the hawks and owls feeding on the islands and shorelines of Jamaica Bay and elsewhere in the park.

As noted in the "Marine Resources" section of this chapter, dolphins, whales, and seals sometimes travel in park-managed waters. Harbor seals are winter visitors to Sandy Hook, Great Kills Harbor, Hoffman and Swinburne Islands, Jamaica Bay, and the Rockaway Inlet area and use local docks, the jetty at Breezy Point Tip, and other locations as haul-out areas. The endangered humpback whale occasionally feeds in New York Bay adjacent to the inlet, and bottlenose dolphins and endangered sperm whales *(Physeter macrocephalus)* have been noted as strandings in the area (USFWS 1997b).

Although the area that is now the park did at one time have larger land mammals, including elk, black bear, and beaver in the 1600s, these and a dozen other mammalian species are now locally extinct (NRCS 2001).

Birds

The wildlife group for which the park is best known is birds, particularly the waterbirds, seabirds, shorebirds, and waterfowl that frequent its estuarine and coastal shorelines. The park is visited annually by 34 species of migratory shorebirds (Harrington, pers. comm. n.d.).

Jamaica Bay, for example, averages mid-winter ground counts of birds at about 11,000, with a peak (during the years from 1980 to 1992) of 36,000 (USFWS 1997b). The migratory and mid-winter concentrations of waterfowl in the Raritan/Sandy Hook Bay complex (which includes both Sandy Hook and the park sites on the shore of Staten Island) average over 60,000 birds (USFWS 1997c).

Breezy Point and Sandy Hook support some of the highest concentrations of beach-nesting birds in the entire New York Bight coastal region, including threatened piping plovers and other rare bird species, such as least terns, black skimmers, and common terns, discussed in the "Species of Special Concern" section of this chapter. Other nesting waterbirds at Breezy Point include great black-backed gull, herring gull, and American oystercatcher. The gulls, terns, and oystercatchers nesting at these park sites feed throughout Rockaway Inlet and Jamaica Bay.

Breezy Point and Sandy Hook are also concentration areas for other migratory shorebirds, waterfowl, and raptors and other landbirds, especially during the summer and fall migrations. The raptor banding station at Breezy Point banded 2,414 raptors during the period from 1978 to 1987 and sighted 15,715 raptors. The most numerous species sighted were American kestrel *(Falco sparverius)* and sharp-shinned hawk (Accipiter striatus), with a total of 9,244 and 4,373 birds, respectively, sighted during that period (USFWS 1997b). Spring hawk counts at Fort Hancock on Sandy Hook average nearly 5,000 birds, with the same two species dominating (USFWS 1997c). Other species consistently sighted include Cooper's hawk *(Accipiter cooperii),* northern harrier *(Circus cyaneus)*, osprey *(Pandion haliaetus),* peregrine falcon *(Falco peregrinus),* and merlin *(Falco columbarius).*

Jamaica Bay's islands, because they are somewhat isolated from predation, support large numbers of colonial-nesting waterbirds as well as a variety of migratory species. At least 326 species of birds have been sighted at Jamaica Bay on its islands and at the wildlife refuge, including confirmed breeding by 62 of those species (USFWS 1997b). A mixed-breed heronry on Canarsie Pol includes a variety of nesting waders, including glossy ibis, great egret, snowy egret, cattle egret, black-crowned night-heron, and tricolored heron. A smaller heronry no longer active occurred on Ruffle Bar in 1995. Recent information from the NYC Audubon (Phillips, pers. comm. 2013) indicates herons and egrets also nest at Elder's Point, Subway Island and Little Egg and that breeding at Canarsie Pol has declined from predation by raccoons and human disturbance in recent years. Although no wading birds nested here in recent years, Canarsie Pol also has nesting by the state-listed threatened common tern, as well as by great black-backed gull, herring gull, and American oystercatcher. Common terns occur on several other islands in the bay, including Jo Co Marsh and Silver Hole Marsh, with smaller numbers at Duck Creek Marsh, East High Meadow, Ruffle Bar, and Subway Island. An average of about 1,000 common terns and a maximum of 1,630 common terns nested on the combined seven colonies in Jamaica Bay between 1984 and 1996 (USFWS 1997b).

Laughing gulls *(Larus atricilla)* recolonized Jamaica Bay in 1979; over 99.9 percent of nesting by this species in the state of New York from 1979 to 2007 was associated with the colony at Joco Island in the park. As of 2008, an estimated 1,280 nests were active at this site (Washburn, Lowney, and Gosser 2012).

Ospreys also nest in the Jamaica Bay Unit and elsewhere in the park. Approximately 18 osprey pairs nest in Jamaica Bay, 14 pairs at Sandy Hook, and 1 pair on Staten Island.

Clapper rails *(Rallus longirostris)* and common moorhens *(Gallinula chloropus)* nest in the saltmarshes. American oystercatchers nest at several islands in Jamaica Bay; they also have nested along the airport shoreline. A variety of other birds breed on the islands and uplands in the bay, including one of only two New York State sites for, and the northernmost nesting extent of, the boat-tailed grackle *(Quiscalus major).* Shorebirds known to breed in or around Jamaica Bay include killdeer *(Charadrius vociferus),* American oystercatcher, willet, spotted sandpiper *(Actitis macularia),* upland sandpiper, and American woodcock *(Scolopax minor).*



In addition to providing wintering and nesting habitat, Jamaica Bay is one of the most important migratory shorebird stopover sites in the New York Bight region, especially during fall migration (July to November). The shorebirds use much of the bay during the migration stopovers, but tend to focus on the intertidal areas during low tide and move to East and West Ponds on Ruler's Bar Hassock during higher tides. The water in East Pond is artificially lowered after July 1 each year. From 1981 to 1990, there was an average of 27 and a maximum of 36 shorebird species counted at the East and West Ponds in the Jamaica Bay Wildlife Refuge during the fall. The most abundant shorebirds during that period were black-bellied plover *(Pluvialis squatarola),* semipalmated plover *(Charadrius semipalmatus),* greater yellowlegs *(Tringa melanoleuca),* ruddy turnstone *(Arenaria interpres),* sanderling *(Calidris alba),* semipalmated sandpiper *(Calidris pusilla),* least sandpiper *(Calidris minutilla),* dunlin *(Calidris alpina),* and short-billed dowitcher *(Limnodromus griseus).* Jamaica Bay is also important during spring migration (March to June) on the ponds for several of these same species, as well as red knot *(Calidris canutus).* Hunting is prohibited in the park by virtue of



The combination of geographic location and configuration coupled with productive bay wetlands, flats, and waters in Raritan and Sandy Hook Bays make this another important migratory staging area in the park for many species of waterfowl on the Atlantic Flyway.

its New York City location, which may contribute to the high numbers of individual ducks and duck species. In one year-round survey of birds at Jamaica Bay, 263,000 individuals of 32 species were recorded (USFWS 1997b).

The combination of geographic location and configuration coupled with productive bay wetlands, flats, and waters in Raritan and Sandy Hook Bays make this another important migratory staging area in the park for many species of waterfowl on the Atlantic Flyway. Peak migration occurs in late October, but November aerial counts in New Jersey waters still average nearly 45,000 birds (USFWS 1997c). The number of horned grebes *(Podiceps auritus),* as well as common and red-throated loons *(Gavia immer, G. stellata),* during migration is regionally significant. Especially notable are the overwintering scaup concentrations, primarily greater scaup, which have increased in this area recently and are an important component of the Atlantic Flyway population. Other significant species populations include Canada geese in the Raritan River and the Navesink system, American black ducks, canvasbacks *(Aythya valisineria),* mallards *(Anas platyrhynchos),* and brant, along with lesser numbers of bufflehead, oldsquaw *(Clangula hyemalis),* mergansers (primarily red-breasted mergansers *[Mergus serrator])*, common goldeneye *(Bucephala clangula),* and American wigeons *(Anas americana).* These waterfowl are not evenly distributed but rather tend to concentrate along the southern Raritan Bay and Staten Island shorelines, where moderate-sized flocks of scaup and American black ducks and smaller groups of brant occur.

Shrublands and woodlands can offer important feeding or resting habitat for songbirds (or "passerines") in the park, such as sparrows, warblers, and other perching species. As noted above, grasslands at Fort Hancock on Sandy Hook and open areas at Breezy Point support very large spring raptor migrations as well.

Grasslands at Floyd Bennett Field became habitat for certain open-country bird species after the airfield was decommissioned in 1950, and stayed that way until the last few decades, when open areas began to transition into shrub and forest. In 1985, a portion of Floyd Bennett Field was cleared and mowed to create grasslands; about 140 acres are still maintained using these techniques. This area is unique in that it is a large grassland in the urban area of New York City, supporting feeding and resting grassland species that are not seen elsewhere in the city. In addition, several birds have or now use this habitat for nesting, including grasshopper sparrow *(Ammodramus savannarum),* horned lark *(Eremophila alpestris),* eastern meadowlark *(Sturnella magna),* upland sandpiper, savannah sparrow *(Passerculus sandwichensis),* northern harrier, American kestrel, and common barn owl *(Tyto alba).* Use of this area by grasshopper sparrows (a state-listed species) increased significantly in average abundance between 1984 and 1992. Since 1996, however, there have been no grasshopper sparrows nesting at Floyd Bennett Field.

Overwintering grassland birds at Floyd Bennett Field include northern harrier, rough-legged hawk (Buteo lagopus), American kestrel, common barn owl, short-eared owl *(Asio flammeus),* horned lark, eastern meadowlark, and savannah sparrow. The bobolink *(Dolichonyx oryzivorus)* is a regular migrant visitor in the grasslands. Grassland birds, especially upland sandpipers, also use the grassland habitat along the runways at John F. Kennedy International Airport (USFWS 1997b).

The bird community at park sites in the Staten Island Unit is most varied at Great Kills Park, including Crooke's Point. Wintering horned larks, snow buntings *(Plectrophenax nivalis),* and Lapland longspurs *(Calcarius lapponicus)* occupy shoreline habitat, and purple sandpipers *(Calidris maritima),* ruddy turnstones *(Arenaria interpres),* and gulls visit jetties at Crooke's Point and north of the tidal flats at Great Kills Park (Audubon New York 2013). Fall migrants are numerous and include red-shouldered hawk *(Buteo lineatus),* rough-legged hawk, and northern harrier, as well as numerous warblers, vireos, orioles, and flycatchers. Shorebirds, wading birds, and waterfowl including herons, ibis, and egrets occupy seasonal ponds after heavy rains. Bank swallows *(Riparia riparia)* nest in cliffs southeast of the parking lot.

Reptiles and Amphibians

Species of reptiles in the park include the estuarine northern diamondback terrapin *(Malaclemys terrapin),* seven species of turtles in the terrestrial maritime environment and freshwater wetlands, six species of snakes, and several sea turtles that swim offshore. The eastern hognose snake *(Heterodon platyrhinos)* has recently been reintroduced to portions of the park (Tanacredi and Badger 1995, as cited in NRCS 2001). An additional eight species of amphibians include salamanders, newts, toads, and frogs, including the northern spring peeper *(Pseudacris crucifer),* reintroduced as a food source for the eastern hognose snake. In addition to the eastern hognose snake and spring peeper, several other reptiles and amphibians have been introduced specifically to the Jamaica Bay Wildlife Refuge area of the park. These include Fowler's toad *(Bufo woodhousii fowleri),* gray treefrog *(Hyla versicolor),* green frog *(Rana clamitans),* spotted salamander *(Ambystoma maculatum),* redback salamander *(Plethodon cinereus),* northern brown snake *(Storeria dekayi dekayi),* smooth green snake *(Opheodrys vernalis),* eastern milk snake *(Lampropeltis triangulum triangulum),* northern black racer *(Coluber constrictor constrictor),* snapping turtle *(Chelydra serpentina),* eastern painted turtle *(Chrysemys picta picta),* and eastern box turtle *(Terrapene carolina carolina).*

Although northern diamondback terrapins and eastern box turtles are not listed, they are considered species of management concern by the park and are discussed in more detail in the "Species of Special Concern" section in this chapter of the GMP/EIS.



Sea turtles use the area offshore of several park sites, and loggerhead sea turtles have occasionally been reported coming on shore in the Jamaica Bay or Breezy Point areas (USFWS 1997b).

Fish

Over 100 species of finfish and shellfish have been counted in park-managed waters, with 90 reported in fisheries hauls in the Raritan and Sandy Hook Bays. The most abundant fish species in the Raritan Bay complex are those tolerant of lower salinities and so require an estuarine habitat like that provided off the Staten Island and east Sandy Hook shorelines. These species include mummichog, hogchoker *(Trinectes maculatus),* weakfish, winter flounder, summer flounder, striped bass, sea bass *(Dicentrarchus punctatus), scup (Stenotomus chrysops),* and spot *(Leiostomus xanthurus).* Commercial fisheries exist for American shad *(Alosa sapidissima),* American eel *(Anguilla rostrata),* and American lobster. Blue crabs and horseshoe crabs are taken in a dredge fishery. Species of clams, oysters, and mussels populate the bays, although

they are closed to direct-market harvest of shellfish due to pollution (USFWS 1997c; Yuhas 2003, New York Department of Environmental Conservation website: **http://www.dec.ny.gov/regs/4014.html#12837;** consulted June 17, 2013). Sandy Hook Bay has been re-classified as a special restricted area (following resolution of water quality issues related to Hurricane Sandy), which mean shellfish taken from here can be sold after depuration in clean water tanks (NJ DEP Marine Water Monitoring website: **http://www.state.nj.us/dep/bmw/sandymonmouth.html;** consulted June 17, 2013).

Waters in Jamaica Bay and ocean-fronting park sites on the Rockaway peninsula are home to an estimated 81 species of finfish and shellfish.

Waters in Jamaica Bay and ocean-fronting park sites on the Rockaway peninsula are home to an estimated 81 species of finfish and shellfish (USFWS 1997b). The majority of species collected in Jamaica Bay, including the commercially important winter flounder, are juveniles using it as a nursery area. Juvenile Atlantic silverside *(Menidia menidia)* composed over 60 percent of all species caught in a seining survey of the bay in 2002 (USACE 2010). Mummichog, Atlantic menhaden, striped killifish *(Fundulus majalis),* and Atlantic silverside compose a prey base in the bay for feeding fish and birds. Recreational landings include scup, bluefish *(Pomatomus saltatrix),* and American eel, many of which are caught in Raritan and Sandy Hook Bays.

Essential Fish Habitat

The regional fisheries management councils, with assistance from the National Oceanic and Atmospheric Administration (NOAA)–Fisheries, are required under the Magnuson-Stevens Fishery Management and Conservation Act to delineate essential fish habitat for all managed species to minimize adverse effects and identify actions to enhance and conserve habitat for these species.

Several of the species listed below are currently in danger of overfishing or are currently overfished, (NOAA websites: **http://www.nero.noaa.gov/hcd/STATES4/conn_li_ny/40307350.html** ~~http://www.nero.noaa.gov/hcd/STATES4/ConnNYNJ.htm,~~ consulted June 14, 2013):

- Whiting *(Merluccius bilinearis)* - eggs, larvae and juveniles at Rockaway Beach, Jamaica Bay; eggs, larvae, juveniles and adults off Sandy Hook.

- Red hake *(Urophycis chuss)* - eggs, larvae and juveniles at Rockaway, Jamaica Bay, Sandy Hook and Staten Island

- Winter flounder *(Pseudopleuronectes americanus)* - all life stages at all park units

- Windowpane flounder *(Scophthalmus aquosus)* - all life stages off Staten Island, Sandy Hook and western Jamaica Bay; juveniles and adults in eastern Jamaica Bay.

- Yellowtail flounder *(Limanda ferruginea)* - eggs and larvae off Sandy Hook

- Atlantic sea herring *(Clupea harengus)* - juveniles and adults offshore of Sandy Hook and western Jamaica Bay; adults in eastern Jamaica Bay; larvae, juveniles and adults off Staten Island

- Monkfish *(Lophius americanus)* – eggs and larvae off Sandy Hook and western Jamaica Bay; eggs, larvae and juveniles in eastern Jamaica Bay.

- Bluefish *(Pomatomus saltatrix)* – juveniles and adults in Jamaica Bay, off Staten Island; all life stages offshore Sandy Hook

- Atlantic butterfish *(Peprilus triacanthus)* - all life stages in eastern Jamaica Bay; larvae, juvenile and adults in western Jamaica Bay and Rockaway beaches, offshore Staten Island; juveniles offshore Sandy Hook

- Atlantic mackerel *(Scomber scombrus)* – all life stages in eastern Jamaica Bay; juveniles and adults in western Jamaica Bay and offshore Staten Island

- Summer flounder *(Paralichthys dentatus)* – larvae, juveniles and adults offshore Staten Island and in western Jamaica Bay/Rockaway quadrant; juveniles and adults in eastern Jamaica Bay and offshore Sandy Hook.

- Scup – all life stages in western Jamaica Bay/Rockaway and offshore Staten Island; juveniles and adults offshore Sandy Hook and eastern Jamaica Bay.

- Black sea bass *(Centropristis striata)* - juveniles and adults at Staten Island, western Jamaica Bay/Rockaway, offshore Sandy Hook; juveniles in eastern Jamaica Bay.

- Ocean quahog *(Artica islandica)*- adults found offshore of Sandy Hook

- King mackerel *(Scomberomorus cavalla)* - all life stages offshore of Staten Island, Sandy Hook, Jamaica Bay/Rockaway

- Spanish mackerel *(Scomberomorus maculatus)* - all life stages at all park units

- Cobia *(Rachycentron canadum)* - all life stages at all park units

- Sand tiger shark *(Carcharias Taurus)* - larvae at all park units

- Dusky shark (*Carcharhinus obscurus)*- larvae and juveniles offshore Staten Island and Sandy Hook; larvae in Jamaica Bay.

- Sandbar shark *(Carcharhinus plumbeus)* – larvae and adults offshore Staten Island; larvae, juveniles and adults at other park sites.

- Tiger shark *(Galeocendo cuvieri)* - larvae offshore Sandy Hook and eastern Jamaica Bay

- Bluefin tuna *(Thunnus thynnus)* - juveniles offshore Sandy Hook

- Skipjack tuna *(Katsuwonus pelamis)* - adults offshore Sandy Hook



The mudflat at Plumb Beach supports other invertebrates, including mud snails and Atlantic ribbed mussels (Geukensia demissa), which provide biomass for horseshoe crabs and a variety of birds.

Invertebrates

Aquatic invertebrates are plentiful in the shallow waters of Jamaica Bay. The muddy sediment of the eastern and northern portions of the bay and sandy soils of the southern and western side support a diverse assemblage of benthic species, measured at 121 in a 1983 survey (USFWS 1997b). Amphipod crustaceans such as marine worms supply food for waterfowl and adult winter flounder. The mudflat at Plumb Beach supports other invertebrates, including mud snails and Atlantic ribbed mussels *(Geukensia demissa),* which provide biomass for horseshoe crabs and a variety of birds. Horseshoe crabs in turn lay abundant eggs, which feed many migrating bird species, and in particular sustain the state-listed red knot, a species that must have this food source to successfully complete its migration to the arctic. Sandy soils offshore of park sites support many mollusks and crustaceans, including northern quahog, soft clam, and Atlantic surf clam. The biodiversity, however, is much impoverished compared with what it must have been before the loss of eelgrass beds and oyster reefs.

Terrestrial invertebrates are largely unsurveyed in the park, although studies of butterflies in the 1990s recorded over 50 species (Tanacredi and Badger 1995, as cited in NRCS et al. 2001). American holly at the park is the host for the rare butterfly, Henry's elfin *(Callophrys henrici),* which has been recorded breeding and overwintering in the Raritan Bay/Sandy Hook area (Lawrence, Roman, and Frame 2010). A slightly more recent survey of Jamaica Bay Wildlife Refuge (USFWS 1997a) counted 54 species of butterflies and skippers at the refuge and in surrounding uplands. This survey noted regular use by several rare butterfly and skipper species, including checkered white *(Pieris protodice),* white-m hairstreak *(Parrhasius m-album),* Appalachian azure *(Celastrina neglectamajor),* tawny emperor *(Asterocampa clyton),* and saltmarsh skipper *(Panoquina panoquin)* (USFWS 1997a). More than 489 moth species have been photo-identified in and around Jamaica Bay (S. Walter, pers. comm. n.d.)

Wildlife in Park Sites

An informal survey of park wildlife types completed by Rowan (2012) was used to compile the following assessments of current wildlife status at park sites.

Jamaica Bay Unit

Plumb Beach. Plumb Beach habitat is composed mostly of native species, and the beach is in relatively undisturbed condition in the eastern portion of the site. The only notes made by Rowan include the presence of horseshoe crabs and the potential for recreational fishing. Although shorebird habitat may be available, the heavy use of the area makes nesting unlikely. However, Plumb Beach continues to provide important stopover habitat for migratory birds, including the stated listed red knot which feeds on the eggs of horseshoe crabs at the site.

Floyd Bennett Field. Open areas of grasslands, meadow, and possible wet areas, including Phragmites, offer habitat for birds, small mammals and their predators (primarily birds), and deer. Rowan noted that feral cats or dogs as well as resident Canada geese are likely present. Grasslands may be used by butterflies, bluebirds, and other grassland or meadow species.

Canarsie Pier Coastal Area, Including Horseshoe Bay, Fountain Avenue and Pennsylvania Avenue Parks, Spring Creek Park Site. The majority of this area is highly disturbed, although mudflats in some areas may support horseshoe crabs. Feral dogs and cats, which may prey on shorebirds or small mammals, are likely present.

Frank Charles Memorial Park. Rowan (2012) did not notice any wildlife and indicated it was likely quite sparse because the park site is small and heavily used.

Hamilton Beach Park. Mudflats at this park site likely support a few invertebrate species. Feral pets are likely present.

Jamaica Bay Fast Islands. The wildlife community on the fast islands, and in particular Canarsie Pol, is important, with wading-bird rookeries and other bird nesting and breeding areas. In addition to its isolation from predators of ground- or colonial-nesting birds, the existing woodland provides habitat for roosting birds.

Jamaica Bay Hassocks. Wildlife at the hassocks is primarily aquatic because these islands are submerged by the tides. Invertebrates and shellfish, crustaceans, waterfowl, seabirds, and shorebirds live and feed in the saltmarsh at lower tide.

Jamaica Bay Wildlife Refuge. The combination of estuarine, saltmarsh, and freshwater habitat provides support for a multitude of migratory bird species, many of which are rare, threatened, or endangered at the state or federal level. The open waters of the refuge ponds support large flocks of resident Canada geese and gulls.

Jacob Riis Park. Although the dune area of this park site could support some wildlife species, habitat is limited by the near absence of vegetation.

Fort Tilden. Habitat in the beach intertidal and splash zone could be home to an abundant assemblage of marine invertebrates. Grasslands and shrublands provide habitat for passerines, including sparrows, warblers, and other species. Fort Tilden is known for raptor migrations between March and May, including many rare or unique species such as northern harriers and ospreys.

Breezy Point Tip. The tip of Breezy Point is excellent shorebird and marine bird/waterfowl habitat. It also is used by terrapins for nesting and is home to surf clams and other invertebrates on relatively undisturbed beach intertidal habitat. Upland dune and shrub habitat is used by a variety of songbirds and waterfowl for feeding, nesting, and resting.

The tip of Breezy Point is excellent shorebird and marine bird/ waterfowl habitat. It also is used by terrapins for nesting and is home to surf clams and other invertebrates on relatively undisturbed beach intertidal habitat.



Staten Island Unit

Fort Wadsworth. Wildlife in Fort Wadsworth would be those species able to live in woodlands and shrublands that are not native to the area. Shoreline areas may support sparse wildlife, although beaches slope quickly to deep water.

Miller Field. The swamp white oak forest may provide habitat for a few woodland birds, although heavy use likely keeps wildlife from permanently residing here.

Great Kills and Crooke's Point. The 1990 amendment to the park's 1979 General Management Plan (NPS 1990c) noted over 80 species of wildlife had been counted in the Great Kills/Crooke's Point area. Species included waterfowl, wading birds, raptors and passerine species of birds. Open areas of beach grass provided habitat for large numbers of amphibians and reptiles. Diamond-backed terrapins (turtles) were found at the harbor on Crookes Point. Green frogs and Fowler's toads were found in shaded areas south of Hylan Boulevard. Small mammals that do not require large areas of cover found at the site included bats, mice, chipmunks, shrews, squirrels and voles. Crookes Point contained diverse wildlife habitat and remains an important habitat for migrating birds and insects, particularly the monarch butterfly. ~~Although Rowan did not observe wildlife, she did note that the wetlands, saltmarsh, and mudflat habitat near shrublands is likely to provide some habitat for native species.~~

Hoffman and Swinburne Islands. These islands are used by herons, ibis, egrets, and other waterbirds in a mixed-species rookery for nesting.



Sandy Hook Unit

Beaches. Rowan indicated that the sparse natural vegetation at Sandy Hook means the beach or foredune wildlife community is less abundant than it could be. Extensive maritime shrublands behind the foredunes may provide habitat for a variety of passerines. As described in the "Species of Special Concern" section in this chapter of the GMP/EIS, abundant shorebird nesting, including for several listed or unique species, takes place on the beaches of Sandy Hook.

Fort Hancock. Grasslands and old fields near the fort support butterflies and other insects, and offer nesting and feeding opportunities for ground-nesting passerines. Small mammals likely occupy the area as well, which contributes to its value as a raptor migration stopover in the spring (USFWS 1997a).

Internal Shrublands and Woodlands. Internal shrublands and woodlands, including the maritime holly forest, can be important roosting or nesting habitat for birds. These habitats include historical nesting by great blue herons *(Ardea herodias)* and black-crowned night-herons, and currently host ospreys and several species of passerines (USFWS 1997a). Horseshoe and Spermaceti Coves. These coves provide saltmarsh, mudflat, and other habitats important for marine birds and waterfowl.

Species of Special Concern

This section of the GMP/EIS lists plants and animals that are named under the federal Endangered Species Act or a state (New York or New Jersey) Endangered Species Act and are referred to as "listed" species throughout the rest of this section. This section also includes species of park management concern, a category that can include rarity, its ecological niche, or need for management because it is invasive, overabundant, a nuisance or a disease vector for example. Where a species is both listed and of management concern to the park, it is described in more detail. Because federally listed species are of particular management concern to the NPS as a federal agency, they are the focus of separate subsections.

Plants

Table 3-4 shows plants that are state or federally listed and that grow in the park. Vegetation associations are described in the "Vegetation" section in this chapter of the GMP/EIS; some of these are considered imperiled in New York or New Jersey, or globally. Although many more plants are listed as threatened or endangered on the New York or New Jersey lists, the species in table 3-4 are the ones whose presence has been verified at Gateway. Information for the descriptions and status is taken from the New York Natural Heritage Program website (http://www.acris.nynhp.org), New Jersey Endangered and Nongame Species Program, and personal communications with NPS staff.

Table 3-4. State or Federally Listed Plant and Animal Species Known to Occur at Gateway.

Scientific Name	Common Name	Listing
Birds		
Accipiter cooperii	Cooper's hawk	SL
Accipiter gentilis	Northern goshawk	SL
Accipiter striatus	Sharp-skinned hawk	SL
Ammodramus henslowii	Henslow's sparrow	SL
Ammodramus maritimus	Seaside sparrow	SL
Ammodramus savannarum	Grasshopper sparrow	SL
Asio flammeus	Short-eared owl	SL
Asio otus	Long-eared owl	SL
Bartramia longicauda	Upland sandpiper	SL
Botaurus lentiginosus	American bittern	SL
Buteo lineatus	Red-shouldered hawk	SL
Calidris canutus	Red knot	SL
Caprimulgus vociferus	Whip-poor-will	SL
Charadrius melodus	Piping plover	FT, SL
Chlidonias niger	Black tern	SL
Chordeiles minor	Common nighthawk	SL
Circus cyaneus	Northern harrier	SL
Cistothorus platensis	Sedge wren	SL
Dendroica cerulea	Cerulean warbler	SL
Dolichonyx oryzivorus	Bobolink	SL
Eremophila alpestris	Horned lark	SL
Falco peregrinus	Peregrine falcon	SL
Gavia immer	Common loon	SL
Haliaeetus leucocephalus	Bald eagle	SL
Icteria virens	Yellow-breasted chat	SL
Ixobrychus exilis	Least bittern	SL

Table 3-4. State or Federally Listed Plant and Animal Species Known to Occur at Gateway (continued).

Scientific Name	Common Name	Listing
Lanius ludovicianus	Loggerhead shrike	SL
Laterallus jamaicensis	Black rail	SL
Melanerpes erythrocephalus	Red-headed woodpecker	SL
Nyctanassa violacea	Yellow-crowned night-heron	SL
Nycticorax nycticorax	Black-crowned night-heron	SL
Pandion haliaetus	Osprey	SL
Passerculus sandwichensis	Savannah sparrow	SL
Podilymbus podiceps	Pied-billed grebe	SL
Pooecetes gramineus	Vesper sparrow	SL
Rallus elegans	King rail	SL
Rynchops niger	Black skimmer	SL,
Sterna antillarum	Least tern	SL,
Sterna dougallii	Roseate tern	FE, SL
Sterna hirundo	Common tern	SL,
Strix varia	Barred owl	SL
Vermivora chrysoptera	Golden-winged warbler	SL
Invertebrates		
Cicindela dorsalis dorsalis	Northeastern beach tiger beetle	FT, SL
Fish		
Acipenser brevirostrum	Shortnose sturgeon	FE, SL
Acipenser oxyrhynchus	Atlantic sturgeon	FE
Reptiles		
Caretta caretta	Loggerhead turtle	FT, SL
Chelonia mydas	Green turtle	FT, SL
Dermochelys coriacea	Leatherback turtle	FE, SL
Eretmochelys imbricata imbricata	Hawksbill turtle	FE, SL
Lepidochelys kempii	Kemp's Ridley sea turtle	FE, SL
Terrapene carolina carolina	Eastern box turtle	SL
Mammals		
Balaenoptera borealis	Sei whale	FE, SL
Balaenoptera musculus	Blue whale	FE, SL
Balaenoptera physalus	Fin whale	FE, SL
Eubalaena glacialis	Northern right whale	FE, SL
Megaptera novaeangliae	Humpback whale	FE, SL
Myotis sodalis	Indiana bat	FE, SL
Phocoena phocoena	Harbor porpoise	SL
Physeter macrocephalus	Sperm whale	FE, SL

Table 3-4. State or Federally Listed Plant and Animal Species Known to Occur at Gateway (continued).

Scientific Name	Common Name	Listing
Plants		
Amaranthus pumilus	Seabeach amaranth	FT, SL
Bidens laevis	Smooth bur-marigold	SL
Cenchrus tribuloides	Sanddune sandbur	SL
Chenopodium rubrum	Red pigweed	SL
Cuscuta polygonorum	Smartweed dodder	SL
Cyperus flavescens var. *flavescens*	Yellow flatsedge	SL
Cyperus lupulinus ssp. *lupulinus*	Hop sedge	SL
Cyperus retrorsus	Retrorse flatsedge	SL
Cyperus schweinitzii	Schweinitz's flatsedge	SL
Digitaria filiformis	Slender crabgrass	SL
Eupatorium leucolepis var. *leucolepis*	White-bracted boneset	SL
Eupatorium torreyanum	Fringed boneset	SL
Galium concinnum	Shining bedstraw	SL
Glaux maritima	Sea milkwort	SL
Juniperus horizontalis	Creeping juniper	SL
Lycopus rubellus	Gypsy wort	SL
Magnolia virginiana	Sweetbay magnolia	SL
Oenothera humifusa	seabeach evening-primrose	SL
Oenothera laciniata	Cut-leaved evening-primrose	SL
Oenothera oakesiana	Oakes' evening-primrose	SL
Polygonum glaucum	Seabeach knotweed	SL
Quercus phellos	Willow oak	SL
Solidago sempervirens var. *mexicana*	Seaside goldenrod	SL
Suaeda linearis	Narrow leaf sea-blite	SL

Sources: NPS n.d.h; NYDEC n.d.a, n.d.b, and n.d.c; NJDEP 2010, n.d.a, and n.d.b.
SL = state listed; FT = federally threatened; FE = federally endangered

Many of the state-listed plants at the park are either saltwater or freshwater wetland or marsh species. These include smooth bur-marigold *(Bidens laevis),* a state threatened plant that is found primarily in freshwater and tidal mudflats; red pigweed *(Chenopodium rubrum),* found along the coast in wet interdunal swales, rocky beaches, and the shores of coastal ponds and saltmarshes; smartweed dodder *(Cuscuta polygonorum)*, which grows in wet meadows and moist shores and riverbanks; and gypsy wort *(Lycopus rubellus),* found in marshes and flooded swamps. High saltmarsh listed plants include a subspecies of seaside goldenrod *(Solidago sempervirens var. mexicana)* and narrow leaf sea-blite *(Suaeda linearis),* although these species are also found in grasslands (goldenrod) or interdunal swales and beaches (sea-blite). Woodland or palustrine wetland state-listed species found at the park

include shining bedstraw *(Galium concinnum),* found in hardwood forests and along the banks or swampy ground next to streams; sweetbay magnolia *(Magnolia virginiana)*, which grows in red maple palustrine wetlands; and willow oak *(Quercus phellos),* which occupies floodplain forests, as well as grasslands or roadside forests where the soil is moist.

The remaining state-listed plants grow on the open sandy areas of the park's coastline, including the upper beach, foredune, and more inland dunes. These include sanddune sandbur *(Cenchrus tribuloides)*, a dune species found at Great Kills Park; creeping juniper *(Juniperus horizontalis),* an evergreen shrub that occupies wetland shores and stream banks in addition to dunes; cut-leaved and Oakes' evening-primrose *(Oenothera laciniata, Oenothera oakesiana),* which grow on dry sandy soils on dunes or along roadsides; seabeach knotweed *(Polygonum glaucum),* which occupies beach and adjacent dune and saltmarsh habitat and has been found in the Sandy Hook Unit of the park; southern arrowwood *(Viburnum dentatum var. venosum),* a species that grows on dry, sandy, coastal habitat including dunes and old fields; slender crabgrass *(Digitaria filiformis),* which grows on sandy disturbed areas near the coast; two species of boneset (white-bracted, *Eupatorium leucolepis var. leucolepis,* and fringed, *E. torreyanum),* which grow in sandy, open habitats including weedy or shrubby roadsides, grasslands, and dunes; and four flatsedges. The flatsedges have been collected from wet sandy sites, beaches, roadsides, and additional areas where the sand is windblown or otherwise mobile. They include yellow flatsedge *(Cyperus flavescens var. flavescens),* hop sedge *(C. lupulinus ssp. lupulinus),* retrorse flatsedge *(C. retrorsus),* and Schweinitz's flatsedge *(C. schweinitzii).*

Many of these state-listed species are ranked S1 or S2 in the state, which means there are fewer than 5 (S1) or 20 (S2) known occurrences statewide.

Many of these state-listed species are ranked S1 or S2 in the state, which means there are fewer than 5 (S1) or 20 (S2) known occurrences statewide. The rarest (S1) species include smartweed dodder, yellow flatsedge, retrorse flatsedge, slander crabgrass, white-bracted boneset, shining bedstraw, creeping juniper, gypsy wort, sweetbay magnolia, cut-leaved primrose, willow oak, seaside goldenrod, and narrow leaf sea-blite.

Although the park does not have specific management goals for any of these state-listed species, it does work toward restoring maritime vegetative communities and many of the species that are rare in the park live in those communities. These include red maple *(Acer rubrum),* red and black chokeberry *(Aronia arbutifolia, A. melanocarpa),* common hackberry *(Celtis occidentalis),* American holly *(Ilex opaca),* eastern red cedar *(Juniperus virginiana),* northern bayberry *(Myrica pensylvanica),* black cherry *(Prunus serotina),* and several species of oak (pin *[Quercus palustris],* white [Q. alba], scarlet *[Q. coccinea],* northern red *[Q. rubra],* black *[Q. velutina]*, and chestnut oak *[Q. prinus]).* The park also lists restoration of the estuarine eelgrass community as of management concern (NPS 2013f).

Federally Listed Plant Species – Seabeach Amaranth

Seabeach amaranth is the only federally listed plant species occurring at the park. Seabeach amaranth *(Amaranthus pumilus)* is a federally threatened species listed in 1993 and is considered endangered by both New York and New Jersey. It is an annual vascular plant

that inhabits upper beaches and overwash areas, primarily at the accreting end of barrier spits like Sandy Hook. It occupies a narrow beach zone that lies at elevations from 0.2 to 1.5 meters above mean high tide. Without overwash to maintain the open, sparsely vegetated habitat required by the species, it can be outcompeted by other plants and eliminated.

Seabeach amaranth has been lost over much of its former range on the east coast, primarily from development and stabilization of barrier island beaches. Coastal storms are considered the single most important natural limitation on the abundance of seabeach amaranth and have both positive effects from habitat creation and negative ones from flooding. The primary nonnatural threat is alteration of habitat from beach erosion and shoreline stabilization (NPS 2004f). Seabeach amaranth was considered extirpated from the state by 1913 until 2000, when it was rediscovered. In 2005, a large population of more than 3,000 plants was found at Sandy Hook; this population remains the largest in New Jersey.

Populations of seabeach amaranth at any given site are extremely variable (Weakley and Bucher 1992, as cited in NPS 2007a) and can fluctuate by several orders of magnitude from year to year. The primary reasons for the natural variability of seabeach amaranth are the dynamic nature of its habitat and the effects of stochastic (random) factors such as weather and storms on mortality and reproductive rates. Although wide fluctuations in species populations tend to increase the risk of extinction, variable population sizes are a natural condition for seabeach amaranth and the species is well adapted to its ecological niche. While the numbers of plants has varied state to state as well, the U.S. Fish and Wildlife Service (USFWS) notes a geographic shift of the largest populations from North Carolina to New York (NPS 2007a).

In addition to the large Sandy Hook population, sites in the Jamaica Bay Unit support seabeach amaranth. Numbers are lower in these park sites; 2007 counts indicated Breezy Point Tip contained 123 plants; Fort Tilden, 11; and Jacob Riis Park, 8 (NPS 2007b). The lower number of plants at Jacob Riis Park is associated with the removal of fencing used to attempt protection of piping plover (Charadrius melodus) nests, because these two species often occur together. The number of plants at Breezy Point Tip grew from 123 in 2007 to 862 plants in 2009, illustrating the variability in the population from year to year (NPS 2009d).

The recovery goals for the park for seabeach amaranth are a long-term average population of at least 2,000 plants and a five-year minimum population of no fewer than 1,000 plants (NPS 2009e). To help in meeting these goals, the park takes the following actions:

- Erecting symbolic fencing (string and post) around plants to create a 10-meter buffer to reduce loss from trampling by visitors

- Keeping habitat for this species available by prohibiting dense planting of other vegetation

- Collecting and storing seabeach amaranth seeds to repopulate in case of catastrophic events or population declines

- Evaluating the potential for, and planting seeds in, suitable areas of the park
- Monitoring the presence and condition of all known populations in the park

Invertebrates

Terrestrial invertebrates are largely unsurveyed in the park, although studies of butterflies in the 1990s recorded over 50 species (Tanacredi and Badger 1995, as cited in NRCS 2001). American holly at the park is the host for the rare butterfly, Henry's elfin *(Callophrys henrici),* which has been recorded breeding and overwintering in the Raritan Bay/Sandy Hook area (Lawrence, Roman, and Frame 2010). A slightly more recent survey of Jamaica Bay Wildlife Refuge (USFWS 1997b) counted 54 species of butterflies and skippers at the refuge and in surrounding uplands. This survey noted regular use by several rare butterfly and skipper species, including checkered white *(Pieris protodice),* white-m hairstreak *(Parrhasius m-album),* Appalachian azure *(Celastrina neglectamajor),* tawny emperor *(Asterocampa clyton),* and saltmarsh skipper *(Panoquina panoquin)* (USFWS 1997b). While only the checkered white butterfly is state listed, each is considered a species of concern by New York.

The park has identified aquatic invertebrates horseshoe crab (Limulus polyphemus), hardshell clam or quahog (Mercenaria mercenaria), and common oyster (Crassostrea virginica) as species of management concern with the objective of increasing the park population of all three. The rare white checkered butterfly is also of management concern at the park, with an increased population as a goal. Eelgrass and oysters are considered key extirpated species (along with Atlantic bay scallop *[Argopecten irradians])* of the original estuarine benthic communities of Jamaica Bay's littoral zone (NPS 2010b).

Federally Listed Invertebrate Species – Northeastern Beach Tiger Beetle

This species is listed as threatened under the federal Endangered Species Act and as endangered in New Jersey.

The northeastern beach tiger beetle *(Cicindela dorsalis dorsalis)* is a predatory species that forages for insects, lice, and fleas in the sand of the intertidal zone. Adults also scavenge dead crabs and fish. Populations of tiger beetles normally experience very high larval mortality and dramatic year-to-year, two- to threefold fluctuations in abundance, sometimes resulting in local extinction. Weather factors such as flood tides, hurricanes, erosion, and winter storms; mortality due to predators and parasites; and recreational beach use all contribute to the population declines (NPS 2004f).

Early records indicate that the northeastern beach tiger beetle occurred in "great swarms in July" along coastal beaches from Martha's Vineyard south to New Jersey and on both sides of Chesapeake Bay in Virginia and Maryland. Ideal habitat for the adult beetles and their larvae are wide, undisturbed, dynamic, fine sand beaches. The most important

consideration, however, is limited use and disturbance by vehicles and humans; northeastern beach tiger beetles are so sensitive to human disturbance, for example, that a recent management document (NPS 2007a) recommended prohibiting all but emergency NPS off-road vehicle use from tiger beetle areas and limiting human use to fewer than 50 people per week during the summer and fall, and then only as walkers along the water's edge.

Disturbance from vehicular traffic and foot traffic has resulted in the extirpation of the beetle from New York State, particularly from the beaches of Long Island, where it had once been prevalent. Although it was not present in the park in recent times, it was reintroduced to the northern section of Sandy Hook in 1994 using larvae from the Chesapeake Bay. Additional reintroductions of larvae to the park have continued through 2006 (NPS 2007a). NPS monitors this species in coordination with the USFWS though annual surveys. Adult populations are estimated to be around 500 individuals according to annual surveys, although the population size varied dramatically from 1994 to 2003, with a low of 18 in 1996 to a high of 955 in July 2000 (NPS 2004f).

A recent management plan for the park's listed species identifies several measures intended to minimize human disturbance or improve habitat. These include establishing a protection zone at North Beach of Sandy Hook, minimizing NPS vehicle use in beetle larva habitat, removing invasive vegetation that diminishes beetle habitat, and exploring beach nourishment in additional areas of Sandy Hook to cover riprap or other structures and restore habitat (NPS 2009e). No tiger beetle adults or larvae have been reported from other areas of Sandy Hook except the reintroduction areas on North Beach. Recent inventories suggest the population may have once again died out (Avrin, pers. comm. 2013).

Fish

The park has not identified any fish species as of management concern (NPS 2009f, NPS 2013f). Only two listed species are known to occupy park-managed waters; both are federally listed and are described below.

Federally Listed Fish Species

Both the Atlantic sturgeon *(Acipenser oxyrinchus)* and shortnose sturgeon *(Acipenser brevirostrum)* are listed as federally endangered fish species using the marine and estuarine environment offshore of the park. Both are demersal and anadromous, migrating from the marine environment to freshwater to spawn during late winter–early summer in the lower sections of rivers. Juvenile sturgeons remain in freshwater for their first summer before migrating to estuaries in winter. Juveniles remain in the freshwater-estuary system for three to five years before migrating to the nearshore marine environment as adults. Migration into the marine environment has only recently been documented for the shortnose sturgeon (NOAA 2013). Atlantic sturgeons have been found in surveys and recreational landings in Jamaica Bay (NPS 2010b).

Reptiles and Amphibians

One amphibian, the eastern spadefoot toad *(Scaphiopus holbrookii),* is a species of special concern and a species of management concern for the park (NPS 2009f). It is not listed as threatened or endangered, but is rare. This species is found in pine or associated forests, such as the red cedar forest in the park. It is ranked S2 (between 6 and 20 occurrences) and is managed at the park for increased population.

Several federally listed sea turtles (leatherback *[Dermochelys coriacea],* hawksbill *[Eretmochelys imbricata imbricata],* Kemp's Ridley *[Lepidochelys kempii],* and loggerhead *[Caretta caretta])* named in table 3-4 may swim in NPS-managed coastal waters and may occasionally come ashore in the park. However, because no actions in any alternative are expected to affect marine species, they are not discussed further.

Four reptiles are of management concern at the park. While each is a species of concern, none is state or federally listed. The park is managing for increases in population for three of the species—spotted turtle *(Clemmys guttata),* eastern hognose snake *(Heterodon platyrhinos),* and eastern box turtle *(Terrapene carolina carolina)*—and for increased nesting success for the fourth, northern diamondback terrapin *(Malaclemys terrapin).*

The eastern hognose snake occupies sandy areas and feeds on toads and frogs. The park has reintroduced this species to some areas. Although it is not a listed species, it is ranked as S3 (between 21 and 100 occurrences) and is considered a regional species of concern in the northeastern United States (NYDEC 2013a). Both the spotted turtle and the terrapin are semiaquatic; spotted turtles are found in wet woodlands, freshwater marshes and wet meadows, whereas the terrapin is a brackish-water species. Jamaica Bay provides important breeding habitat for terrapins, as well as providing habitat for the largest northern diamond back terrapin population in the northeast (NPS 2010b). Ruler's Bar Hassock and Little Egg Island, as well as dunes south of the Jamaica Bay visitor center (USFWS 1997c), are known nesting sites in the park. Within the Jamaica Bay Unit, 11 other sites have suitable upland habitats for nesting; however, development in these areas limits access and use (NPS 2010b). Of these 11 potential nesting areas, 5 are located along developed portions of the Jamaica Bay north shoreline. Other nesting areas include Dubos Point (outside the park) and Floyd Bennett Field (USFWS 1997c). Both the terrapin and the spotted turtle are of statewide concern and are ranked S3. The eastern box turtle is a land turtle that occupies deciduous forests with a moist forest floor. It is also ranked S3 in New York and is of regional concern in the northeastern United States.

Birds

All state-listed birds at the park are managed to increase occurrence or increase nesting populations. Federally listed birds in the park include piping plover and roseate tern *(Sterna dougallii),* discussed separately below.

Breezy Point Tip, Sandy Hook, and Jamaica Bay are each important habitats for listed and/or rare shorebirds, waterbirds, wading birds, and seabirds. At Sandy Hook, piping plover and

least terns *(Sterna antillarum)* nest, red knots *(Calidris canutus)* rest and feed, roseate terns feed, and ospreys *(Pandion haliaetus)* nest. As noted in the "Wildlife" section in this chapter of the GMP/EIS, migrations are substantial at these locations, with birds concentrating along the shorelines of park sites and adjacent areas. Migratory hawks number in the thousands at Sandy Hook and Breezy Point Tip, with several state-listed species, including sharp-shinned hawk *(Accipiter striatus),* northern harrier *(Circus cyaneus),* and Cooper's hawk *(Accipiter cooperii)* among those sighted at both Sandy Hook and Breezy Point Tip, and osprey and peregrine falcon *(Falco peregrinus)* additionally recorded at Breezy Point Tip. Approximately 25 osprey pairs nest in the Jamaica Bay Unit of the park, 14 pairs at Sandy Hook, and 1 pair on Staten Island. Fourteen pairs of ospreys have nested at the Jamaica Bay Wildlife Refuge and Breezy Point Tip in recent years (USFWS 1997b; NPS 2009d; Frame and Avrin, pers. comm. 2013). Overwintering grassland birds at Floyd Bennett Field include raptor species northern harrier, red-shouldered hawk *(Buteo lineatus),* and short-eared owl *(Asio flammeus),* as well as grassland species horned lark and savannah sparrow *(Passerculus sandwichensis).* Listed grassland birds that have been confirmed nesting at Floyd Bennett Field include horned lark, upland sandpiper *(Bartramia longicauda),* savannah sparrow, and northern harrier (USFWS 1997b). Grasshopper sparrows *(Ammodramus savannarum)* nested in the grasslands at Floyd Bennett Field between 1984 and 1992, but nests have not been found in recent years. Bobolinks *(Dolichonyx oryzivorus)* have also been seen during migration at Floyd Bennett Field. Several of these species also use grasslands along the runways at John F. Kennedy International Airport adjacent to Jamaica Bay.

Jamaica Bay islands are largely isolated from disturbance and predation and as a result support large numbers of nesting waterbirds and diverse populations of migratory birds throughout the year. A heron rookery on Canarsie Pol supported many nesting wading birds, including state-listed black-crowned night heron *(Nycticorax nycticorax)* as well as other species of heron, ibis, and egrets. Canarsie Pol has also been the site of nesting by common terns *(Sterna hirundo)* and American oystercatchers *(Haematopus palliatus),* an unlisted species of special concern in New Jersey ranked as S3 with 21–100 occurrences in New York. A smaller heronry occurred on Ruffle Bar "in 1995," and heron and egret nesting is reported by Audubon to occur at Elder's Point, Subway Island and Little Egg. Common terns occur on several other islands in the bay, including Jo Co Marsh and Silver Hole Marsh, with smaller numbers at Duck Creek Marsh, East High Meadow, Ruffle Bar, and Subway Island. An average of about 1,000 common terns and a maximum of 1,630 common terns have nested on the combined seven colonies in Jamaica Bay since 1984 (USFWS 1997b). Seaside sparrow *(Ammodramus maritimus)* and least bittern *(Ixobrychus exilis)* have also been spotted in the Jamaica Bay Unit.

The bay itself has a variety of habitats, including mudflats, saltmarsh, and sandy shorelines, that are important to shorebirds and other water-dependent species. Twenty-two species of shorebirds are currently found in the Jamaica Bay estuary; historically, 44 species had been identified here. Shallow-water areas also provide fishing habitat for foraging wading birds, including nine species of herons (NYCDEP 2007). Both the federally endangered roseate tern and threatened piping plover nest or have attempted nesting in Jamaica Bay habitat, as have common terns, pied-billed grebes *(Podilymbus podiceps),* peregrine falcons, and northern harriers (NYCDEP 2007).

Nesting by several state-listed shorebirds either currently takes place or has taken place in the recent past in locations at Breezy Point Tip. Common tern nesting numbers have varied from 30 in 1988 (when monitoring first indicated nesting) to more than 4,000 in 1994. In recent years, it has diminished steadily, from 1,990 in 2006 to 324 in 2009 (NPS 2007a, 2009d). This may be a function of increasingly dense vegetation in some Breezy Point nesting areas. Least tern nesting has also been variable at Breezy Point Tip, although it has declined fairly steadily since numbers peaked in 1991 at 1,128 to 18 in 2009. Although 18 is a low number, it represents a substantial increase over the 0 nesting birds at the site in the years 2005–2008 (NPS 2009d). Black skimmers *(Rynchops niger),* a species of special concern listed as S2 by the state of New York and a species of management concern for the park, have apparently ceased nesting at the Breezy Point Tip, given that no nests have been discovered since 2002, although 750 nesting black skimmers were recorded just two years earlier (NPS 2009d). With the scouring effect of Hurricane Sandy in removing shrublands and dense coastal vegetation, it is possible that several or all of these shorebird species will once again nest at Breezy Point Tip. Species recorded at Jamaica Bay and not noted above include bald eagle and yellow-crowned night heron *(Nyctanassa violacea).* Very rarely observed species here include northern goshawk *(Accipiter gentilis),* black rail *(Laterallus jamaicensis),* king rail *(Rallus elegans),* roseate tern, black tern *(Chlidonias niger),* long-eared owl *(Asio otus),* and red-headed woodpecker *(Melanerpes erythrocephalus)* (Davis n.d.).

Bird species recorded at Floyd Bennett Field and not noted otherwise in this section include vesper sparrow *(Pooecetes gramineus);* this species has been seen only rarely in the area (NPS n.d.f).

The park takes multiple measures to protect and enhance habitat for several of its listed birds. These fall into a few main categories, which include increases in program staffing, minimizing human disturbance, managing predators, enhancing and restoring habitat, education, and monitoring. For some species, fireworks or NPS vehicles used on the beach are also issues; a recent management plan (NPS 2009e) lists actions to keep these activities from unduly disturbing nesting birds. The majority of these measures are aimed at sustaining and improving the park's existing piping plover nesting population, but these same actions assist other protected species that live or breed in the same vicinity, such as northeastern beach tiger beetles, least terns, seabeach amaranth, common terns, seabeach knotweed, and seabeach evening-primrose *(Oenothera humifusa),* a state-listed plant in New Jersey. These measures are discussed in more detail in the piping plover subsection below. A few measures to improve conditions for intertidal mudflat or estuarine species such as terrapins, black rails, American bitterns, red knots, horseshoe crabs, and American oystercatchers were also identified in the park's *Shoreside Threatened and Endangered Species Beach Management Plan* (NPS 2009e). Measures include better signs and enforcement for recreational use at Spermaceti and Horseshoe Coves and Plum Island at Sandy Hook to protect habitat for these species; evaluating the potential for restoration of bayside habitats, including the possible removal of shoreline stabilization structures; and *Phragmites* removal.

Federally Listed Birds

Roseate terns *(Sterna dougallii)* are listed as endangered under the federal Endangered Species Act and by both New York and New Jersey. This species nests almost exclusively on rocky or saltmarsh islands where predation pressure is lower than on mainland sites. Colonies are often located close to shallow-water locations where the terns can fish. Roseate terns are threatened by the loss of breeding habitat to development, rising sea level and related storm surge, human disturbance, and predation. A few roseate terns have nested in the park, but recent surveys at Breezy Point Tip did not show any breeding roseate terns here after 1999. Breeding numbers have always been low, peaking in 1998 at six (NPS 2009d).

Piping plovers *(Charadrius melodus)* are small shorebirds listed as threatened under the federal Endangered Species Act. Piping plovers at the park are part of the Atlantic Coast population, one of three population segments listed in the country. No critical habitat has been identified or proposed for this population (NPS 2004f).

Plovers arrive at the park nesting beaches in mid-March; nests are established above the high tide line on coastal beaches, on sandflats at the end of barrier spits, in washover areas cut into dunes, and on suitable dredge material. Access to feeding areas such as bayside flats, inlets, ephemeral pools, and the intertidal beach are important to productivity and survival of chicks. If these access routes from the nest are vegetated, chicks are less able to detect hidden mammalian predators. Eggs can be laid any time from early April to late July and chicks may be present from mid-May until late August. The productivity goal for the mid-Atlantic population established by the USFWS is 1.5 chicks per nesting pair for five years, a goal the park population has not reached on average. There is also extreme variability in nesting success for plovers; productivity at Sandy Hook has ranged from 0.36 chicks per pair to as high as 1.94 in the years 1991 to 2003 (NPS 2004f). Weather and predation, particularly by the park's red fox (Vulpes vulpes) population, is implicated as the cause of the very low number of 0.36 chicks per pair fledged at Sandy Hook in 1997.

Breeding by piping plovers also occurs at park sites along the Rockaway barrier spit, including at the Surf Club, West Beach, Fort Tilden, and Jacob Riis Park. In 2009, the number of chicks fledged per pair ranged from an average low of 0.25 at Jacob Riis Park to a high of 2 at the Surf Club location. Historical data show that nesting at Breezy Point Tip has also been variable, with the number of chicks fledged per pair fluctuating from a high of 1.89 in 2006 to 0.68 in 2009 (NPS 2009d).

The park now constructs predator-resistant fencing around nests to keep foxes, feral cats, opossums, and raccoons from capturing chicks at the nest site. The park also traps potential predators and depending on available staff time can catch quite a few in a given nesting season. For example, 15 cats, 10 opossums, and 10 raccoons were trapped in 2007 at the Breezy Point Tip. Foxes are also caught at the Sandy Hook sites. Crows and gulls also prey on plover eggs and chicks, and the park takes measures such as destroying gull nests in the vicinity of nesting plovers. In recent years, the park has begun to suspect that nesting American oystercatchers may be contributing to piping plover nest abandonment (NPS 2009d).

Recreational activities can be a source of direct mortality and harassment of nesting plovers. Plovers that flush because of human disturbance leave eggs or chicks exposed to predation and excessive temperatures. High concentrations of beachgoers can also keep plovers from using otherwise suitable habitat (NPS 2004f). The park monitors some of the violations by recreationists who enter beaches where posted signs indicate the area is closed. In Breezy Point Tip, even occasional monitoring noted 115 visitors in the closed area, including with pets or motor vehicles.

Once hatched, chicks almost immediately leave the nest and move along the beach and to other areas to feed. This places them outside park-fenced areas and increases their vulnerability to predation or to pedestrian or beach vehicle traffic. Although most of the park is closed to over-sand vehicle traffic, over-sand vehicles are allowed during non-nesting times at Breezy Point Tip and park rangers use them for emergencies and to patrol beaches.

The park has established six protected areas on Sandy Hook. In these areas, no over-sand vehicles are permitted except for NPS law enforcement and emergency use; dogs are prohibited from March to September; and predators are monitored. Exclosures are placed around all plover nests.

The *Shoreside Threatened and Endangered Species Management Plan for the Sandy Hook Unit* (NPS 2009e) noted that, in addition to the USFWS recovery goal of 1.5 chicks per pair on average for five years, the park has set goals of an average nesting population at Sandy Hook of 51–65 pairs for five years, and annual predation losses at or below 15 percent. To help in meeting these goals, the park has proposed additional measures beyond those already established. These include a 100-meter buffer from nests; prohibiting all vehicles, including NPS vehicles, except in emergencies; prohibiting kite flying and kite surfing within 650 feet of protected areas; expanding protection zones if needed; increasing the intensity of predator monitoring and management; removing any attraction for predators, such as trash and fish offal; trapping and relocating foxes and using lethal control when necessary; allowing fireworks only outside the breeding season; prohibiting beach raking between April and December; and the use of signs, meetings, and other education and interpretation media to inform visitors of pet, trash, and closure policies.

Mammals

Several marine mammals that may use park-managed waters are listed. These include sei *(Balaenoptera borealis),* blue *(Balaenoptera musculus),* fin *(Balaenoptera physalus),* humpback *(Megaptera novaeangliae),* and northern right whales *(Eubalaena glacialis),* as well as the state-listed harbor porpoise *(Phocoena phocoena).* All of the whale species are both state- and federally listed as endangered. Humpback whales occasionally feed in New York Bay adjacent to the Rockaway Inlet (USFWS 1997c) and sei, humpback, and sperm whales *(Physeter macrocephalus)* have been noted swimming in Raritan Bay. The park does not have a management objective for any of these species except for the harbor porpoise, where the park has stated a desire to increase the predictability of its seasonal occurrence. None of the actions in any of the alternatives would change conditions for these species or impact them in any way. They are therefore not considered part of the affected environment and are not discussed further in this GMP/EIS.

Indiana bat *(Myotis sodalis)* is a federally and state-endangered species that hibernates in caves and mines during the winter. Its roosts consist of trees, both living and dead. In New York, there are 10 hibernation areas for Indiana bats that appear to be stable. Thirteen maternity and bachelor colonies are also known to be present in the state, although some of these are threatened by increasing development. The total count in New York has recently increased from 13,000 to 40,000 bats, largely because of improvements in counting methods and the discovery of new hibernation areas. A recent (January 2013) survey of listed species in New Jersey indicated that the Indiana bat was not present at Gateway (USFWS 2013).



Cultural Resources

Introduction

For management purposes, the NPS recognizes five categories of cultural resources: archeological resources, historic structures, cultural landscapes, ethnographic resources, and museum collections. Because no effects to ethnographic resources are anticipated from the proposed actions analyzed in this GMP/EIS, that topic has been dismissed and is not discussed further. For this document, the park has chosen to present cultural landscapes in the context of historic districts. The following description of these resources is gleaned primarily from NPS-28: *Cultural Resource Management Guideline* (NPS 1998a).

Archeological resources are the remains of past human activity and records documenting the scientific analysis of these remains. They are typically buried, but may extend aboveground. These resources are commonly associated with pre-contact peoples but also may be products of more contemporary societies. At Gateway, the vast majority of archeological resources fall into this latter category.

Structures include such things as buildings, bridges, roads, forts and associated earthworks, monuments, ruins, and other manufactured objects that extend the limits of human capability. The manufacture and use of structures provide humans the ability to live in harsh climates and in areas far removed from where they work and live.

Historic districts are defined as resources that possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development (NPS 1990a).

Cultural landscapes are defined as a geographic area, including both natural and cultural resources, associated with a historic event, activity, or person. Cultural landscapes are listed in the National Register of Historic Places (National Register) when their significant cultural values have been documented and evaluated within appropriate thematic contexts and physical investigation has determined that they retain integrity. They are classified in the National Register as sites or districts or may be included as contributing elements of larger districts (NPS 1998a).

Museum collections are described as assemblages of objects, works of art, historical documents, and/or natural history specimens collected/maintained so they can be preserved, studied, and interpreted for public benefit.

In the following description of existing conditions, the effects on Gateway's cultural resources from Hurricane Sandy in the fall of 2012 must be mentioned. These storm-related effects range from detectable/not substantial to considerable in scope, much of which was dependent on the location of the resources. The most significant damage occurred to resources located immediately along the coastlines, particularly in the Sandy Hook Unit and along Jamaica Bay (Jacob Riis Park, Fort Tilden, Breezy Point Tip), which sustained considerable wind and water damage. Preliminary damage assessment efforts immediately after the storm focused primarily on the historical cultural resources of the park and typically included descriptions of severe erosion and sand redeposition, flooding, and wind damage. Damage assessments are ongoing. The following represents general descriptions of typical storm damage to cultural resources in the park:

- Erosion/exposure of buried resources (e.g., Battery Kessler at Fort Tilden Historic District)

- Flooding/storm surge (e.g., seawall at Battery Weed, Fort Wadsworth Historic District; Jacob Riis Park/bathhouse/associated facilities, Jacob Riis Park Historic District; Fort Hancock and Life Saving Station at Fort Hancock and Sandy Hook Proving Ground National Landmark Historic District, also referred to as Fort Hancock and Sandy Hook Proving Ground)

- Sand deposition (e.g., Jacob Riis Park facilities, Jacob Riis Park Historic District; roads located within Fort Hancock and Sandy Hook Proving Ground National Landmark Historic)

- Wind damage to a variety of structures throughout the park

Many of the park's impacted cultural resources are either listed in or eligible for listing in the National Register. Comprehensive damage assessments are underway and will provide specific information on the condition of any damaged historic properties. Preliminary damage assessments led the park to believe that the National Register status of the majority of the park's resources will be retained.

Cultural Resource Context for Gateway

The cultural resources of the park represent tangible manifestations of humans interacting with their environment and with each other throughout time, up to the present day. To understand the effects of the alternatives on the cultural resources of Gateway, a summary context is presented below. Much of this information is gleaned from archeological overview and assessment documents prepared for Gateway (NPS 2009a, 2011a, 2011b, 2011c). The information provided is intended to be a brief summary of cultural context of the study area; please refer to the documents referenced for additional detail.

Pre-Contact to Contact Context

Because the coastal areas of the park would have provided pre-contact inhabitants with a variety of important natural resources and transportation routes, it is reasonable to assume that undiscovered, buried cultural resources reflecting earlier lifeways may still exist. The potential for such discoveries varies by location and the history of natural and human impacts.

The pre-contact human use of the New York/New Jersey area dates back approximately 12,000 years. Although human history is known to vary locally and regionally within a defined area, it is generally believed that the major pre-contact periods for the Gateway area (as defined by existing material culture assemblages) are as follows:

- Paleo-Indian (ca. 12,500–10,000 years BP)
- Archaic (ca. 10,000–2,700 years BP)
- Woodland (ca. 2,700 years BP to European Contact, ca. AD 1600)

It is believed that Paleo-Indian cultures used the coastal areas of New York and New Jersey by exploiting the megafauna and tundra environment of the Late Pleistocene. It is theorized that inhabitants of the area lived in small, mobile bands whose movements were dependent on proximity to resources. Their subsistence patterns likely included the use of both animal and vegetable resources. Lithic tools characteristic of the period (distinctive fluted points, scrapers, knives, etc.) suggest that hunting, butchering, and animal processing were an important part of the subsistence strategy. Evidence of Paleo-Indian use of the study area is sparse. Although an isolated projectile point was located in Great Kills area of Gateway (NPS 2011a) and other manifestations of Paleo-Indian use of the general region are evident, no Paleo-Indian sites have been recorded within the park boundaries.

It is believed that Paleo-Indian cultures used the coastal areas of New York and New Jersey by exploiting the megafauna and tundra environment of the Late Pleistocene. It is theorized that inhabitants of the area lived in small, mobile bands whose movements were dependent on proximity to resources.

The Archaic period is subdivided into Early, Middle, and Late stages and, in general, is characterized by adaptation to a post-Pleistocene climatic transition. This is reflected by a variety of resource procurement strategies as the more temperate conditions of the Holocene began to prevail. Human use of the study area during this period suggests diverse hunting and gathering activities, likely employed by small, mobile social groups. Human reliance on a wide variety of flora and fauna is apparent, as are a variety of technological innovations (groundstone tools, gouges, knives, net-sinkers, etc.) (JMA 1978). During the later part of the Archaic period, settlement patterns appear to be associated with seasonal resource availability. Although manifestations of human occupation of northern New Jersey and the New York Harbor during the Archaic period have been recorded, no archeological sites dating definitively to this period have been recorded in the study area.

The Woodland period is also divided into Early, Middle, and Late stages and, in general, is characterized by considerable technological changes (e.g., production/use of ceramics), more intensive subsistence practices, an increasing trend toward sedentism (living in one place), larger settlements, changes in social organization, and long-distance trade. Technological advances in tool making are represented by a variety of distinctive projectile point styles and pottery. Woodland sites in and around the study area reflect more intensive and continuous

use and occupation of the area, with a reliance on shellfish and a variety of other floral and faunal resources. Coastal shell middens have "preserved evidence of a variety of shellfish, fish, white-tailed deer, turtle, and other small mammals as well as bone and stone tools and ceramic types" (NPS 2011c, 9). The effects of the introduction/use of pottery significantly improved the efficiency of food preparation and storage, and pottery styles become more stylized and distinctive in the later part of the Woodland period. Horticulture based on maize, beans, and squash becomes apparent during the Late Woodland times, and is often associated with increased social complexity. Village sites near permanent rivers and other water sources were likely occupied year-round, while smaller occupations farther from the coast were used for seasonal hunting and gathering activities. Several sites dating to the Woodland period have been identified within the study area and are characterized by the presence of ceramic sherds (fragments), lithic artifacts, and shell middens indicative of the period (NPS 2011b, 2011c).

The Contact period, beginning around AD 1600, marks a time when indigenous groups were making contact with Europeans along coastal areas of the Northeast. At that time, many indigenous people of the area were living in year-round villages and seasonal camps.

The Contact period, beginning around AD 1600, marks a time when indigenous groups were making contact with Europeans along coastal areas of the Northeast. At that time, many indigenous people of the area were living in year-round villages and seasonal camps. Archeological evidence of their activities includes shell middens, shellfish-processing sites, cemeteries, and forts/trade houses. Numerous communities of Munsee-speaking Delaware Indians are documented in early records written during the first decades of Dutch contact and through archeological evidence. People speaking what Van der Donck later called the Manhattan language lived on the islands of New York Harbor, along the lower Hudson River estuary, and on the shores of Long Island opposite Staten Island (Grumet 2009). At the time of contact with Europeans, at least 13 separate groups of Native Americans were known to reside in the coastal portions of the study area. All of these groups were associated with the larger Algonquian-speaking people of the Lenape (Delaware) cultural group. Prior to contact, human cultures of the area were characterized by a wide diversity of cultural adaptation representing change over thousands of year. The exploration of the Lower Hudson River and the early 17th century fur trade resulted in very rapid Dutch colonization of the area, which brought about a dramatic change in the population, economy, social organization, and material culture of local indigenous groups. Disease, warfare with Dutch settlers, and land loss were the major factors bringing about change in indigenous population levels and ways of life. As access to food, farmland, and resource-collecting areas was being restricted by Europeans, the indigenous peoples who did survive moved inland. The Native American occupation of the area was largely supplanted by European colonization by the time the Dutch handed over New Netherlands to Great Britain in 1664. Contact period settlements typically include small amounts of European goods (metal kettles, glass beads, bottles, etc.) intermixed with larger amounts of indigenous-material cultural items. Several Contact period sites are known to have existed in the area around Gateway, but none have been recorded in the park.

General Historical Context

The following historical context of the study area is focused on presenting information related to cultural resources that have the potential to be affected by proposed park actions, with emphasis on those defined in this GMP/EIS as "fundamental." Fundamental resources

are defined as those considered vital to maintaining the park's purpose and significance. Other cultural resources not considered fundamental are included and presented more broadly.

This summary is not intended to provide a comprehensive narrative on the history of Gateway. Rather, it is designed to provide a summary of the people and events that played a role in the major historical themes of the park: namely, those related to maritime, military, and aviation history. These historical influences have significantly shaped the history of the area and many resources, dating from the Revolutionary War to the Cold War, reflect this.

The historical development of the Gateway area is one involving diverse coastal, island, marsh, and aquatic environments. The structure of settlements, land use, industry, transportation, and landscape modification is complex and closely linked to the development of the entire region. By the mid-17th century, a number of small European settlements existed along the New Jersey and New York coastlines. Like the Native Americans, early settlers made use of the wide range of coastal natural resources—fish, shellfish, and wildlife—for food, and by the mid-19th century, such resource-harvesting endeavors were commercialized. Agriculture was also a major economic activity of settlers in the area, resulting in the need for processing mills. Among others, the Dutch and British established permanent early settlements in the harbor area.

Throughout historical times, the New York Harbor has served as one of the most convenient and active deep-water ports on the eastern seaboard. Surrounded by land favorable for urban development, the harbor consequently became commercially important to the Dutch, the British, and the Americans, eventually supporting New York City. Consequently, defensive strategies have been implemented for centuries to protect the harbor from assault and capture. Early earthwork fortifications, first built by the Dutch and British to repel ground forces and enemy vessels, later gave way to U.S. artillery emplacements and fortifications surrounding the harbor that were designed to destroy enemy vessels and protect local residents. During the last half of the 20th century, defensive structures and weapons related to the Nike Missile Program played a role in the national defense system.

The following summarizes the major historical themes represented at Gateway. Although addressed separately, there is considerable overlap among them. In the discussion, the use of the term "historic districts" refers to historic districts listed in the National Register.

Maritime History

The first recorded European observations of the New York Harbor were made by the Italian explorer Giovanni De Verrazano in 1524. In the early 17th century, explorers had discovered that the natural harbor of New York and the adjacent Hudson River Valley provided wide-reaching access into the region's interior. From the Colonial period to the mid 19th century, early development in the harbor area focused on maritime safety, transportation and trade, and temporary defensive fortifications designed to protect maritime interests and provide harbor defense. The ship-building industry dates to the 17th century in the harbor area and continues today. European development grew rapidly along the coastal areas of what is

now New Jersey and New York, and by the 19th century harbor traffic was extensive (ferries, barges, schooners, clippers, steamships, etc.). As the importance of the harbor for commerce and transportation increased through the years, its defense became imperative and resulted in a variety of temporary and permanent fortifications along the perimeter of the harbor (NPS 2011b) (see "Military History").

Structures dedicated to ship navigation and lifesaving are well represented in the maritime cultural record of the area. The Sandy Hook Lighthouse, a National Historic Landmark, was first illuminated on June 11, 1764, generated by 48 oil-fueled lamps. Today it is the oldest continuously operating lighthouse in the United States and the only surviving one of the 11 lighthouse buildings dating to the Colonial period. The Elm Tree Light, a contributing structure at Miller Army Airfield Historic District, has undergone several transformations. A 1797 map marks an elm tree that was considered a mark for vessels coming and going from New York in the late 18th century. Evidence of it also shows on 1826 and 1850 maps. Although it was not certain that a beacon was actually hung in the tree in these earlier times, there was some kind of light noted in 1852. The current Elm Tree Light was constructed by the U.S. Coast Guard in 1939 to replace an earlier tower that had served as a mark for sailing vessels in the late 18th century (Wren 1974; NPS 1979a). The first Fort Tompkins lighthouse was replaced in 1893 with a new light constructed on the top of Battery Weed (see below) to provide better protection of the shipping lane through the Narrows. The light was visible for 14 nautical miles. The light was decommissioned in 1965 (Olmsted Center for Landscape Preservation 2008).

Structures dedicated to ship navigation and lifesaving are well represented in the maritime cultural record of the area. The Sandy Hook Lighthouse, a National Historic Landmark, was first illuminated on June 11, 1764, generated by 48 oil-fueled lamps.

In the late 17th century, harbor pilots were guiding vessels through the channels of New York Harbor, playing a critical role in preventing shipwrecks and strandings. One archeological site, a former tavern on Sandy Hook, is associated with harbor pilots and s listed in the National Register for its potential to yield information about harbor pilots, among other things. Buoys marking harbor channels existed as early as 1778. In 1889, an electric generator on the north end of Sandy Hook served five buoys in Gedney Channel (NPS 2009a).

Organized lifesaving efforts are known to have existed in the harbor area by the 19th century, with lifeboats stationed at various localities around the harbor (e.g., Rockaway Inlet and others spaced between Sandy Hook and Little Egg Harbor) (PBS&J 2009). During this era, lifesaving stations were also being constructed that would prove crucial for saving shipwreck victims. The Sandy Hook Life Saving Station No. 1, built in 1848 near the tip of Sandy Hook, no longer exists. The extant Spermaceti Cove Life Saving Station (1894) was constructed about 1,000 feet from the No. 1 station and was identified as Station No. 2 (see below for additional information). The station was decommissioned in 1949 as an active U.S. Coast Guard Station and has served as a visitors' center for the park since 1974. Additional lifesaving stations built in 1855, 1872, and 1891 on Sandy Hook no longer exist. There is also mention of a former mid-19th century lifesaving station being located in the Fort Tilden area (NPS 2011c), with the possibility that archeological evidence of it may still be present (Linck 1981).

Lifesaving stations were staffed with volunteers and adhered to no regulations, standards of practice, or reporting requirements. In 1878, the lifesaving system was officially named the U.S. Life Saving Service, which would include paid surfmen and the construction of new stations. Between 1871 and 1914, the service "aided 28,121 vessels, and rescued or aided 178,741 persons, while only 1,455 people lost their lives" (NPS n.d.a, 4). In 1915, the U.S. Life Saving Service merged with the U.S. Revenue Cutter Service to become the U.S. Coast Guard (NPS n.d.a; PBS&J 2009). The U.S. Coast Guard Station is currently located at the northwest end of Sandy Hook. The Spermaceti Cove Life Saving Station on Sandy Hook is an extant example of these structures.

Military History

Seacoast fortifications along the New York Harbor area date to the early days of discovery and colonization of the New Jersey and New York coastlines. Since the Colonial period, the defense of New York Harbor was considered critical for commerce and the defense of the United States. The fortifications included a variety of forts and batteries dating back to the late 18th century and continuing through the Cold War era. Technological advances in weaponry and construction techniques through time resulted in greatly improved fortifications, some of which were built over earlier, outdated structures. The following describes the evolution of the defense systems represented in the New York Harbor areas of Gateway.

Seacoast fortifications along the New York Harbor area date to the early days of discovery and colonization of the New Jersey and New York coastlines. Since the Colonial period, the defense of New York Harbor was considered critical for commerce and the defense of the United States.

First System Defenses

Since the early 18th century, there have been attempts to defend and protect the coast and harbor areas of New York and New Jersey. The first system of defense dates to 1794 when it seemed the United States might be drawn into European wars following the French Revolution (New York City, Landmarks Preservation Commission 1974). Fortifications (batteries, forts) dating to the Revolutionary War and the War of 1812 are mentioned in historical literature, but little evidence of them remains (NPS 2009a). One example, described as a crude defensive structure, is said to have been constructed in the current Fort Wadsworth area and was designed to protect the Narrows area of the harbor (Black 1983).

Second System Fortifications, 1807–1815

Conflicts on the seas arose between the United States and Great Britain in the early 19th century, initiating a new defense program characterized by open batteries built of earth and wood and casemated masonry structures. These structures were centered in the New York Harbor area, particularly the inner harbor close to and on Manhattan. The fortifications were used in the War of 1812 and were built to defend against enemy vessels such as the British ship HMS Victory. The cannons had the ability to fire on enemy ships up to 1 mile away (NPS 2013a). A temporary fortification on Sandy Hook—Fort Gates—included a wooden stockade and blockhouse, constructed in the general area of the current Fort Hancock. Archeological evidence of the fort was likely disturbed by grading and excavating for later building foundations, etc. (NPS 2009a).

Third System Fortifications, 1817–1867

Third System fortifications in the harbor area were characterized by elaborate enclosed masonry structures and were equipped with numerous smoothbore iron cannons that could fire up to 3 miles, a significant improvement over second system defense weapons. These fortifications were also used during the Civil War against potential enemies. Examples of these fortifications are Battery Weed and Fort Tompkins at Fort Wadsworth and the fort at Sandy Hook (which was never completed) (NPS 1984a, n.d.b).

Endicott-era Defenses, 1890–1910

Weaponry developed during the Civil War and after had advanced significantly, making masonry forts and smoothbore cannons obsolete. In 1885, the U.S. government convened the Endicott Board to create a new system of defense. The board, led by Secretary of War William C. Endicott, studied existing U.S. and European weapons technology and submitted a report to President Grover Cleveland in 1886 calling for a comprehensive defense system to protect the United States' most important ports and harbors from naval attack. The defenses were to consist of "high-powered guns and mortars mounted on concrete emplacements; submarine mine-fields; floating batteries and torpedo boats; and rapid-fire guns to protect the minefields" (NPS 1984a, 60). The batteries featured "breech-loading guns made of steel, mounted on 'disappearing' carriages that were designed to recoil behind a parapet wall during reloading, protecting the defenders" (NPS n.d.b, 5).

Table 3-5. Endicott- and Taft- Era Batteries, Fort Hancock and Sandy Hook Proving Ground.

Battery Name	General Description	Approximate Date of Construction
Potter	Large-caliber gun battery; two 12-inch disappearing-carriage guns	1891
Granger	Large-caliber gun battery; two 10-inch counterweight disappearing-carriage guns	1896
Nine-Gun	Large-caliber gun battery	1902
Mills	Large-caliber gun battery	1917
Kingman	Large-caliber gun battery	1917
Mortar	Large-caliber gun battery, prototype for future gun batteries of the Endicott system	1890
Engle	Rapid-fire gun battery, one 5-inch gun on pedestal mount	1898
Morris	Rapid-fire gun battery, four 3-inch guns on pedestal mount	1904
Urmston	Rapid-fire gun battery, four 15-pounders and two 3-inch guns on pedestal mount	1899–1904
Gunnison	Rapid-fire gun battery, two 6-inch counterweight disappearing-carriage guns	1904
Peck	Rapid-fire gun battery	1902
Arrowsmith (Ruin)	Three 8-inch disappearing-carriage guns	1908

Endicott era = 1890–1905; Taft era = 1907–1945

Weaponry included guns with ranges of 7 to 9 miles. High-velocity guns were able to fire projectiles four times heavier and to ranges two to three times greater than earlier weaponry (NPS n.d.b). The use of these long-range guns on enemy ships in the harbor allowed United States Navy vessels the necessary time to reach the enemy. Some Endicott-era defenses remained in use until 1945. Extant examples within Gateway include fortifications at Fort Hancock and Sandy Hook Proving Ground and Fort Wadsworth (NPS 1984a, 1985) (see tables 3-5 and 3-6). Construction during this time at Fort Hancock and Sandy Hook Proving Ground resulted in the demolition of prior defensive fort structures. There is also evidence that ordnance and munitions, both fired and disposed of, related to military operations at Fort Hancock and Sandy Hook Proving Ground are still present on the ground and in the waters adjacent to the Fort (Panamerican Consultants 2001).

Table 3-6. Endicott-Era Batteries, Fort Wadsworth Historic District.

Battery Name	General Description	Approximate Date of Construction
Duane	Five 8-inch counterweight disappearing-carriage guns	1895–1897
Catlin	Six 3-inch rapid-fire guns	1902–1904
Bacon	Two 3-inch rapid-fire guns	1899
Turnbull	Six 3-inch rapid-fire guns	1902–1903
Barbour	Two 6-inch counterweight disappearing-carriage guns, two 4.7-inch rapid-fire guns	1898
Hudson	Two 12-inch counterweight disappearing-carriage guns, one 6-inch counterweight disappearing-carriage gun, one 4.7-inch rapid-fire gun	1898-1899
Mills	Two 6-inch counterweight disappearing-carriage guns	1899–1900
Upton	Two 10-inch counterweight disappearing-carriage guns	1896–1899
Dix	Two 12-inch counterweight disappearing-carriage guns	1902
Barry	Two 10-inch counterweight disappearing-carriage guns	1897–1899
Richmond	Two 12-inch counterweight disappearing-carriage guns	1898–1899
Ayers	Two 12-inch counterweight disappearing-carriage guns	1900–1901

Endicott era = 1890–1905

New York Harbor Defenses, 1907–1945

As was the case with earlier defense systems, many of the Endicott-era defenses were eventually replaced with newer weapons and technology. In 1905, the Taft Board—headed by Secretary of War William Taft—proposed improving the Endicott defenses and adding fortifications to possessions newly acquired in the Spanish-American War (NPS 2006c). Beginning in 1907, Taft-era improvements to existing fortifications included general electrification, telephone communications, searchlights, and motorized ammunition hoists (Layton and Foulds 2010). Observation posts and plotting rooms were used to refine information on target direction and bearing and speed of enemy ships with great accuracy (please refer to "Fort Tilden Historic District—Battery Harris, Battery Construction 220, Battery Kessler, and Nike Missile Launch Site"). This information was then relayed to artillery guns crews for their use in targeting the enemy.

Within a short period (by 1915), it became apparent that the disappearing-carriage guns in use were not sufficient to defend against the longer-range firing capabilities of new battleships. As a result, construction was begun on new large-caliber gun batteries with high-angle gun carriages that had a range of over 20 miles (compared with the 7- to 8 mile range of counterweight-carriage guns). The high-angled carriages on rotating platforms allowed a 360-degree field of fire (Layton and Foulds 2010).

Following World War I, the need to defend against air attacks became apparent, which resulted in additions to the area's defense system including rapid-fire anti-aircraft guns and the use of camouflage techniques. During the post–World War I period and the World War II period, new 16-inch gun batteries were constructed. During the latter period, existing 12- and 16 inch barbette guns were armored with thick concrete enclosures, covered by tons of sand, and camouflaged with natural vegetation. This was intended to render them virtually invisible from the air and impervious to most aerial bombs.

Being waged with airpower, World War II used strategies dramatically different from those used in earlier conflicts. Aircraft carriers became extremely important and radar developed by the U.S. Army on Sandy Hook was employed to provide early warning of approaching enemy aircraft. Examples incorporating Taft-era improvements include structures at Fort Hancock and Sandy Hook Proving Ground and Fort Wadsworth (NPS 1984a, 1985) (see table 3-5).

Nike Missile Defense System, 1954–1974

After World War II, the coastal artillery was abandoned and anti-aircraft guns remained as the only defense for the coastline and harbor. However, the limited capabilities of this defensive strategy—jet planes were able to fly higher and faster than the guns' capabilities—led to the development of the Nike Air Defense Missile (Nike Missile). Between the Cold War years of 1954 and 1974, 19 Nike Missiles encircled the New York Harbor area. The Nike Missile defense strategy required soldiers to be stationed at either the missile launch areas or the radar sites (Integrated Fire Control Area); soldiers lived at the sites and worked 24-hour duty shifts.

The Ajax was the first Nike Missile employed with the capability of destroying a target at 30 miles. The Hercules, with a range of over 96 miles and the ability to carry a nuclear warhead, began to replace the Ajax around 1958. All Nike batteries were disarmed in 1974 in compliance with the Strategic Arms Limitation Talks (SALT) treaty signed by the United States and the Soviet Union.

Nike Missile installations are still evident at Gateway at Fort Hancock and Sandy Hook Proving Ground and Fort Tilden. Both maintained two missile batteries, each with underground magazine storage rooms and large elevators that raised/lowered missiles (NPS 1984a, U.S. Department of the Interior 2009).

Aviation History

Both commercial and military aviation were quickly evolving after World War I. The early history of aviation in the United States is well represented in several Gateway facilities dating back to the early 20th century, including Floyd Bennett Field, Miller Army Airfield, and the Rockaway Naval Air Station (now the site of Jacob Riis Park).

Floyd Bennett Field

New York City opened its first municipal airport in 1931 with the dedication of Floyd Bennett Field. The new state-of-the-art airport was located on Barren Island and was named for a Congressional Medal of Honor recipient and navy pilot, Floyd Bennett. Rated highly by the Civil Aeronautics Board, it included concrete runways, an administration building/terminal, and Hangar Row, consisting of four identical rectangular two-bay aircraft hangars. Floyd Bennett Field was a popular site with aviators seeking to break records, and numerous transcontinental and transatlantic flights used the facility as a start or end point during the 1930s. In 1938, Howard Hughes and his crew, starting and ending their flight at Floyd Bennett Field, completed an around-the-world flight—14,791 miles in 3 days, 19 hours, 8 minutes and 10 seconds—to gather navigational data (NPS 2010c). The interest in these aviation records reflected the public's interest in aviation and contributed to improving both piloting skills and technology (NPS 1978).

New York City opened its first municipal airport in 1931 with the dedication of Floyd Bennett Field. The new state-of-the-art airport was located on Barren Island and was named for a Congressional Medal of Honor recipient and navy pilot, Floyd Bennett.

In 1933, Floyd Bennett Field was the second busiest airport in the country. Unfortunately, very little of the traffic was commercial and the lack of revenue was problematic. In 1939, Municipal Airfield 2 (later renamed LaGuardia Airport) opened. Unable to compete with LaGuardia and Newark Airports, the city sold Floyd Bennett Field to the United States Navy in 1941. During World War II, it was renamed Naval Air Station, New York. The navy expanded the facilities from 387 acres to 1,288 acres and continued to operate the field for 30 years (NPS 2010c).

The navy already had an established presence at Floyd Bennett Field, where pilots and ground crews from a Naval Air Reserve Squadron trained throughout the 1930s. A U.S. Coast Guard Air Station was also established at Floyd Bennett Field in 1936 (NPS 2010c). During World War II, "neutrality patrols" were established to protect the convoys of ships carrying war materials from New York to Great Britain. These patrols, involving PBY Catalinas (flying boats) and other naval patrol aircraft, flew from Floyd Bennett Field and other naval air stations to offer protection to convoys from German U-boats.

The navy's later interest in the helicopter for use in air-sea rescue operations resulted in the establishment of the first helicopter pilot and mechanic training facility in the world at Floyd Bennett Field in 1943. The ability to take off and land vertically would prove invaluable in rescuing downed servicemen in areas inaccessible to other aircraft. The airborne rescue capabilities of the helicopter were proven, and the first associated rescue equipment was developed and tested at Floyd Bennett Field (NPS 2010c, 2011c).

Floyd Bennett Field was redesignated as a Naval Air Reserve Training Station in 1946. In 1950, it was redesignated as the Naval Air Station, New York. In 1971, the navy deactivated the field and soon after, Gateway took over the management of the field. Today, the Ryan Visitor Center (which originally served as the historic passenger terminal) has been renovated to reflect the Golden Age of Aviation in the 1930s. It provides visitors with information and educational exhibits related to the period when Floyd Bennett Field served as New York City's municipal airport. Volunteers with the Historic Aircraft Restoration Project use Hangar B at Floyd Bennett Field to work in the preservation of historic aircraft and interpret them for the public (NPS 2010c) (see the "Other Important Cultural Resources" section in this chapter for additional information on Floyd Bennett Field).

Miller Army Airfield (Miller Field)

When completed in 1921, Miller Field included, among other structures, a concrete seaplane ramp, a sod runway, two landplane hangars, and two seaplane hangars (NPS 1979a). From 1923 to 1940, the New York National Guard's 102nd Observation Squadron was the major air unit at Miller Field. During this period, both military and civilian aircraft used the airfield. It was the home of the only Air Coast Defense Station on the East Coast during World War II when seacoast guns and observation towers were added. During the 1950s and 1960s, Miller Field was used by a variety of military aircraft (NPS 2013b). Other entities that used Miller Field from the 1950s through its closing in 1969 included the Civil Air Patrol, the National Guard, and U.S. Army Reserve troops. It was the last grass runway in New York City when it was deactivated by the army in 1969 (NPS 1979a).

Miller Field was also the site of several early experimental tests by private aircraft manufacturer Remington-Burnelli. In the spring of 1929, the American Aeronautical Corporation assembled and tested two Italian seaplanes—the SS-55 twin-hulled Savoia-Marchetti flying boat and the S-62 Savoia-Marchetti flying boat—at the airfield (NPS 1979a).

In 1973, when Miller Field was transferred to the NPS, about 24 structures existed at Miller Field; all were deteriorated. The landplane hangar was demolished in 1976, and the site was converted to paved areas and playing fields laid out over parts of the old airfield (see "Miller Army Airfield Historic District, Hangar No. 38" in the "Other Important Cultural Resources" section for additional information on Miller Field).

Rockaway Naval Air Station

The Rockaway Naval Air Station was located on undeveloped New York City park land and included 21 buildings in 1918. These included hangars for servicing HS-2 flying boats, for housing blimps, and for housing Navy-Curtiss flying boats, as well as a variety of other aviation-related structures. In 1919, one of the four Navy-Curtiss flying boats that departed from the air station completed the first transatlantic flight "totaling 3,936 miles in 53 hours, 58 minutes" (NPS 2011c, 25). Today, Jacob Riis Park, part of Gateway, occupies the location of the earlier Naval Air Station.

Fundamental Resources

Coastal Defense Resources

Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District—Fort Hancock Parade Grounds, Endicott/Taft-era Batteries, and Nike Launch and Radar Sites

The information presented below is summarized primarily from the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District nomination form (NPS 1984a), the Fort Hancock and Sandy Hook Proving Ground Historic District nomination form (NPS 1980a), and the Cultural Landscape Report for Fort Hancock (NPS 2006b); please refer to these documents for additional detail.

Fort Hancock is in the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District in the Sandy Hook Unit of Gateway (figure 3-3). Originally defined as including the more heavily developed northern area of Sandy Hook, it was listed on the National Register in 1980 as a historic district (NPS 1980a). In 1982, the district was designated as a National Historic Landmark, with boundaries encompassing the entire Sandy Hook peninsula, including all NPS, U.S. Coast Guard, U.S. Army, and State of New Jersey property. It also includes the Sandy Hook Lighthouse—also listed as a National Historic Landmark—and the Spermaceti Cove Life Saving Station, listed separately in the National Register (see below). The district also contains approximately 110 significant historic buildings and 16 batteries dating from the last quarter of the 19th century through the first half of the 20th century. The district reflects the history of the U.S. Army's Ordnance Department Proving Ground and Fort Hancock Military Reservation, both vital defense installations protecting New York City from 1895 through the Cold War era. It also played a significant role in the development of radar systems and the radar equipment that would eventually be located on Sandy Hook (NPS 1984a). For nearly 80 years, the fortifications at Fort Hancock and Sandy Hook Proving Ground contributed to the protection of the United States' most important harbor and its largest city, New York (NPS 1984a).

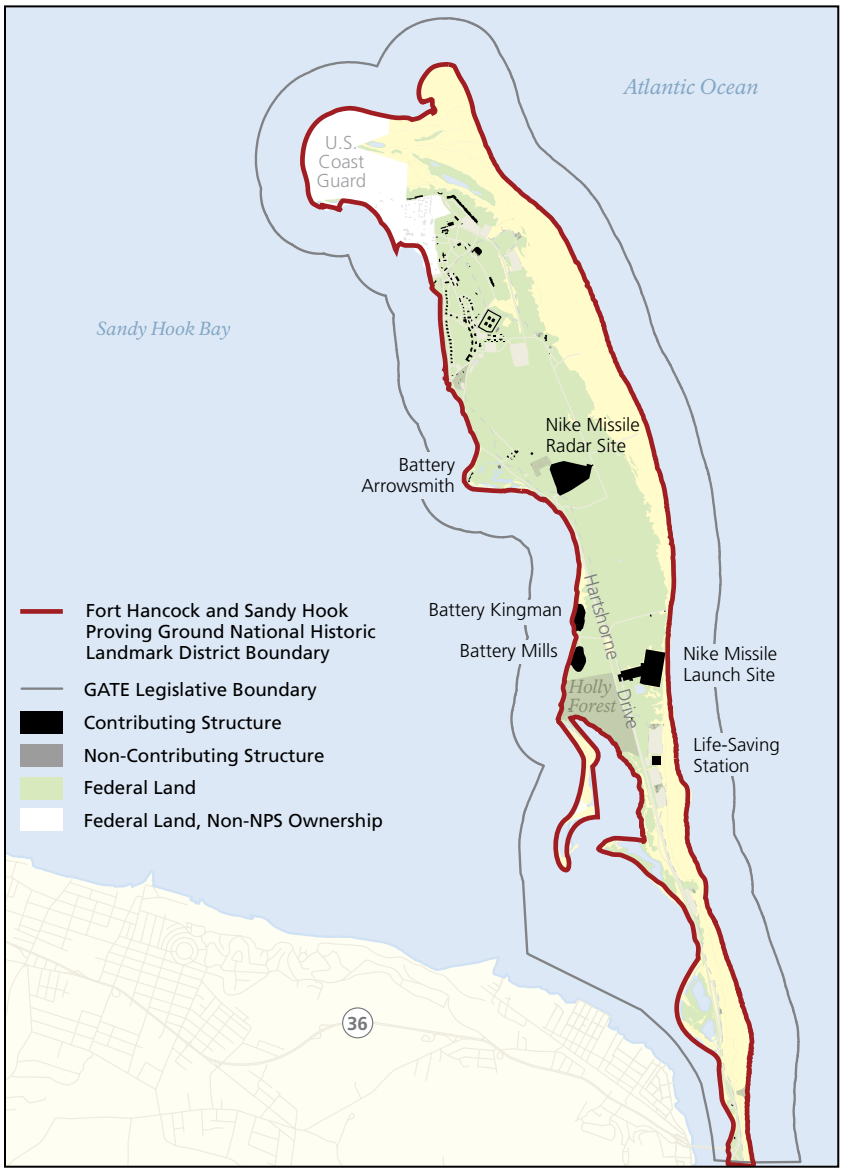
Two separate periods of significance exist for the district. The first period is associated with the Sandy Hook Proving Ground (1874–1919), and the second is related to the theme of coastal defenses associated with Fort Hancock and Sandy Hook Proving Ground (1859–1974) (figure 3-3). Nearly all the structures in the district contribute to its significance. A few examples in Fort Hancock and Sandy Hook Proving Ground include Officers' Row, the enlisted men's barracks, the mess halls, post headquarters, post hospital, bachelor officers' quarters, Sandy Hook Light, and the Spermaceti Cove Life Saving Station, among others (see NPS 1984a for complete listing).

The Sandy Hook Proving Ground operated from 1874 to 1919 and is considered the most significant part of the district, playing a key role in weapons development by the United States. The test facility, located on the northeast edge of the Fort Hancock cantonment, became one of the U.S. Army's most important facilities. Four structures—the Proof Battery, the Brick House, the Powder Magazine, and the Chemistry Lab—exist today as the most

important of the remaining buildings in the proving ground (NPS 1984a). Three are managed by the park; the fourth (the chemistry lab) is managed by the U.S. Coast Guard.

As major technological advances in weaponry were occurring around the world, the proving ground played a vital role in the testing of experimental guns and carriages for the seacoast defenses of the country. All the big guns and mortars and their carriages "mounted in the Nation's Endicott and Taft period coast fortifications from early 1890s through World War II were developed at Sandy Hook and many of them were proved there" (NPS 1984a, 7). The proving ground was deactivated in 1919 when improvements in weapons technology made the short test field at Sandy Hook too small (NPS 2009c).

Figure 3-3. Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District.



Source: NPS 2013b.

In 1886, the Endicott Board called for a comprehensive defense system to project the country's most important ports and harbors from attacks from the sea (see "Military History"). Under this and later programs, Sandy Hook evolved into one of the most important complexes guarding the approaches to the New York Harbor. Once the construction of the Endicott defenses was underway at Sandy Hook, permanent facilities for a garrison were needed. The site of Fort Hancock was selected and plans for an initial 34 buildings were drawn. The site was cleared and graded and a parade was laid out with the officers' quarters arranged along a linear alignment on the western edge of the parade. The enlisted men's barracks were constructed on the eastern side. The buildings are centered on two open space areas—the parade ground and the athletic field (Layton and Foulds 2010; NPS 1984a). Many of the more than 100 buildings at Fort Hancock share stylistic similarities—distinctive buff brick and Classical Revival ornamentation—and are grouped to take advantage of views of Sandy Hook Bay to the west. The initial buildings were completed around 1899 and construction at the fort continued at a steady pace up to 1918, when it began to slow. Today the fort is composed primarily of the buildings erected at the turn of the century (NPS 1984a).

Figure 3-4. Example of Endicott-Era Battery: Battery Peck, Open Battery Commander's Station, Circa 1905-1910, Looking Southeast.



Source: NPS 2010c, 113.

The Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District sustained considerable damage from Hurricane Sandy. Fort Hancock structures experienced flooding (in basements) and many have substantial damage to porches, piers, and columns and will need stabilization. Ninety percent of the structures within Fort Hancock need electrical repair, including Officers' Row House #1, "History House." Roof damage is evident on many structures and sand and debris covered many of the parking areas, roads, and driveways. Numerous trees were blown down. Infrastructure and equipment were lost throughout the area. Erosion/damage around some Endicott-era fortifications and the Nike Missile Launch Site was noted. The museum collection housed at Fort Hancock was at considerable risk and was moved to Fort Wadsworth to ensure its preservation (IMT 2012a, b).

The large, open parade ground is one of the most distinctive features of the Fort Hancock landscape. It is defined by "the architecture of Officers Row, the linear row of senior officers' quarters that back onto the Parade Ground and face Sandy Hook Bay" (NPS 2006b, 16). The parade ground also contributes heavily to the spatial relationship of the landscape, which is central to the historical character of the Fort.

The Sandy Hook Endicott- and Taft-era batteries associated with Fort Hancock and Sandy Hook Proving Ground are presented in table 3-5. For summary information on Endicott/Taft-era batteries, please refer to "Military History."

The boundaries of battery sites extend beyond the aboveground masonry batteries and include "engineered slopes in front of the masonry structures, and battery service areas to the rear of the masonry structures" (Layton and Foulds 2010, 3). This design was an attempt to make the structure indistinguishable from the surrounding landscape at a distance.

All the Fort Hancock and Sandy Hook Proving Ground batteries have experienced some degree of deterioration and loss of integrity. In the case of Battery Arrowsmith, built in 1908, the battery is considered to be in an "extremely ruinous state and coastal storms continue to break apart the remaining structure and the peninsula upon which it sits" (Layton and Foulds 2010, 318). In 1995, gun decks were demolished by the USACE, leaving only about 30 percent of its original structure intact. Still, it is believed that the ruins convey a "sense of the structure's size and shape and is thus contributing" to the district as a ruin (NPS n.d.e).

Figure 3-5. Looking West at Target Tracking Radars, Fort Hancock and Sandy Hook Proving Ground, Control Area No. 1, Nike Radar Site, Circa 1962.



Source: Layton and Foulds 2010.

In the 1950s, Nike Missile installations—a response to the threats of the nuclear age—were placed on Sandy Hook. The launch area (14.69 acres) consisted of the "launching complex where missiles were stored in underground silos and a radar tracking and control station with equipment for acquiring targets, tracking targets, and tracking the flight of outbound missiles" (Layton and Foulds 2010, 471). The Nike Missile installation at Fort Hancock and Sandy Hook Proving Ground was one of only a few dual battery sites built in the United States that featured two rows of missile launchers and two related groups of radar. Construction was completed on the launch site in 1955 and on the radar site in 1956 (Layton and Foulds 2010).

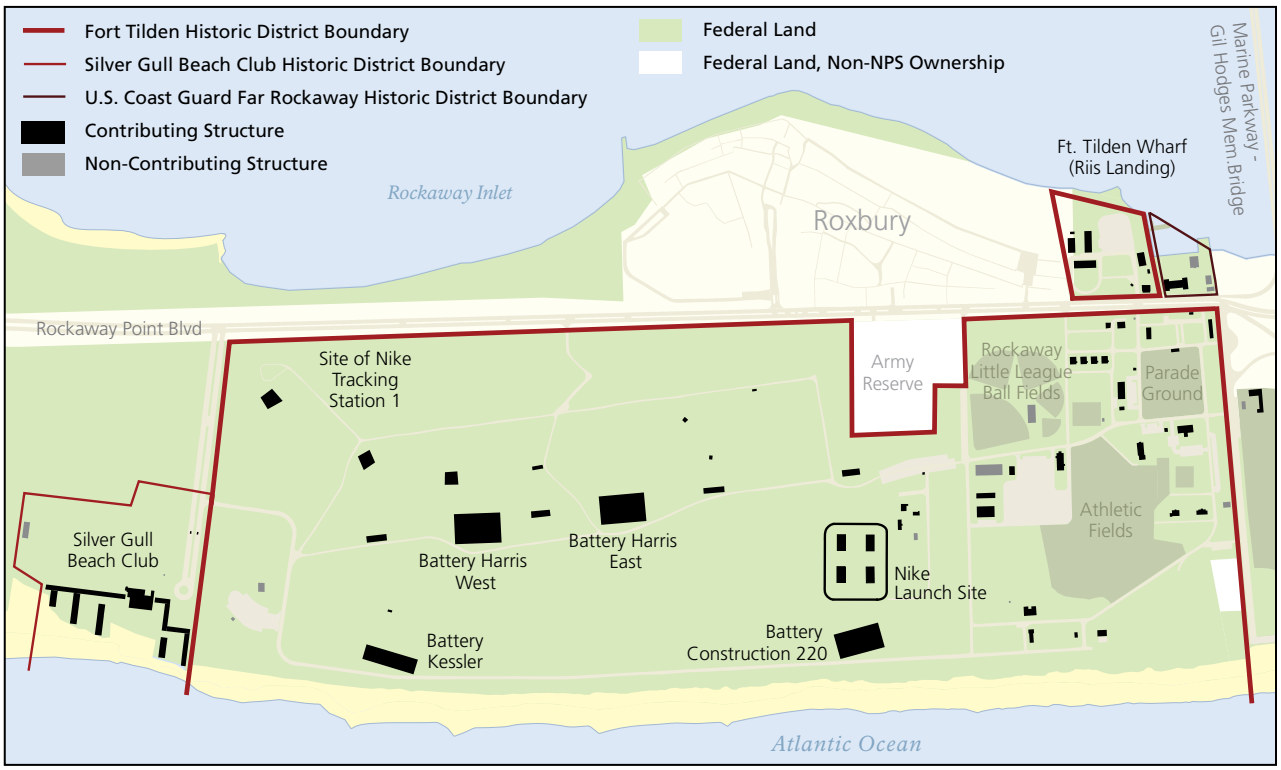
The launch area site is bound by a perimeter fence. On the surface, "double steel doors through which the missile would have passed and the missile launch elevator apparatus are evident" (NPS 1984a, 23). The silos contain no missiles today. The two tracking station towers to the north of the launch site include concrete radar towers and several support buildings (NPS 1984a). Currently, the radar site is interpreted for visitors.

Fort Tilden Historic District—Battery Harris, Battery Construction 220, Battery Kessler, and Nike Missile Launch Site

Located on the Rockaway Peninsula, the fort area was recognized in the early 19th century as a strategic location in the harbor (figure 3-6). Established in 1917, Fort Tilden complemented Fort Hancock and Sandy Hook Proving Ground and Fort Wadsworth as part of the "outer defense system for New York City and the harbor from World War I through the Cold War era" (NPS 1984b, 3). Coordination between Fort Tilden and Fort Hancock and Sandy Hook Proving Ground allowed for the efficient use of "seacoast artillery, anti-aircraft artillery, submarine mining and observation" in these efforts (NPS 1984b, 3). Fort Tilden is believed to illustrate a reorganization of the traditional coastal defense systems and was an integral part of a highly specialized strategy by the army to protect New York Harbor from sea and air attacks.

The fort consists of three areas: the post (administration) area, the fortification area, and Fort Tilden wharf area (Riis Landing) (figure 3-6). The post area reflects the administrative life of the fort (barracks, recreation, etc.). The primary early Taft-era fortifications at Fort

Figure 3-6. Fort Tilden National Register Historic District.



Tilden were Battery Kessler, Battery Construction 220, and Battery Harris (Selvek 2005) (figure 3-6). Later, during the Cold War years, a Nike Missile Launch Site and tracking station were installed.

The post area of Fort Tilden was located on the east quarter of the fort (figure 3-6) and included a number of structures built over several decades. They include the chapel (1941), the recreation building with dance floor (1941), the permanent brick barracks building (1938–1939; later converted to a hospital annex, and subsequently used as a headquarters), the theater (1941), two officers' quarters (1938; WPA construction, two-story, brick, with one-story garage), the double NCO quarters (1918–1919, the oldest permanent structure at the fort), the parade ground (early 1940s), the motor repair shop (1941), an ordnance building (1937–1938; replaced earlier World War I structure), the engineers' office (built soon after World War I), and the engineers' storehouse (1923–1924). The wharf dock (just north of the post area) existed prior to the fort being established and has undergone repairs through the years. This was a critical component of the fort because everything that was shipped to the facility had to come by way of the wharf (NPS 1980b). (Please see additional information on Fort Tilden wharf area provided in "Coastal Defense Support Structures.") Today, several modern playing fields exist in the post area of the fort (figure 3-6).

Battery Construction 220 and Battery Kessler were both constructed along the coastline of the fort. Battery Construction 220 was built in approximately 1917 and was outfitted with two 6-inch guns, separated by about 210 feet. Battery Kessler, originally known as "West Battery," consisted of two 5-inch guns mounted on a circular platform (NPS 1984b).

Constructed in approximately 1922–1924, Battery Harris is located slightly inland and to the north of Battery Construction 220 and Battery Kessler. It is characterized the technical improvements in military weapons at the time (Selvek 2005) (figure 3-6). In 1941, the two guns (16-inch gun placements) were roofed over by concrete casemates, approximately 850 feet apart. They were covered with earth and sand, resembling two oval hills. Together, these structures compose Battery Harris. There is a circular concrete hood projecting over the southern aperture of each gun emplacement. Due to their long range and power, the two guns represented an important factor in the defense of New York Harbor (NPS 1984b).

At the beginning of the Cold War period (1945–1974), a new surface-to-air missile defense program (Project Nike) was developed. The systems were installed at Fort Tilden and Fort Hancock and Sandy Hook Proving Ground. At Fort Tilden, this included the construction of "four magazine double Nike batteries" located at the eastern end of the fort, which were operational by 1955 (Selvek 2005, 47) (figure 3-6). Two missile-tracking stations were constructed at the western end of the fort, with two additional ones to follow. By 1967, the Nike technology had become obsolete and the Fort Tilden installation was decommissioned. By this time, the fort was slowly being shut down as a military installation (Selvek 2005).

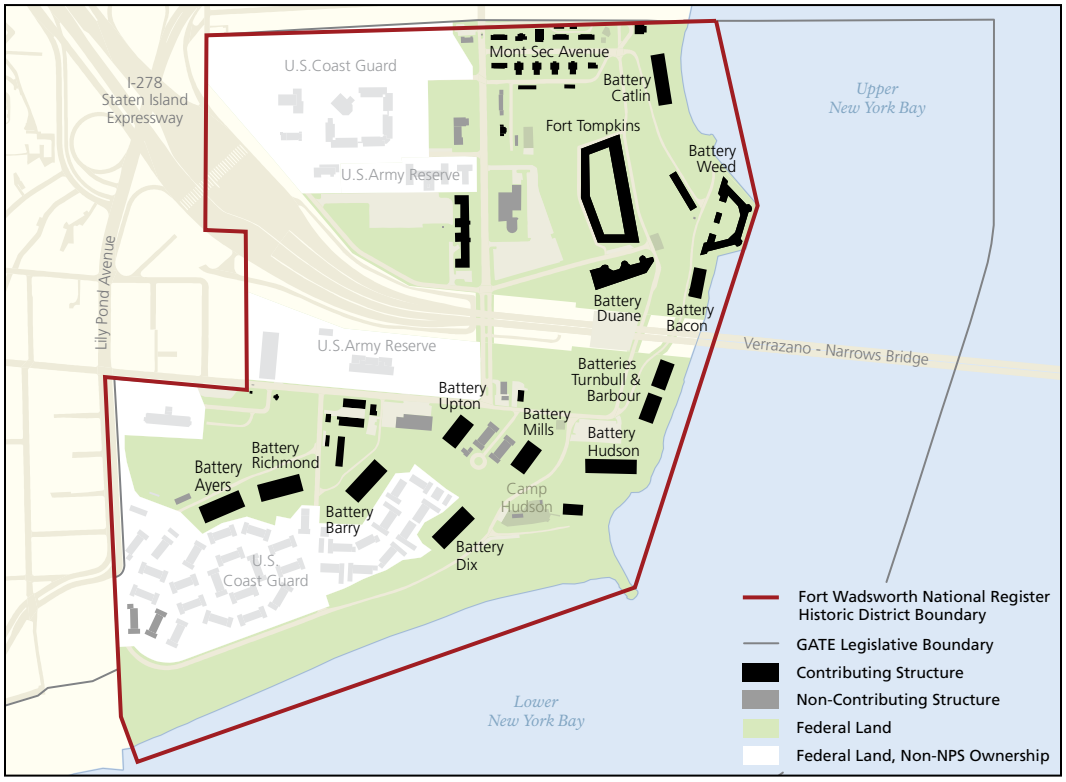
Fort Tilden experienced considerable flood and wind damage from Hurricane Sandy and many contributing features of the historic district were heavily impacted (officers' and enlisted men's buildings, Battery Kessler, small-scale features, etc.). Numerous trees were also downed (IMT 2012c).

Fort Tilden Historic District is considered significant because of its role in the defense network designed to protect New York Harbor. It was determined eligible by the Keeper of the National Register of Historic Places for its association with military history from 1916 to 1967. Contributing resources include the surviving Taft-era gun emplacements and associated structures from World Wars I and II, surviving features associated with the Nike-Ajax and Nike-Hercules missiles, and significant surviving operational, administrative, housing, wharf, and transportation components (U.S. Department of the Interior 2009). All of these elements retain sufficient integrity to contribute to the "significance of the district as an integrated 20th century coastal defense installation" (U.S. Department of the Interior 2009, 47). (Please refer to NPS 1984b, U.S. Department of the Interior 2009, and Selvek 2005 for greater detail on Fort Tilden.)

Fort Wadsworth Historic District—Battery Weed, Fort Tompkins, Torpedo-storage Building, and Endicott-era Batteries

The Fort Wadsworth Historic District is characterized by resources primarily associated with the coastal defense system that has contributed to the protection of New York Harbor for some 200 years (figure 3-7). The site is remarkable for the conspicuous bluff that rises to about 150 feet from the coastline. Damage from Hurricane Sandy in 2012 has left some of these slope areas unstable/unsafe (IMT 2012d). Battery Weed lies at the toe of the slope; Fort Tompkins is located at the highest point (figure 3-7). Both represent major third system fortifications listed on the National Register and retain much of their historic character (NPS n.d.b). The district also includes a number of other batteries and numerous military-

Figure 3-7. Fort Wadsworth National Register Historic District.



Source: NPS 2013b.

related resources ranging in time from the early 1800s to the 1990s, 12 of which have been determined eligible for the National Register (NPS 1985) (see below). It encompasses elements ranging from the post–Civil War period to the Endicott period. A most notable change from its original state is the increased vegetation (mature trees) that now exists; the original fortifications and batteries were covered with low-lying grass to allow for optimal visibility (NPS n.d.b). Management of Fort Wadsworth was transferred to the NPS from the United States Navy in 1994. The U.S. Coast Guard and U.S. Army Reserve also own and occupy a portion of Fort Wadsworth.

According to the National Register nomination form for Wadsworth (NPS n.d.b), important components of the fort include the following:

- Civil War–era fortifications (Battery Weed and Fort Tompkins), including the surrounding open space
- Battery Duane, Battery Catlin, Battery Turnbull, Battery Bacon, Battery Barbour, Battery Hudson
- Torpedo-storage building (Building 147)
- Seawall and dock
- Unrestricted view of New York Harbor
- Hillside below Fort Tompkins and above Battery Weed
- Hudson Road wall from Fort Tompkins turnout to head of Battery Weed Road
- Rail network between the torpedo-storage building and Battery Weed (NPS n.d.b, 9)

Fort Tompkins is located on the site of two earlier fortifications—one British (1779), the other built by the state of New York (1814, never completed). It was originally constructed as support for Battery Weed. What is evident today at Fort Tompkins dates to about 1859, when construction of the granite and brick fort began (construction was completed in 1876). It is a five-sided structure with one side overlooking Battery Weed and the harbor entrance (figure 3-7). The well-preserved fort is believed to be an outstanding example of the third system military architecture (NPS n.d.b) (see "Military History"). Fort Tompkins is also recognized as a Landmark Site by ~~the~~ New York City for its "special historical, aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City" (New York City, Landmarks Preservation Commission 1974, 2).

Many of the existing batteries at Fort Wadsworth are located on the sites of earlier fortifications. Battery Weed, begun in 1847, is one of the earliest structures that remains intact at the fort and was constructed on the site of the former Fort Richmond, a water battery (Black 1983). Battery Weed's construction involved the use of granite blocks in a half-hexagon shape and included a central parade ground (figure 3-8). At the time of its completion (1861–1864) it included 116 cannons, three tiers of casemates, and a fourth barbette tier, each with gun emplacements. Access to the tiers is via circular granite staircases. A seawall follows the perimeter of Battery Weed and at one time functioned as the exterior side of a moat that once surrounded the battery. The seawall is constructed of granite blocks similar in appearance to the construction materials of the battery. Damage to Battery Weed from Hurricane Sandy in 2012 included loss of fencing and damage to the seawall (IMT 2012d).

Figure 3-8. Battery Weed Looking Northeast Across the Narrows Toward Brooklyn (2006).



Battery Weed was garrisoned by a large force from the Fifth Regiment New York Volunteer Artillery. It represents "an important example of a multi-tiered casemated fort—one of only three 4-tiered forts built—belonging to the Third System of American seacoast fortifications" (NPS n.d.b, 5). It is believed to retain a high degree of integrity. Battery Weed is also recognized as a Landmark Site by ~~the~~ New York City for its "special historical, aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City" (New York City, Landmarks Preservation Commission 1967, 2).

Twelve Endicott-era batteries constructed between 1895 and 1904 at Fort Wadsworth have been determined eligible for the National Register (table 3-6). Of these 12, 6 were reconstructed from existing works (rebuilt and renamed) (NPS 1985). Constructed of concrete, granite, and extensive earthworks, these batteries were designed to replace the third system defenses that were unable to defend against new military strategies and weaponry. The number of guns mounted in each battery varied. Their current conditions also vary and most are considered "generally in a state of deterioration" (NPS n.d.b, 6). (For more detail on individual batteries, please refer to NPS n.d.b. For additional information on Endicott-era batteries, please refer to "Military History."). Damage to these resources associated with Hurricane Sandy in 2012 included loss of fencing at Battery Duane, collapse of stone walls and unstable earthworks at Battery Hudson, numerous downed trees, and erosion and scouring around many other coastal batteries/earthworks (e.g., Battery Bacon) (IMT 2012d).

The Endicott-era torpedo-storage building was constructed on the hillside behind Battery Weed between 1892 and 1894 (figure 3-7). It served as the storage area for torpedoes or submarine mines that protected the harbor. The structure is a rectangular, two-story building with a corrugated roof constructed of granite and brick. The southeast portion of the building was substantially damaged by fire in the 1980s, causing a partial roof collapse. Mitigation measures were taken, but the damaged section remains in a deteriorated state; the northern portion of the structure remains "fairly intact" (NPS n.d.b, 7).

Maritime Resources

Sandy Hook Lighthouse

The Sandy Hook Lighthouse (also known as Sandy Hook Light) is designated as a National Historic Landmark. It is also located within the boundaries of the much larger Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District (figure 3-3). Construction on the light began sometime in 1761, with the first lighting in 1764, marking the beginning date for its period of significance. It was the fifth lighthouse to be built in America and now stands as the oldest continuously operating light tower in the nation.

During the Revolutionary War, the Americans extinguished the light so as not to aid the British. The British soon returned it to service and it has remained lit ever since with the exception of a temporary blackout periods during World War II. In addition to its shining beacon, the lighthouse communicated with lookouts on Staten Island during the day by flying various colored shapes from the tower, indicating inbound vessels (NPS 1971).

Figure 3-9. Sandy Hook LIghthouse and Keeper's Quarters.



Source: NPS 2013b.

The lighthouse was built by Isaac Contro and can be described as an octagonal structure, nine stories (103 feet) tall, and tapered from a base diameter of 29 feet to a 15-foot diameter at the top level. It is constructed of bricks on a masonry foundation and its walls are 7 feet thick at the base. It includes 13 windows and a circular iron staircase to the upper levels. A ladder allows access through the vaulted ceiling to the beacon itself, which is protected by a glass and steel cupola. The 45,000-candlepower beacon is approximately 4 feet wide by 8 feet high and is housed in a thick circular glass lens. Graphic depictions of the light in the late 1870s and early 1880s include, among other things, the keeper's quarters, a fenced yard, a second house (probably for an assistant keeper), a farmyard, and a possible chicken coop (Bianchi 2006). Restoration work was completed on the lighthouse in 2000.

Just southwest of the light structure sits the former lightkeeper's house—a two-and-a-half story frame house with hip and gable roof constructed in the early 1880s (figure 3-9) (NPS 1971). The original exterior has not changed substantially except for the addition of asbestos shingles. The interior of the house was renovated by the Coast Guard in 1980 (NPS 1984a); a more recent renovation by the Sandy Hook Foundation occurred in 2000. While the Sandy Hook Unit sustained considerable damage from Hurricane Sandy in 2012 (see Fort Hancock and Sandy Hook Proving Grounds, above), the lighthouse and keeper's quarters do not appear to be damaged.

Spermaceti Cove Life Saving Station

The Spermaceti Cove Life Saving Station was listed in the National Register in 1981 and represents one of only three individual resources recognized within the larger Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District (figure 3-3). It is considered significant due to its association with the earliest federally sponsored efforts (through the U.S. Life Saving Service and U.S. Coast Guard) to save life and property from shipwrecks and its distinctive characteristics of a particular period and type of construction (Lee 2008). It was constructed in 1894 and, at the time, was located 800 yards from the ocean. Since then, that distance has been reduced to 150 feet (NPS 1981a).

Figure 3-10. Spermaceti Cove Life Saving Station, East Elevation.



Source: Lee 2008.

The station was one of at least 28 Duluth-type stations constructed for the U.S. Life Saving Service, which are characterized by "three building sections that form the station; a one-and-a-half story Main Block; a one-story Boat Room; and a four-story Watch Tower" (Lee 2008, 4). The Spermaceti Cove Life Saving Station, described as a one-and-one-half story structure with a two-bay boathouse on one end and a four-story tower on the front with a pyramid roof facing the ocean, exhibits strong Craftsman influence. The boathouse has double doors facing the sea. The front porch was enclosed in the 1930s. Other than the porch, the entire structure is shingled. (Please refer to the National Register nomination form (NPS 1981a) for greater architectural detail.) Effects of Hurricane Sandy on the structure in 2012 included flooding on the first floor and basement (IMT 2012e), the loss of the porch, and damage to some exhibits.

Between 1894 and 1949, the U.S. Life Saving Service conducted numerous rescues from this structure. The Spermaceti Cove Life Saving Station was one of the six to eight original New Jersey U.S. Life Saving Service sites. In 1949, the lifesaving station was decommissioned by



the U.S. Coast Guard and later housed administrative offices for the New Jersey State Park on Sandy Hook. Since 1974, it has served as one of Gateway's visitor centers and remains an important example of late 19th century New Jersey coastal utilitarian architecture (NPS 1981b).

Other Important Cultural Resources

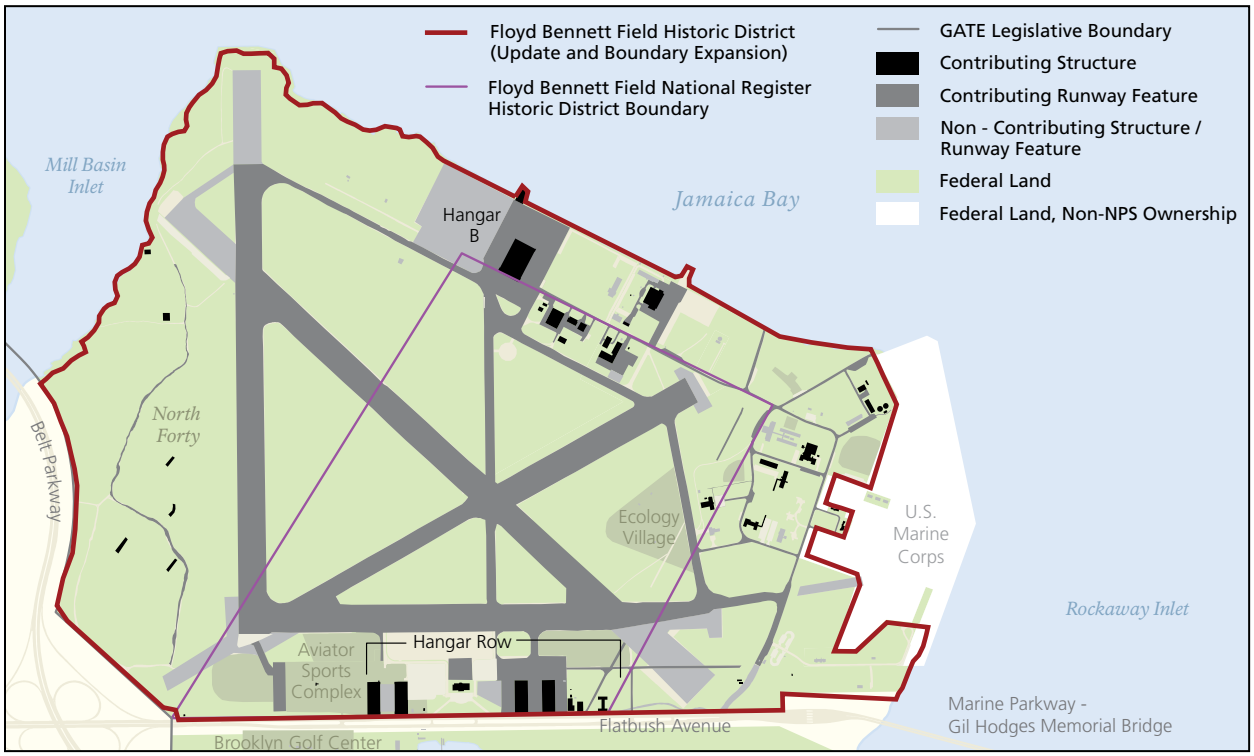
Floyd Bennett Field Historic District

Floyd Bennett Field Historic District was originally listed on the National Register in 1980 (figure 3-11). Its period of significance (1931–1941) was related to its involvement in the evolution of aviation history and municipal airport construction. According to the original National Register nomination, the original complex of steel frame and brick hangars and support building at Floyd Bennett Field still retains the "architectural design and historic cohesion of an early municipal airport" (NPS 1978, 3). A recent determination of eligibility expands the district's boundaries and period of significance. The revision to the period of significance ranges from 1928 to 1945 to incorporate important historical themes not addressed in the original documentation. The district's boundaries have been revised to include all lands east of Flatbush Avenue and south of the Shore Parkway, with the exception of the U.S. Department of Defense land used as a Marine Corps Reserve Center (NPS 2010c). These expanded boundaries conform to federally owned lands administered by the NPS that are historically associated with Floyd Bennett Field and the Coast Guard Air Station Brooklyn (NPS 2010c).

The expanded district is significant for its role in early aviation history. "In the 1930s it was the starting point and terminus for many record-breaking continental and intercontinental flights and important air races in the 'Golden Age' of U.S. aviation history" (NPS 2010c, 1). Its significance also lies in its role during World War II when the navy operated the field as Naval Air Station New York, one of the most vital "home front" navy installations, "ferrying more naval aircraft from regional assembly plants to the West Coast for deployment in the Pacific Theater than any other facility" (NPS 2010c, 1). The district is also significant for its architecture and engineering. Much of Floyd Bennett Field's original structure and setting—hangars, administration building, runways, and taxiways—is still evident and it is one of the few municipal airports that still reflects the pioneering of the aviation industry (NPS 2010c). Hangar B, the largest structure at the field, was completed in 1941 to house seaplanes and currently houses the Historic Aircraft Restoration Project volunteer group and numerous historic aircraft. Hangar B sustained roof damage and broken windows and is in need of stabilization as a result of Hurricane Sandy in 2012 (IMT 2012g).

The historic district's National Register significance lies not only in its association with aviation history and municipal airport construction but also in its association with individuals significant in early aviation (NPS 2010c). The former air terminal at Floyd Bennett Field is currently being used as the Ryan Visitor Center. (Please refer to NPS (2010c) and the "Aviation History" section above for additional information on Floyd Bennett Field Historic District.)

Figure 3-11. Floyd Bennett Field National Register Historic District.



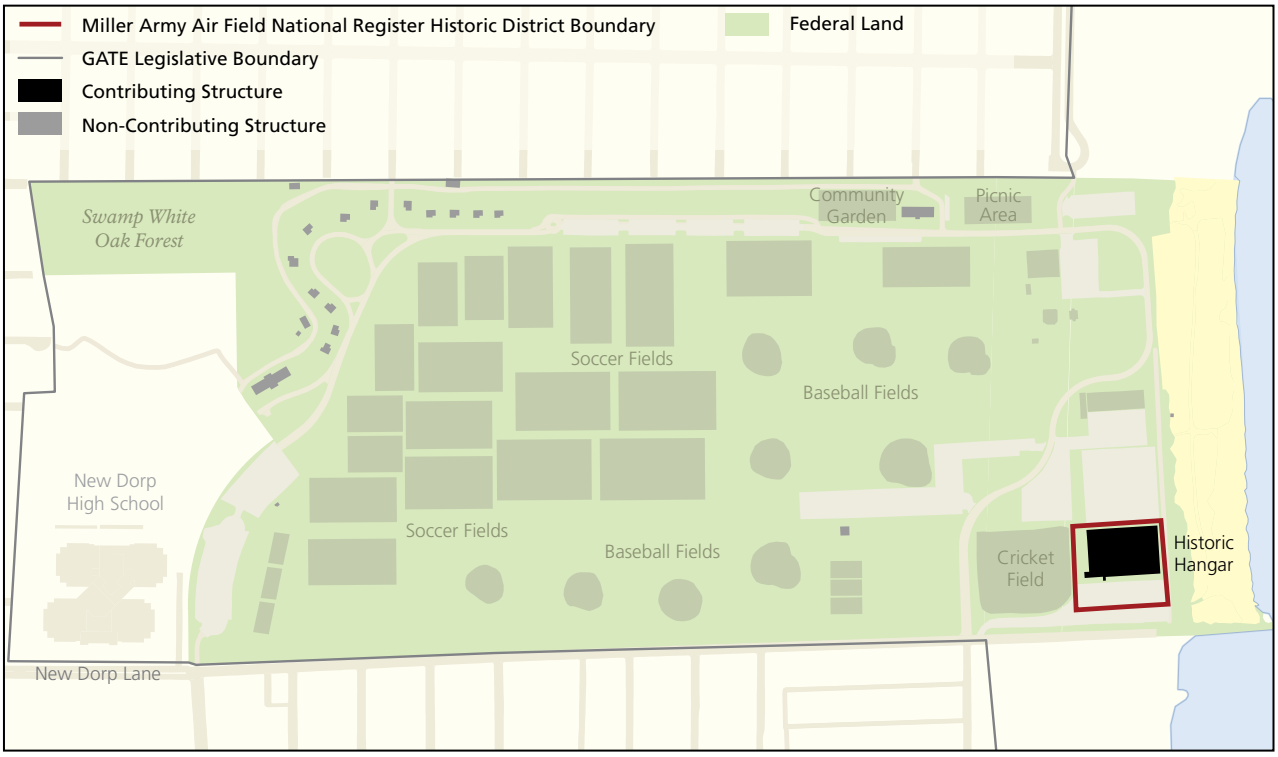
Miller Army Airfield Historic District, Hangar No. 38

Miller Field was established in 1919–1921 as a 180-acre army airfield (figure 3-12). It originally consisted of 38 structures including two double hangars, the most important buildings at the field. The flying field originally encompassed 80 acres, centered on a sod runway running diagonally across the field. When the park acquired the field in 1973, about 24 buildings and structures remained, all in deteriorated condition. The landplane hangar (Building 33) was demolished in 1976 and replaced with paved areas and fenced playfields. Former residential buildings have been renovated for park purposes and do not meet National Register criteria; the runway is no longer distinguishable because of its use as playing field (NPS 1979a). The area nominated was restricted to the double seaplane hangar (Hangar No. 38) and the Elm Tree Light, a total of about 3 acres (NPS 1979a).

Hangar No. 38, constructed in 1920 at Miller Field, is important because of its association with early aviation history (see the "Aviation History" section in this chapter). It was viewed as a part of the Hangar Group of Buildings, which included a variety of support structures (aero repair shop, boiler house, aero storehouse, etc.). It was constructed of a steel frame and stucco walls and consisted of two side-by-side bays. Several additions were made by the Works Progress Administration (WPA) of the Roosevelt administration in 1935–1939. The significance of Hangar No. 38 is its direct association with early aviation history and the history of air coast defenses of New York (NPS 1979a). Hangar No. 38 sustained considerable damage from Hurricane Sandy in 2012 (IMT 2012f).

The Elm Tree Light, an octagonal concrete beacon tower, stands near Hangar No. 38. It was constructed by the Coast Guard in 1939 to replace an earlier tower that served as a mark for sailing vessels in the late 18th century and was abandoned in 1924. The significance of the Elm Tree Light lies in its direct association with the early lighthouse service (NPS 1979a). Miller Field continues to be used by team/league sports teams, bikers, and for self-guided nature tours.

Figure 3-12. Miller Army Airfield National Register Historic District.



Jacob Riis Park Historic District—Bathhouse Pavilion, Central Mall Building

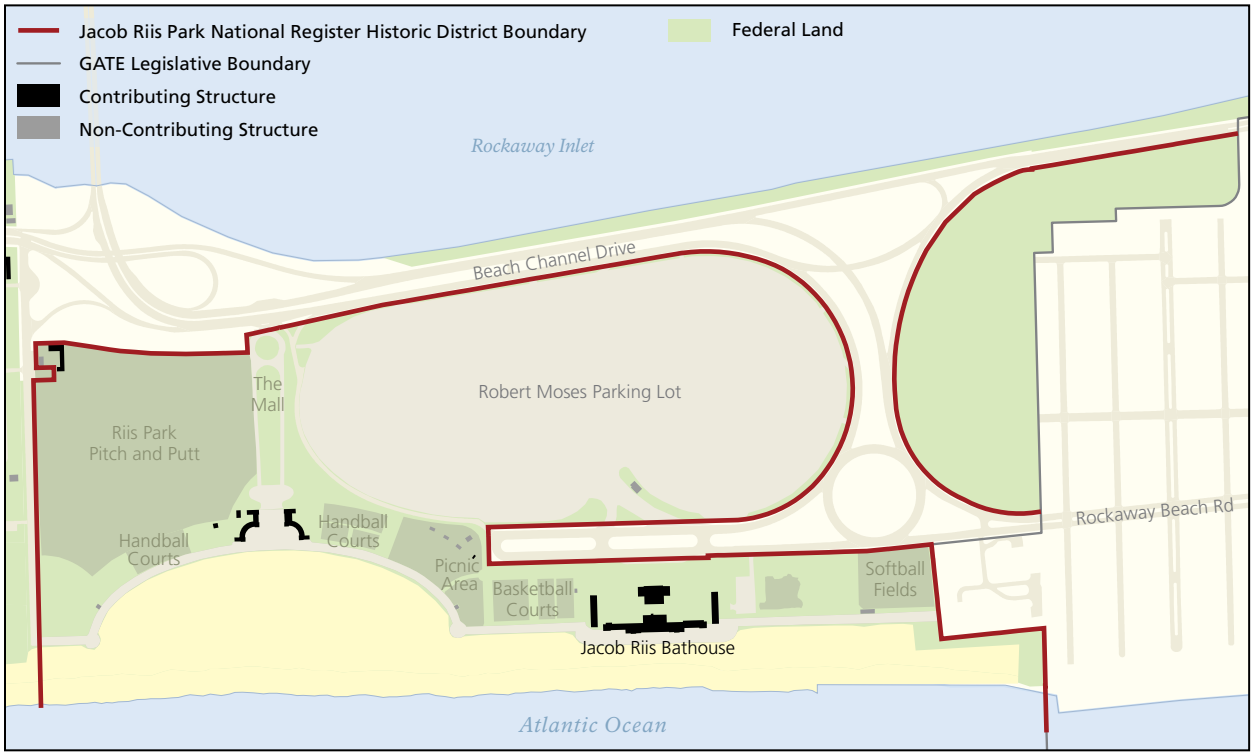
The Jacob Riis Park Historic District, listed in 1981, is considered an "excellent, though greatly deteriorated, example of … municipal recreational planning the 1930s" (Olmsted Center for Landscape Preservation 2002, 2) (figure 3-13). Its historical significance derives from its association with New York City's Commissioner of Parks, Robert Moses, as well as it being a notable work of landscape architecture. The park was completed through the WPA and is associated with this important social and government program (NPS 1979b). The park landscape has lost much of its integrity and has not been well maintained (Olmsted Center for Landscape Preservation 2002). In 2012, Hurricane Sandy resulted in heavy wind and water damage to Jacob Riis Park facilities, including flooding; broken windows; blown out walls, sand deposition in the bathhouse; missing ceramic tiles in the bathhouse; and sand and other debris deposited in structures and across the landscape. The brick courtyard wall was destroyed and heavy erosion is evident along the boardwalk (IMT 2012h).

The 220-acre Jacob Riis Park occupies a mile-long section of the Rockaway Peninsula and provides a variety of recreational activities. The park's three significant recreational buildings were constructed between 1932 and 1937.

The original bathing pavilion—commonly known as the bathhouse—is the dominant feature of the park. The T-shaped, one-story brick masonry structure was completed in 1932. In 1936–37, it was enlarged by a long, two-story addition on the south side of the structure. The entrance to the bathhouse is located on the north wall. The front of the bathhouse is faced with a long arcade supported by pillars and topped with two octagonal turrets (NPS 1979b).

The mall focuses on a crescent-shaped extension of the boardwalk. The twin central mall buildings—constructed of brick and tile masonry—face each other at the southern end of the mall. Constructed in 1936–1937, both are two-story, square buildings, flanked by one-story wings, and connected to a rectangular, single-story wing to the south by a single-story, semicircular wing. Both have flat concrete roofs, concrete cornices, and concrete floors (NPS 1979b).

Figure 3-13. Jacob Riis National Register Historic District.



In addition, a broad promenade plaza adjacent to the original bathhouse was opened in 1932. During an expansion of the original park in 1936–1937, a continuous walkway (the length of the beach) was created, connecting all areas of the park. Both the promenade and boardwalk are considered integral elements of the park and contribute to its historic significance (Lane, Frenchman, and Associates 1992). Another striking feature of the park is the 72-acre parking lot located north of the bathhouse. With a 12,000–14,000 car capacity,



The history of the park's defensive military fortifications and weaponry is manifested in some of the most notable cultural resources in the park.

it was believed to be the largest in the world at that time (NPS 1979b). The parking lot still retains its original integrity and is a contributing element to the district. (Please refer to NPS 1979b; Lane, Frenchman, and Associates 1992; and the Olmsted Center for Landscape Preservation 2002 for greater detail on the Jacob Riis Park Historic District.)

Coastal Defense Support Structures

The history of the park's defensive military fortifications and weaponry is manifested in some of the most notable cultural resources in the park. Places like Fort Wadsworth, Fort Tilden, and Fort Hancock and Sandy Hook Proving Ground, with their associated gun batteries and weaponry, have played critical roles in the history of the country, and particularly in the protection of New York Harbor (refer to discussions about the specific forts). The mission of the forts was to provide support for the soldiers manning the gun batteries. The support that these facilities required to function efficiently cannot be understated and included an important array of services, personnel, and facilities. Often, these forts resembled small towns, including such things as housing, hospitals/medical facilities, bakeries, post exchanges, schools, chapels, theaters, mess halls, transportation facilities, recreation areas, and so on. Many of these support structures still exists today in Gateway. A discussion of a few notable examples follows.

Parade Ground, Fort Tilden

The parade ground at Fort Tilden was built around 1941 with assistance from the WPA. In order to construct it, 11 World War I cantonment buildings were destroyed (NPS 1980b). The parade ground is about 3 acres in size and was designed as the primary ceremonial area at the fort. The WPA placed a steel, 75-foot-high flagpole at the northeast corner of the parade ground near the main fort's entrance; the flagpole was lost during Hurricane Sandy in 2012. The flagpole was set in a cut stone with inscriptions of the installation, organization, and U.S. Army Coast Artillery insignia (NPS 1980b). Plans called for the parade ground to be seeded and landscaped. It was bound by tree-lined roadways and enclosed by structures to the west, north, and south (Selvek 2005). The parade ground contributes to the significance of the Fort Tilden Historic District.

Fort Tilden Wharf Area (Riis Landing), Fort Tilden

The wharf area is located immediately to the northeast of the Fort Tilden post area (figure 3-6). It consists of an area approximately 10 acres in size and was historically considered part of the post. It contained the "main dock, warehouses, maintenance facilities and administration buildings, with rail lines connecting from the main dock through the post area to the fortifications" (Selvek 2005, 2). Although the wharf area contained 19 buildings during the World War II period, only 8 structures remain today, and only pilings remain from the main dock. In the early 2000s, a new ferry dock and parking lot were constructed as part of the Riis Landing redevelopment project. The project included the adjoining complex of buildings once used as the U.S. Coast Guard Station Rockaway (Selvek 2005).

Mont Sec Avenue, Fort Wadsworth

Fort Wadsworth's Mont Sec Avenue was the primary location of officers' housing at Fort Wadsworth from the 1870s to the present day (figure 3-7). The houses consist of ten duplexes and one single-family residence. These houses retain their original form and much of their original detail, both exterior and interior, with the exception of synthetic shingles. One—Mont Sec House—has had its interior restored to its 1890s appearance. One duplex, originally the quarters for the post surgeon and other medical officers, was originally clapboard but is now brick-faced with a mansard roof. Five brick duplexes (Buildings 101, 102, 106, 107, 110) and one residence (Building 115) were constructed by the WPA in the 1930s. Garages behind the houses served the multiple residences (NPS n.d.b).

Fort Wadsworth's Mont Sec Avenue was the primary location of officers' housing at Fort Wadsworth from the 1870s to the present day.

An associated fort street—New York Avenue—runs perpendicular to Mont Sec Avenue and has served as the main street of Fort Wadsworth since the mid-19th century. Although development in the area has dramatically modified the street in the last half of the 20th century, historically important structures that remain today along New York Avenue include the entry gate and gatehouse, the WPA-era former officers' quarters, and the former barracks (NPS n.d.b).

Officers' Row, Fort Hancock, Fort Hancock and Sandy Hook Proving Ground

Eighteen two-and-a-half story structures built along Hartshorne Drive between 1898 and 1899 served as officers' housing at Fort Hancock. Basically identical, all the buildings are constructed of buff-colored brick, chosen because it was less porous than traditional red brick (figure 3-3). The houses are among the most distinctive buildings at Fort Hancock due to the "cohesive architectural ensemble that survives as originally designed" (NPS 2006b, 19). Few alterations have been made to the structures and their surface appearance remains relatively unchanged. Single-car garages were added to some of the houses (Buildings 6–16) in the 1930s. Necessary maintenance has included repairs to leaking roofs, defective flashing, deteriorated brick mortar, faulty gutters/downspouts, decay on wood window sashes/frames, etc. The park manages Building 1 (Officers' Row House #1) as the "History House." Another building (Building 18) is currently used by the American Littoral Society (NPS 1984a; Ehrler, pers. comm. 2013).

Many of the historic structures along Officers' Row experienced damage from Hurricane Sandy in 2012. This included basement flooding and substantial damage to porches, piers, and columns that will require stabilization. Ninety percent of the structures within Fort Hancock need electrical repair, including Officers' Row House #1, "History House" (IMT 2012b). For additional detail, please refer to storm effects discussion above for Fort Hancock and Sandy Hook Proving Ground ("Fundamental Resources").

Other Historic Districts

The Silver Gull Beach Club, the Breezy Point Surf Club, and the Far Rockaway Coast Guard Station have been determined eligible for the National Register by the New York State Historic Preservation Office.

Silver Gull Beach Club Historic District

The Silver Gull Beach Club Historic District is in its original location on the Atlantic Ocean and retains a high degree of integrity in terms of setting, design, materials, workmanship, feeling, and association.

The Silver Gull Beach Club Historic District is located on the Atlantic Ocean shorefront, immediately west of Fort Tilden, on the Rockaway Peninsula. The historic district includes approximately "7.5 acres of relatively flat land that is surrounded on three sides by undeveloped coastal land covered with dense low brush. It is bordered on the south by the Atlantic Ocean, where a wide sandy beach provides uninterrupted vistas to the east and west" (NPS n.d.c, 1).

The district is an oceanfront cabana complex containing a total of 15 contributing (1 site, 7 buildings, 7 structures) and 10 non-contributing (5 buildings and 5 structures) resources. The district's contributing resources include a large clubhouse, 4 court buildings, a pool court, an activity building, recreational facilities, and both paved and unpaved parking areas. The 12,000-square-foot, one-story clubhouse is the central building of the cabana complex. The Silver Gull Beach Club sustained substantial storm damage from Hurricane Sandy in 2012. Cabanas, the pool, and surrounding concrete were destroyed. Large sections of beaches were eroded, large amounts of sand were deposited in parking lots and roads, and buildings within the historic district were damaged (IMT 2012i).

The Silver Gull Beach Club Historic District is in its original location on the Atlantic Ocean and retains a high degree of integrity in terms of setting, design, materials, workmanship, feeling, and association. Only one major alteration—the removal of a set of second-floor cabanas from the clubhouse building—has occurred. "The club continues to serve its original function and it conveys a strong sense of feeling and association as a mid-twentieth-century oceanfront recreational resource" (NPS n.d.c, 5).

The Silver Gull Beach Club is significant at the local level in the areas of entertainment/recreation, social history, community planning and development, and architecture. Its "period of significance is 1962–1963, the years the club was designed, constructed, and opened by its original owner the Atlantic Improvement Corporation" (NPS n.d.c, 8).

Breezy Point Surf Club

The Breezy Point Surf Club is an approximately 60-acre cabana complex in a coastal setting of relatively flat land facing the ocean on the Rockaway Peninsula. The historic district contains 69 contributing buildings, 11 contributing structures, and 1 contributing site; most of these were constructed between 1937 and 1962. The complex has two distinct sections of cabana courts known as the Original Courts and the Ocean Courts, along with several pools and athletic courts. The district reflects a primarily recreational landscape that evolved from 1937 to 1963 in response to increased demand for memberships in the club (NPS n.d.d; IMT 2012i).

The historic district retains a high degree of integrity in terms of its location (original), setting, design, materials, workmanship, feeling, and association. Although routine maintenance has occurred throughout the years, the majority of the original materials are intact and the workmanship of the buildings is still evident. The district retains a strong sense of its feeling and association as a large, recreational oceanfront resort built in the early to mid-19th century (NPS n.d.d). Damage to the Breezy Point Surf Club from Hurricane Sandy in 2012 was not extensive (Ehrler, pers. comm. 2013).

The Breezy Point Surf Club Historic District is eligible for listing in the National Register at the local level in the areas of entertainment/recreation, social history, and architecture. "The period of significance ranges from 1937, when the Club was established, and ends in 1963 when the layout of the cabana complex as it exists today was completed" (NPS n.d.d, 11).

Far Rockaway Coast Guard Station Historic District

The Far Rockaway Coast Guard Station Historic District is located just east of the Fort Tilden wharf area (Fort Tilden Historic District). The Coast Guard facility is considered historically and architecturally significant for its association with the "history of lifesaving services and as a distinctive example of Colonial Revival institutional architecture (NPS 2004e, 3). During the 19th and early 20th centuries, Far Rockaway was the site of numerous marine accidents and shipwrecks. An earlier lifesaving station—established by the New York Life Saving Benevolent Association—operated with volunteers at Far Rockaway as early as 1849 (NPS 2004e). The current station's construction began in 1938 with WPA funds and continued through 1944. The facility was designed with a boat basin, piers, breakwaters, marine railways, and radio communications. Through the years some support facilities have been removed (e.g., boat shop), but the complex is believed to retain substantial integrity of its original construction period (NPS 2004e). In 2012, Hurricane Sandy resulted in moderate damage to the main building, boathouse, garages, and power house (NPS n.d.g).

The Coast Guard facility is considered historically and architecturally significant for its association with the "history of lifesaving services and as a distinctive example of Colonial Revival institutional architecture.

Historic Structures

Historic structures include buildings, bridges, roads, temples, and other manufactured objects that extend the limits of human capability. Structures allow humans to live in harsh climates and in areas far removed from where they work and live (NPS 1998a). Gateway maintains a List of Classified Structures (LCS), a required list identifying historic structures that meet the criteria of the National Register or are elements of resources that do (NPS 1998a). The LCS includes information on the significance of and recommended treatment levels (preservation, restoration, etc.) for each structure. It provides data on all historic structures and their National Register status.

The LCS includes resources that are broadly defined as structures. In addition to buildings, other structures such as dams, mounds, forts, earthworks, etc. are included in this list. For instance, at Gateway, the LCS contains such structures as the Jacob Riis Park boardwalk and promenade, Mont Sec Avenue in Fort Wadsworth, the flagpole at Floyd Bennett Field, and the Elm Tree Light at Miller Field (NPS n.d.e).



Historic structures included in this plan are primarily located within the boundaries of National Register historic districts in the park. These districts include Fort Wadsworth, Fort Tilden, Fort Hancock and Sandy Hook Proving Ground, Floyd Bennett Field, Jacob Riis Park, Miller Field, Silver Gull Beach Club, and Breezy Point Surf Club (see discussions about each of these resources in this section).

The LCS contains 355 structures from these historic districts, with the exception of Silver Gull Beach Club and Breezy Point Surf Club. These two districts have recently been determined eligible for the National Register and the park will likely be adding their contributing structures to the LCS in the near future. Within the park, there are buildings that may be more than 50 years of age which have not been evaluated for NRHP eligibility (Ehrler 2013).

Historic structures encompassed in LCS represent the following historic districts, with examples of building types included:

- Fort Tilden Historic District—Nike Missile installations, Taft-era batteries, post structures
- Jacob Riis Park Historic District—park structures, boardwalk, promenade, parking lot
- Fort Wadsworth Historic District—fort housing, third system and Endicott-era batteries, warehouse, Mont Sec Avenue, torpedo-storage building, seaplane hangar
- Floyd Bennett Field Historic District—hangars, garage/maintenance shop, light beacon, fire pump house, seaplane ramp, runways/taxiways
- Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District—fort housing, bakery, chapel, commissary, mess halls, Sandy Hook Lighthouse and Keeper's Quarters, Spermaceti Cove Life Saving Station, power plant, Endicott/Taft-era batteries, Nike Missile installations
- Miller Army Airfield Historic District—Hangar No. 38, hangar apron, Elm Tree Light

The LCS identifies each structure by name, number, and location. Individual structure summaries include specific data on physical description, historical significance, construction materials, and function and use. Please refer to the Gateway LCS (NPS n.d.e) for additional detail on historic structures identified for the districts above.

The National Register nomination form for Breezy Point Surf Club lists 79 contributing structures, including those related to transportation (roads/parking areas) and recreation (e.g., cabanas, boardwalks and walkways, pools, cabins, showers) (NPS n.d.d). Fifteen contributing structures are listed in the National Register nomination form for the Silver Gull Beach Club, including those related to transportation (roads/parking) and recreation (e.g., clubhouse, pools, cabanas) (NPS n.d.c). (Please refer to the "Historic District" discussions for information on the context of the Gateway historic structures and to the Gateway LCS [NPS n.d.e] for specifics on each structure.)

Archeological Resources

Archeological resources in the park date primarily to later pre-contact (Woodland period) and historical periods (see "Cultural Resource Context for Gateway National Recreation Area"). Cultural manifestations include both surface and subsurface materials. Many of the archeological resources identified in earlier studies can no longer be located (NPS 2009a, 2011a, 2011b, 2011c). This is related to a variety of factors, including inaccuracy of the original recordation, the influence of natural processes (e.g., erosion), and the significant effect of landfilling operations that have occurred throughout the region in the late 19th and 20th centuries.

Pre-Contact Archeological Sites

Most of the recorded pre-contact sites in the park are described as lithic scatters, lithic/ceramic scatters, campsites, or shell middens. Most of these remain undated or are believed to date to the Woodland period. A variety of isolated finds, including a fluted projectile point believed to date to the Paleo-Indian period (NPS 2011a), have also been recovered from park lands. Occasionally, a site will reflect the use of an area during both pre-contact and historical periods (e.g., the VanDeventer-Mouquin site at Fort Wadsworth) (Louis Berger Associates, Inc. 1990; NPS 2011b). The potential for encountering pre-contact archeological resources in the future is dependent on the original sensitivity and later historical use of the area. For greater detail on pre-contact archeological resources and the potential for future discoveries throughout the park, please refer to NPS 2009a, 2011a, 2011b, and 2011c.

Historical Archeological Sites

Certain historical activities tend to leave more substantial structural remains than others (e.g., houses, sheds, foundations, fortifications). Isolated artifacts and light scatters of historical materials may receive less attention. All are considered important clues to historical use of an area and should be used to guide future investigations in the park.

Historical archeological sites recorded in the park include remnants of structures related to residential housing, military activities (forts, etc.), homesteads, and commercial activities; middens/refuse deposits; and transportation rights-of-way. While many are still evident, a considerable number have been destroyed or can no longer be located; in some cases, the area has been filled, covering the site (NPS 2011c). For greater detail on historical archeological resources and the potential for future discoveries throughout the park, please refer to NPS 2009a, NPS 2011a, 2011b, and 2011c.

Investigators speculate that additional archeological resources may be discovered associated with both domestic and military occupations of park lands. For instance, limited archeological materials may remain from 18th and 19th century occupations within the Fort Wadsworth Historic District boundaries. It is believed possible that remnants of shoreline batteries, signaling beacons, and homesteads may exist within specific areas of the district, although their integrity may be compromised (NPS n.d.b). There is also a potential for several significant historical archeological sites within the boundaries of the Miller Army Air Field

Historical archeological sites recorded in the park include remnants of structures related to residential housing, military activities (forts, etc.), homesteads, and commercial activities; middens/refuse deposits; and transportation rights-of-way.

Historic District. For instance, a Dutch settlement—Niealve Dorp, ca. 1600—was located near the present site of the airfield. A country estate on land located within the district boundaries was built in 1843 by William Vanderbilt. In 1936–1937, the Vanderbilt Mansion, water tower, and barns were razed to allow for expansion of the landing field to the west (NPS 1979c).

The potential for the discovery of additional in situ archeological resources in Gateway is influenced by a variety of natural and human factors. These include ancient and historical sea-level fluctuations, erosion and sediment transport due to tidal/wave action, and land filling/land-modification activities in the 19th and 20th centuries. All these factors affect the potential for the discovery of buried archeological resources, and their influence varies by geographic location. Although many natural coastal park areas have been buried beneath deep fill deposits, there are also areas where intact soils and archeological deposits have been recorded. For these reasons, the potential for the identification of intact archeological deposits in the park is strongly dependent on the types and effects of past and ongoing natural and human processes. The potential for discovery of archeological resources in each specific area of the park should be evaluated based on each area's unique set of circumstances.

The potential for submerged cultural resources in the study area includes both pre-contact and historic sites and historical shipwrecks.

Recent and comprehensive archeological assessments that considered the issue of the potential for archeological resources in Gateway included area-specific analyses of the sensitivity for such resources (NPS 2009a, 2011a, 2011b, 2011c). These studies have included consideration of both natural and human impacts on specific park areas, and they have speculated on where the areas of highest potential for archeological resources may be. For instance, in Fort Wadsworth (Staten Island Unit), high-potential areas include pre-contact sites on bluffs within 1,000 feet of the shoreline, 18th century structures, late 19th century batteries, pre-contact sites on bluffs and terraces in the southern and western portions of Fort Wadsworth, and others (NPS 2011b).

The sensitivity for archeological resources located within portions of Breezy Point Tip in the Jamaica Bay Unit stands in contrast to the high-sensitivity areas at Fort Wadsworth. In this second case, the recent formation of the landform and the lack of long-term historical occupation have created a situation in which the potential for archeological resources of any period is very low. The ability to predict to a limited extent the sensitivity of an area for the presence of archeological resources is an outcome of the patterned nature of human behavior. Such predictions have many uses, one of which is their use in project planning.

Submerged Archeological Resources

The potential for submerged cultural resources in the study area includes both pre-contact and historic sites and historical shipwrecks. The identification of the former categories is difficult, at best, and is related to a variety of issues such as the ever-changing beach morphology caused by sediment transport that redeposits and disturbs in situ cultural materials along the coastlines. Changes in sea level through the millennia are also believed to have made larger terrestrial areas available for pre-contact human occupation in the area, much of which is now submerged (Panamerican Consultants 2001). In addition,



significant storm-related coastline alterations (e.g., those caused by Hurricane Sandy) and numerous historical dredging activities in the larger harbor area have disturbed or obliterated resources. That said, the potential for submerged archeological deposits is noted by researchers who report the presence of over 200 artifacts, tentatively identified as ranging from the Early Archaic to Late Woodland periods, recovered along a stretch of beach in Monmouth County, New Jersey. The beach area had been recently renourished by sands dredged from an offshore area east of Sandy Hook and redeposited on the New Jersey beach (Panamerican Consultants 2001, 6).

Prior research indicates that shipwrecks dating to the Colonial period and later are known to occur in the general harbor region, with the potential to exist in waters managed by Gateway (Panamerican Consultants 2001) (see also "Maritime History" under "Historic Context"). For instance, several recent remote-sensing surveys associated with proposed projects around the Sandy Hook Unit and the Fort Wadsworth area have revealed magnetic anomalies indicating the potential for cultural materials of unknown historical significance (NPS 2004a; Panamerican Consultants 2001). A recent survey (PBS&J 2009) within the waters of Jamaica Bay, including waters under the jurisdiction of Gateway, found no significant magnetic anomalies or sonar targets that might indicate the presence of buried/submerged cultural resources. However, the authors provided information on several shipwrecks that are known to be present in waters adjacent to lands managed by the NPS. These include the *Mistletoe*, the *Black Warrior,* the *Ajace*, and the *Cornelia Soule,* all of which sank, burned, or were grounded between 1859 and 1924 (PBS&J 2009, 18). New York State also maintains a list of shipwrecks in Jamaica Bay. These submerged historic resources are also subject to disturbance from weather, development (construction of undersea utility lines, structures, etc.), and dredging activities.

Museum Collections

Gateway manages a variety of museum objects and archival materials that have been collected in the park, as well as some acquired through donations, purchases, and transfers. Museum holdings include significant cultural collections associated with local military, aviation, and maritime history; pre-contact artifacts dating back to the Woodland period; archive and manuscript collections (NPS management records, rare books); and natural history collections (NPS 2011d).

Museum collections at Gateway are currently managed under the Final Collection Management Plan (Collection Management Plan) (NPS 2009b). The Collection Management Plan was drafted prior to the impacts on museum collections resulting from Hurricane Sandy in 2012. Storm damage at Fort Hancock required that collections housed there be salvaged and transferred (ongoing) to storage areas at Fort Wadsworth. Storm-related impacts and concerns mentioned by the Incident Management Team (IMT) after the storm included the continued threats to museum collections posed by lack of climate control and potential flood-related contamination of collections (IMT 2012a). It is assumed that as the impacts of the storm become better defined, further revisions to the Collection Management Plan may be necessary. Despite the considerable effect of consolidating collections into one facility at Fort Wadsworth, in many other regards the Collection Management Plan represents the

most current information on existing conditions related to Gateway's museum collection planning and management. The majority of the following information is gathered from the Collection Management Plan.

As of 2012, the park had 1,953 accessions and an estimated 661,786 objects in the museum collection. Of these, 195,760 objects are cataloged.

In addition, the Scope of Collection Statement guides the management of museum collections at Gateway by defining the scope of "present and future museum collection holdings … that contribute directly to the understanding and interpretation of the park's purpose, themes, and resources" (NPS 2011d, 4). The Scope of Collection Statement is used extensively to assist the park in efforts such as historical military structure restoration and the interpretation of park resources for the public (NPS 2011d). Most of the park's museum collection objects have been acquired through donations, field collections, transfers, and purchases. As of 2012, the park had 1,953 accessions and an estimated 661,786 objects in the museum collection. Of these, 195,760 objects are cataloged.

The Gateway museum collections represent the history and significance of important cultural resources in the park. The park manages collections associated with the following significant resources: Fort Hancock and Sandy Hook Proving Ground (Sandy Hook Lighthouse, Spermaceti Cove Life Saving Station), Fort Wadsworth, Miller Field, Great Kills Park, Jacob Riis Park, Fort Tilden, Floyd Bennett Field, Jamaica Bay Wildlife Refuge, the Breezy Point Tip, and other areas of the park (NPS 1981a, 2011d). Such collections include site-associated objects (e.g., ordnance, furnishings, weapons, coins), uniforms, aircraft, and large weapons. Significant archival collections include, among other things, materials donated by veterans who served at the various park sites, both civilian and military. Significant archeological collections include objects related to Fort Hancock and Sandy Hook Proving Ground (e.g., munitions, ordnance), Fort Wadsworth (objects related to past military/community life at the fort), and Miller Field.

The natural resource collection is divided into three disciplines: biology, geology, and paleontology. The purpose of the collection is "to support scientific research, resource management, and education; provide baseline data of park natural resources; document changes these resources are undergoing because of internal park conditions and external effects; provide a database for researchers concerned with resource use by the park's pre-contact occupants; preserve important or locally significant species collected in response to specific research or interpretive needs; to guarantee the protection of specimens whose in-situ preservation cannot be assured" (NPS 2011d, 10).

Gateway's museum collection began in 1968 at Fort Hancock (Fort Hancock and Sandy Hook Proving Ground) and became the focus of the Sandy Hook Unit collection when the U.S. Army transferred the fort to the NPS in 1972. Fort Hancock remained the main storage location for the park's collection of objects, archives, archeological collections, and other items. In 1995, the NPS gained possession of Fort Wadsworth (Staten Island), where additional collections were then housed. Prior to being stored at Fort Wadsworth, collections were also stored at Floyd Bennett Field. Before Hurricane Sandy hit the area in 2012, collections at Fort Hancock were curated in three storage locations (Buildings 32, 47, 125), whereas Fort Wadsworth used two locations (Building 210 basement and Building

210 first-floor storage). None of these storage locations was considered large enough to accommodate the current museum collection and its potential growth, and none was used solely for the storage of museum objects (NPS 2009b, 86).

When Hurricane Sandy hit the New Jersey/New York coastline in the fall of 2012, its impact (storm surge, wind, etc.) seriously jeopardized the collections at Fort Hancock. The Sandy Hook Unit of the park sustained considerable storm damage and the most sensitive collection materials were salvaged from Fort Hancock and taken to Fort Wadsworth to ensure their preservation. Collections at both Fort Wadsworth and Floyd Bennett Field were not seriously impacted by the storm. It is tentatively planned for rest of the Fort Hancock collections to be moved to Fort Wadsworth permanently (Mahan, pers. comm. 2013a). New challenges for appropriate storage space exist today with the recent consolidation of these materials.

The Gateway museum collections are purposefully "evaluated for their contributing value to the park's resources based on the park's enabling legislation, the park's mission statement, the sites' National Register documentation, and established themes developed in park planning documents such as the Long-range Interpretive Plan" (NPS 2009b, 14; 2004b). The primary themes identified in the Long-range Interpretive Plan and included in the Collection Management Plan (NPS 2009b) include the following:

- The Wonders, Dynamics, and Challenges of an Urban Estuary
- Fighters, Falcons, Monarchs, and Missiles: A Heritage of Flight
- From Colonial Outpost to World Power: The Changing Nature of National Defense
- Immigrants to Presidents: Symbols and Stories of the American Odyssey
- Shaping the Modern World: Innovations in Health, Recreation, and Transportation

The Gateway museum collections are purposefully "evaluated for their contributing value to the park's resources based on the park's enabling legislation, the park's mission statement, the sites' National Register documentation, and established themes developed in park planning documents such as the Long-range Interpretive Plan."

In the Collection Management Plan, the park staff has examined a variety of issues important to the adequate preservation of museum collections. Summaries of existing conditions related to specific issues and upon which recommendations are presented in the Collection Management Plan, are summarized below. Please see NPS 2009b for detailed recommendations addressing each issue.

Scope of Collection Statement. Use new Scope of Collection Statement guidelines and periods of significance as filters for accepting new collections; deaccession collections that fall outside of the Scope of Collection Statement or that were accessioned in error; and work with the Resource Management Division to establish and maintain collections related to each unit of the park.

Museum Records. Among other things, address staff training, standardization of cataloging protocols, and resolution of existing problems related to artifact cataloging and descriptions.

Use of and Access to Collection. Research and registration forms are being successfully used to access collection storage areas. Expand use of all NPS researcher registration forms and establish a dedicated research space for museum collections. Improve accessibility of

resource management records for researchers. Accessioning and processing of archival collections currently in curatorial custody should be accomplished under the guidance of a professional archivist.

Archives and Manuscript Collections. Establish a clear direction for management of park archives and manuscript collections. Archival materials not cataloged into the museum collection are constantly at risk. Use cataloging methods that will clarify contextual information, how items are associated, why they are significant for the park, and why/how they came to be curated by the park. The addition of a professional archivist would aid in conducting an overdue appraisal with the National Archives and Records Administration to ensure that NPS and other agency records can be examined holistically by provenance.

Archeology Collections. Duplication of archeological records has occurred in some instances but the overall effort to accession and document these materials has improved. The collections can continue to enhance the quality of museum exhibits and educational and interpretive programs. A complete survey of these materials is greatly needed to identify museum-quality objects. Attaching photographs to their electronic catalog records will make these materials more accessible to staff and researchers. Additional cataloging and rehousing of the collection is necessary to improve the current storage conditions and at the same time, a survey can be completed.

Collection Storage. The NPS Service-wide Storage Plan (2006c) recommends upgrading the existing facilities at Fort Wadsworth to improve climate control and to consider as an option for infrequently used collections from other area parks. Portions of the summary of this issue as presented in the Service-wide Storage Plan and the Collection Management Plan are outdated because the description of the Fort Hancock storage areas has changed so dramatically. The damage to Fort Hancock caused by Hurricane Sandy required some sensitive collections housed there to be moved (ongoing) to Fort Wadsworth on Staten Island, and the park currently plans to house all collections there for the foreseeable future (Mahan, pers. comm. 2013a). It is also expected that the recommendations for collection storage at Fort Wadsworth will be revised due to the transfer of collections from Fort Hancock. Both plans ultimately suggest the need to work within the ongoing general management plan effort to identify and evaluate feasible long-term alternatives that address the need to consolidate the Gateway collections.

Exhibits. The preservation focus is on the exhibition of textiles and paper-based objects; the substitution of high-quality color photographs for paper-based objects, when appropriate; the rotation of textile items on exhibit for more than six months; the monitoring of objects; and the maintenance of a list of all exhibit items on a biannual basis.

Curatorial Staff. Several positions need to be created in the Resource Management Division to improve the curatorial program and records management. In addition, there is a need for training designed to improve the quality of the program. Park management should provide overall guidance and ensure that funding and resources are prioritized appropriately.

Funding and Programming. NPS-wide programs maintain a five-year funding cycle; it is important that Gateway projects be submitted and programmed to these multi-year lists. The park should improve the updating and revising of the Annual Checklist Program to reflect existing conditions for museum collections. Additional staffing is a critical need.

Visitor Use and Experience

Spanning three New York City boroughs and the northernmost portion of the New Jersey shore, Gateway's park lands stand in sharp contrast to the nearby metropolitan area and offer abundant opportunities for residents and visitors to recreate and experience nature and historic settings. Natural areas; water, beaches, and coastal views; historic coastal defense and maritime structures; diverse recreation opportunities; and educational and interpretive programming combine to create rich and varied visitor experiences at Gateway.

The Gateway lands and waters serve many millions of visitors a year, making Gateway an important urban park environment on the East Coast and in the New York and New Jersey Metropolitan area.

Visitor Use and Characteristics

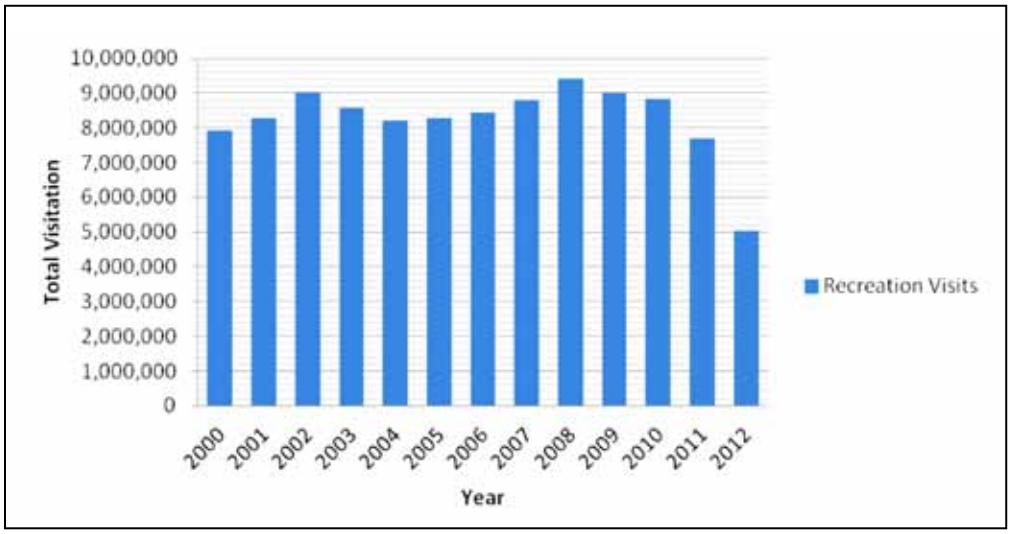
To inform the general management planning effort for Gateway, in 2009 the NPS commissioned Pennsylvania State University's Department of Recreation, Park, and Tourism Management to synthesize findings from past visitor studies and analyze areawide demographics characteristics and projected trends (Mowen, Graefe, and Graefe 2009). Relevant visitor characteristics from the Pennsylvania State University synthesis are summarized in this section (see the "Visitation Patterns" section in this chapter) along with park visitation statistics reported on the NPS Integrated Resource Management Applications portal (NPS 2013c, 2013d).

The Gateway lands and waters serve many millions of visitors a year, making Gateway an important urban park environment on the East Coast and in the New York and New Jersey Metropolitan area. Encompassing 27,025 acres of land and water in New York City and New Jersey, the three units of Gateway form an expansive public green space for both the local urban population and tourists to enjoy.

In 1974, the first year that the park reported visitation, Gateway had over 3.8 million visitors. Substantial increases and a few intermittent decreases have occurred since then, but annual visitation has remained around 9 million total visitors over the last 10 years (NPS 2013c) (figure 3-14 on next page).

Gateway recreation visitation typically ranks it within the top five parks in the national park system (NPS 2013c). Many of the sites in Gateway are in the "backyard" of New York City and New Jersey residents, who use the park lands for recreation and exercise. At most park sites, people from the local area account for the majority of visitors. A review over the last five years indicates that visitor use levels peak in the summer months, decrease in the fall, and are lowest in the winter and spring.

Figure 3-14. Gateway Recreation Visitation by Year (2000-2012).

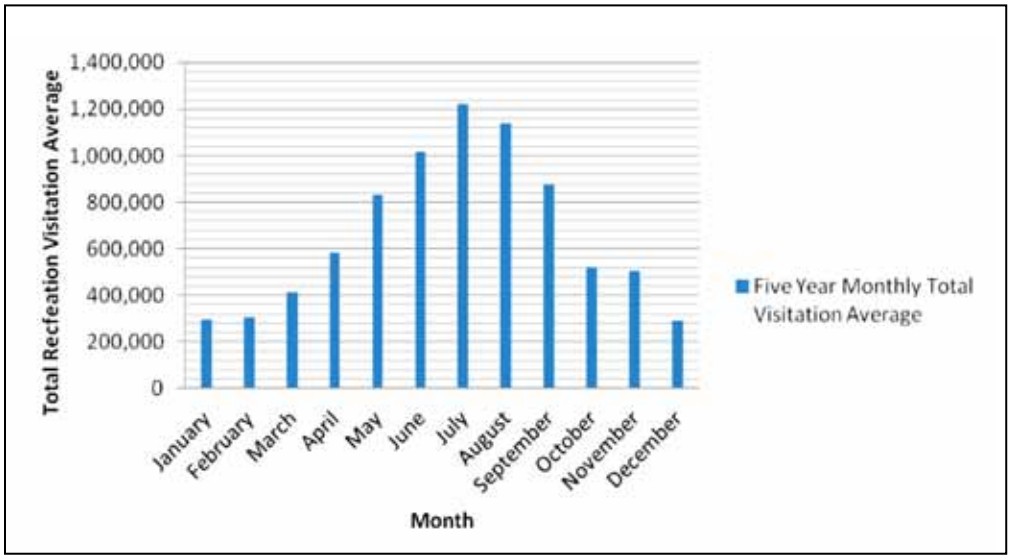


Source: NPS Public Use Statistics Office.

Note: Storms impact visitation numbers. Hurricane Irene in 2011 impacted visitation, and Hurricane Sandy in 2012 caused the park to close for just over two months.

The weather patterns along the northeastern seaboard are the largest influence on these demand fluctuations because visitor demand is tied to outdoor recreation activities (NPS 2013d) (see figures 3-14 and 3-15). This seasonal visitation pattern is reflected in the highest beach use occurring in the summer through early fall. Interpretive and Education and Visitor Services park staff focus on the pulses of school group programming, which typically occur in the spring and fall, with youth group visitation in summer. In addition, at the Jamaica Bay Wildlife Refuge, the spring and fall bird migrations typically result in visitation increases.

Figure 3-15. Gateway Recreation Visitation By Month (2008-2012) Five-Year Average.



Source: NPS Public Use Statistics Office

Annual Visitation

Since 2000, annual recreation visitation has fluctuated between 5 and 9.4 million, typically hovering between 7.7 and 9.4 million (figure 3-14). Recreation visitation has been selected as the more appropriate element to measure since it relates to individuals visiting the park for the purpose of recreation visits. Non-recreation visitation includes suppliers and vendors traveling in and out of the park for non-recreation purposes. Visitation in 2012 was only 5 million because of park closures (November 2012–December 2012) due to Hurricane Sandy that resulted in unusually low visitation in the last quarter of the year. For example, in December 2012, total visits were down 96 percent from December 2011; annual park visitor numbers were down 40 percent from 2011 totals. Additionally, in 2011 Hurricane Irene impacted visitation levels. Subtracting the 2012 visitor numbers, annual visitation since 2000 has averaged 8.5 million. Interestingly, in the park's early years of establishment between 1975 and 1986, annual visitation averaged 8.9 million, so no substantial change in annual visitation has occurred over the course of the park's 38 years (NPS 2013c).

Seasonal Visitation

Summer is when the most people visit Gateway, with July and August typically being the park's busiest months. The spring and fall also see high visitation, and then numbers begin to taper off in November through February, with the quietest time during January (NPS 2013d).

Visitation Patterns

The last parkwide visitor study conducted at Gateway was the *Gateway National Recreation Area General User Study* administered by the NPS Cooperative Park Studies Unit in 1991 (NPS 1991). Although efforts were made to survey visitors across all three park units, a majority of survey respondents were from the Sandy Hook Unit (59 percent), Great Kills (20 percent), and Jacob Riis Park (16 percent). Thus, overall study findings should be considered with this setting bias in mind. The 1991 survey revealed the following characteristics of the Gateway user:

- The average age was 43.7 years, with 46 percent under 30 years old.
- Most visitors were in larger groups, with an average of 5.9 people per group.
- Only 17 percent visited these Gateway units alone.
- Over the past 12 months, 36 percent visited 10 or more times and 25 percent visited only 2 to 4 times.
- Approximately 60 percent of respondents visited for two to five hours and were more likely to report visiting with family (39 percent) than with friends, friends/family, or alone.

The 2003 *Floyd Bennett Field Visitor Study* revealed additional information on the patterns and characteristics of Gateway visitors (NPS 2003a). Although study results and the visitation patterns they reveal are specific to Floyd Bennett Field, it is worth noting that the study's findings are consistent with future projections identified in the NPS Northeast Region's visitation trends report (Godbey et al. 2001).

The *Floyd Bennett Field Visitor Study* assessed race/ethnicity and found that a majority of visitors were White (82 percent), but a sizable minority was African-American (15 percent) or Hispanic (9 percent). The study showed frequent visitation to Floyd Bennett Field, with 47 percent visiting 21 or more times in the past 12 months and 53 percent reporting that they visit once a week. Visitors tended to arrive at midday (68 percent). A majority (56 percent) stayed four or more hours during their visit and visited in small groups of one to two people (72 percent). Floyd Bennett Field was more likely to attract single visitors or groups composed of friends only (versus friends/family, family) (NPS 2003a).

In 2007, the National Parks Conservation Association (NPCA) commissioned an online poll of New York City residents' awareness of, use of, and attitudes toward Gateway. This poll was conducted by Zogby International, Inc. (Zogby) and targeted a broad sample of New Yorkers who were both park users and nonusers. The NPCA/Zogby study revealed that nearly half (47 percent) of New York City area residents were unaware of Gateway, and 39 percent had never visited the park. Forty-four percent of New York City area residents who had visited Gateway evaluated the park facilities as below average in comparison to other national parks, particularly regarding restrooms, beaches, historic buildings, and trails (NPCA 2007d). When asked why they rated Gateway lower, respondents commonly noted dirty water, limited recreation opportunities, poor beaches, dirty bathrooms, poor facility conditions, and overcrowding. This poll also found that a majority of respondents (63 percent) believed that Congress and the Administration should increase the federal budget to benefit Gateway and agreed that both the city and state should also help fund restoration efforts at Gateway (53 percent) (NPCA 2007d).

The Pennsylvania State University research team used data from this online poll to create a general picture of both Gateway user and nonuser characteristics. The Pennsylvania State University research team compared socio-demographic characteristics of poll respondents who said that they had recently visited Gateway ("Recent User"—less than five years ago), had visited Gateway a long time ago ("Lost User"—more than five years ago), and who had never visited Gateway ("Never User"). Results of this analysis revealed that Gateway Never Users were more likely to be younger (18 to 29 years) (table 3-7). This finding is consistent with the general observations made at the Gateway staff workshops. At the same time, however, the 50- to 64-year-old baby boomer respondents were more likely than other age groups to have visited Gateway more than five years ago (Lost Users) (Mowen, Graefe, and Graefe 2009).

User comparisons also revealed that females were much more likely than males to be Never Users, whereas males were much more likely than females to be Recent Users (table 3-7). Low-income households (under $35,000 annually) were more likely to be Never Users, whereas middle- and higher-income households were more likely to be Recent Users (table 3-7). Finally, African-Americans were more likely than other race/ethnic groups to be Gateway Never Users, Asians were more likely than other race/ethnic groups to be Recent Users, and respondents from the Other race category were least likely to be Recent Users. These results indicate that strategies to attract and appeal to females, African-American residents, younger adults, and low-income people should continue and expand if Gateway is to be relevant to future New Yorkers (Mowen, Graefe, and Graefe 2009).

Table 3-7. Demographic Comparison of Gateway Never, Recent, and Lost Users.

Demographic Characteristic	Never Visited (Never Users)	Visited More than 5 Years Ago (Recent Users)	Visited within the Last 5 Years (Lost Users)
Age Group			
18–29	55.5%	5.8%	38.7%
30–49	43.0%	19.7%	37.3%
50–64	33.9%	30.0%	36.2%
65+	38.2%	31.4%	30.4%
Sex			
Male	33.0%	23.4%	43.7%
Female	47.6%	24.1%	28.3%
Household Income			
$0–$34,999	61.0%	24.0%	15.0%
$35,000–$74,999	45.4%	18.9%	35.8%
$75,000 or Greater	33.1%	28.1%	38.8%
Race/Ethnicity			
White	39.5%	23.5%	37.0%
Hispanic/Latino	39.4%	33.0%	30.3%
African-American	48.2%	24.1%	27.7%
Asian	42.9%	0.0%	57.0%
Other	44.1%	35.3%	20.6%

Source: NPCA 2007d.

Visitor Experience and Recreation

Gateway offers a wide array of recreational opportunities and programming throughout the year. Interpretive and recreational offerings range from ecology walks and kayak lessons to history tours and urban camping. The park's trails and natural areas invite self-guided exploration and discovery of the habitats and historic resources, whereas the Gateway beaches present opportunities for relaxation and retreat from the more congested urban environs that surround the park. Finally, the park's athletic fields, picnic facilities, and playgrounds provide community-based recreation opportunities and attract neighboring residents into the park.

From their 2009 synthesis of visitor survey data, the Pennsylvania State University research team found that the most popular recreational activities at Gateway were swimming, picnicking, fishing, bicycling, sunbathing, walking/hiking, gardening, birding, and visiting historic sites. Activity trends identified by Gateway staff are increases in walking (including dog walking), bicycling, fishing (including net fishing), and special events, and decreases in sunbathing (Mowen, Graefe, and Graefe 2009). Recreational activities that were frequently cited as "favorites" during public scoping included boating, fishing, kayaking, biking, swimming, hiking, birdwatching, canoeing, crabbing, exploring, wind surfing, scuba diving,





historic ship viewing, and sightseeing (NPS 2012b). Introduced in all three units in the summer of 2011, camping is also emerging as an increasingly popular park recreational use.

The visitor survey cards collected during 2006 to 2008 by each unit showed that overall, the highest satisfaction lies with recreational services (such as learning about nature, history, or culture; outdoor recreation; and sightseeing), at 85 percent, followed by visitor services (such as assistance from park employees, park maps/brochures, and ranger programs), at 79 percent (Mowen, Graefe, and Graefe 2009). The survey also showed that 75 percent of respondents were satisfied with facilities (such as visitor centers, restrooms, walkways/trails, and campground/picnic areas).

The multiple types of recreation opportunities and visitor experiences available at Gateway are described below.

Trails and Opportunities for Exploration, Adventure, Discovery, and Solitude

Trails are a significant part of the park and offer many recreation opportunities. Trails open up Gateway park lands for recreational use and facilitate the exploration and enjoyment of the park's natural habitats, coastal defense resources, and maritime resources. Approximately 33 miles of official NPS trails at Gateway, which range from paved surfaces to single-track paths, provide walker and hiker access to and through the park's developed and natural areas. With little elevation change, most trails are easy to moderate in terrain and from 0.1 mile to 6 miles in length. Although some trails are heavily used and traverse developed areas, others provide backcountry-like experiences where visitors venture into relatively remote areas and encounter few if any developed facilities. Portions of Gateway's trails are open to bicycles, including the 6.1 miles of multi-use paths at Sandy Hook.

Water-based Recreation

With all its park lands bordering a water body and two-thirds of the park's 27,025-acre area covered in water (17,500 acres), Gateway offers an abundance of water-based recreation opportunities, including fishing, scuba diving, boating, swimming, surfing, and wind sports such as kite boarding, sailing, and windsurfing. Nearly every park site in Gateway provides fishing access. Additionally, there are many hand-launch sites for kayaks, canoes, and other small non-motorized watercraft. Water-based recreation programming includes seining programs, canoe and kayak tours, boat tours, and sailing classes.

Beaches

Beaches play an important role in recreational activities for visitors in the park. Guarded swim beaches at Sandy Hook, Great Kills Park, Jacob Riis Park, and the Breezy Point Surf and Silver Gull Beach Clubs provide places for visitors to walk, jog, sunbathe, picnic, surf, and swim. Visitation to these beaches is highly weather dependent, with the heaviest use occurring during the summer months. Unguarded beaches at Fort Wadsworth, Miller Field,

Fort Tilden, Breezy Point Tip, and Plumb Beach offer a more natural visitor experience and provide opportunities for fishing, wind sports, beach walks, surfing, and nature study.

Marinas

Gateway has two marinas, both of which are concession-run recreation facilities: Nichols Marina in Great Kills Harbor at Great Kills Park and Gateway Marina in Dead Horse Bay at Floyd Bennett Field. The Nichols Marina was extensively damaged by Hurricane Sandy, but the NPS has committed to reconstructing a marina at Great Kills Park. Both marinas accommodate motorized and non-motorized watercraft and offer dockage as well as boat storage. Overnight stays at the marinas are prohibited.

The Rockaway Yacht Club on the inlet side of Fort Tilden is currently operated under a lease and is not open to public recreation.

Camping

In 2011, camping opportunities were expanded across the park, and camping is now offered as an overnight recreational use in all three park units. With only 87 campsites parkwide, camping opportunities at Gateway are limited compared to camping at more distant and remote national parks. However, the opportunity Gateway affords to camp in the New York City metropolitan area is a unique recreation experience.

Three varieties of camping experiences are offered at Floyd Bennett Field and include programmatic camping at Ecology Village, walk-in tent camping at Goldenrod and Tamarack Campground (40 sites), and recreational vehicle (RV) camping at an RV park (20 sites). On Sandy Hook and Staten Island, walk-in tent camping is offered at Camp Gateway (20 sites, on Sandy Hook) and Camp Hudson (7 sites, on Staten Island). Walk-in campsites typically include a picnic table, grill, and fire ring.

Because Fort Wadsworth's Camp Hudson opened on July 6, 2011, approximately half the campsites were occupied during the week throughout July 2011. Weekends were completely booked, as was the entire month of August. Although more than half the visitors to Camp Hudson are local, the small site has attracted visitors from all corners of the globe, thanks in part to Reserve America (a free iPhone application) and to Frommer's travel guide, *NYC Free & Dirt Cheap* (NPS 2012a).

Picnicking

Visitors enjoy opportunities for picnicking at designated picnic sites in Gateway parks. Group picnic facilities are offered at Guardian Park at Sandy Hook, Miller Field, Jamaica Bay Wildlife Refuge, Frank Charles Memorial Park, Canarsie Pier, Fort Tilden, and Jacob Riis Park.

Additionally, picnicking on the beaches is common during the summer months.

Community Gardening

Community gardening is a current recreation use at Miller Field, Fort Tilden, and Floyd Bennett Field. Each park unit has a community garden with several plots. The community garden at Floyd Bennett Field is very large, at 7.5 acres, whereas the 2-acre garden at Miller Field hosts 100 plots and the garden at Fort Tilden is only 0.5 acre.

Concession-operated Recreation

Several concession-run recreation facilities operate in the park. These include two beach clubs on the Rockaway Peninsula, the Riis Park Pitch-n-Putt at Jacob Riis Park, and the Aviator Sports Complex and driving range at Floyd Bennett Field. As mentioned earlier, Gateway's two marinas are also operated by concessioners.

Equestrian Use

Bergen Beach is distinguished as the only area in the park that offers equestrian use. Operated by a concession, the Jamaica Bay Riding Academy at Bergen Beach features an arena and stables as well as trails. People currently board horses at Bergen Beach (approximately 100 horses) and there is limited equestrian programming.



Athletic Fields and Community-based Recreation

Both the Staten Island and Jamaica Bay Units contain parks with athletic fields, courts, and playgrounds that support a substantial amount of community-based recreation such as sports leagues and tournaments. Community-based recreation is a popular recreational use, and during public scoping many people showed support for continuing organized sports leagues and for community groups using park buildings.

The major athletic field complex at Gateway is at Miller Field. With over 30 playing fields, the park sees intensive community use and can attract 10,000 to 15,000 young people over a weekend. Smaller field complexes and court facilities (including paddle tennis, basketball, handball, and shuffleboard) are in Frank Charles Memorial Park, Hamilton Beach Park, and Jacob Riis Park. Traditional playground equipment can be found at Canarsie Pier, Miller Field, Great Kills Park, and Jacob Riis Park.

The Great Kills Park community-based recreation facilities have been closed since 2010 because of the discovery of radium and ongoing cleanup efforts. (For more about the Great Kills Park closure, see the "Health and Safety" section in this chapter.)

At Fort Tilden, the Rockaway Little League leases a clubhouse and land (five ball fields and one multipurpose field) at Fort Tilden to conduct Little League activities. Community groups also use buildings at Fort Tilden to host community activities and art programming. Additionally, there are rugby and soccer fields at Fort Tilden that are used by the public.

Opportunities for Visitors with Disabilities

The NPS is committed to implementing all practicable efforts to make NPS facilities, programs, and services accessible and usable by all people, including those with disabilities. Accordingly, most administrative offices and visitor contact stations; some trails, campgrounds, and fishing access; and most interpretive and visitor service facilities are accessible. Recreation facilities in undeveloped areas, outside the immediate influence of buildings and roads, have typically not been modified to be universally accessible.

Use Permits and Reservations

Although Gateway does not have an entrance fee, many of the recreation uses require permits. Fishing parking permits are required for some fishing sites in the Staten Island and Jamaica Bay Units and for all-night fishing on Sandy Hook. A fee of $50 is collected for each fishing parking permit issued. These fees are used to offset the costs of administering the permitting program. The permit is valid for the calendar year in which it is issued. Additionally, there are beach parking fees at Jacob Riis Park and Sandy Hook.

Special-use permits are required by the NPS for several other recreation activities in addition to fishing, including the following: parking (beach, surfing, off-road, nature study, and archery), public camping, youth group camping and programs, overlook, picnics, ceremonies, athletic fields, gardens, facility, special events, after-hours park access, filming, photography, and other activities.

Visual Quality: Scenic Natural and Historic Settings

Nature study / wildlife observation and discovering historic sites are two recreation opportunities at Gateway that are associated with the park's scenic qualities.

The open, natural spaces and historic settings preserved in Gateway are a dramatic contrast to the surrounding city environment and provide an attractive location for the park's many recreational uses. During scoping for this plan, the public expressed appreciation for the scenic qualities of the park and the quiet and solitude that they offer. The importance of maintaining access to the park's diversity of natural landscapes and preserving the opportunity to experience nature and view wildlife and native plants was also noted.



Nature Study

Wildlife observation is a prevalent recreation activity for visitors in all three units, with the most popular wildlife observation or nature study activity being birding. Opportunities for watching wildlife and taking in natural scenes are available throughout the park from trails, blinds, park roads, and the water. Urban naturalists and birders seek diverse habitat in the park to maximize the number of species seen, typically looking for places that offer access to different ecosystems. In particular, the Jamaica Bay Wildlife Refuge and Sandy Hook are the most popular destinations for naturalists and birders. Jamaica Bay is an international destination for birders. Jamaica Bay Wildlife Refuge, Sandy Hook, Floyd Bennett Field, and Fort Tilden include trails through natural areas and viewing blinds or other observation facilities that help facilitate and encourage nature study.



Discovering Historic Sites

Learning about the area's history is also an important part of the Gateway visitor experience tied to the park's scenic and preserved historic settings. Cultural resource–based recreation opportunities include self-guided exploration and discovery of forts and batteries along trails as well as the guided tours and programming.

The opportunities to "discover" historic structures and view signs of military and maritime history enrich the visitor experience at several Gateway park sites. At Fort Wadsworth, Fort Tilden, and Sandy Hook, for example, visitors can follow a trail from the more popular areas of the park into the backcountry and find themselves alone in the presence of impressive batteries and fortifications. Some of the more visible and prominent structures, such as Battery Weed and Fort Tompkins, are interpreted on site with signs and overlooks, whereas others, like Battery Harris East and Battery Kessler at Fort Tilden, have no interpretive signs and therefore carry a bit of mystique to the visitor trying to determine their role in defending New York City.

Night Skies

Section 4.10 of NPS Management Policies 2006 (NPS 2006a) recognizes that the natural lightscapes of parks are a natural resource and value that exist in the absence of human-caused light. As such, the NPS is directed to preserve this resource and value to the greatest extent possible. The natural lightscape of a park plays a role in natural resource processes and affects biological behavior, as well as being a feature that contributes to the visitor experience. Viewing of the night sky is an important aspect of visitor experience in Gateway and "darkness and night sky" is recognized in this GMP/EIS as one of the park's fundamental values.

Given its context in the New York City metropolitan area, the park's night sky visibility is affected by light pollution from the urban environment throughout the park; however, the light pollution is dissipated in the more remote reaches of the park. For example, Sandy Hook night skies are less impacted by human-caused light sources than those of the Staten Island and Jamaica Bay Units due to Sandy Hook being more distant from New York City and urban development.

While completely natural night skies are not obtainable given the surrounding urban environment of New York City, many of Gateway's park sites do offer relatively dark night skies, where the overnight or evening visitor can experience night skies in a natural setting with only dim and distant artificial lights. In the interior and/or more remote sections of the following park lands, artificial light sources do not impair night sky viewing opportunities: Sandy Hook, Great Kills Park, Breezy Point Tip, Fort Tilden, Jamaica Bay Wildlife Refuge, Bergen Beach, and Floyd Bennett Field. Currently, astronomy programs that draw audiences to appreciate the park's night sky are incorporated into programming at Floyd Bennett Field's Ecology Village and at Great Kills Park.

Sources of artificial lighting in the developed areas of the park that intrude into the natural lightscapes include but are not limited to lit building entrances, operations and maintenance structures, parking lots and pathways lit as necessary to meet safety requirements, the lighthouse at Sandy Hook, night lighting at the Riis Park Pitch-n-Putt course, and lights at the Great Kills and Gateway marinas. Where possible, the park does use dark-sky-compliant lighting.

Soundscapes

The NPS mission addresses the protection and enhancement of acoustical environments and soundscapes. A soundscape can be defined as the human perception of acoustic resources (i.e., physical sound sources). The acoustical environment is the combination of all the acoustic resources within a given area. This includes natural sounds and cultural sounds, as well as non-natural human-caused sounds. Gateway's fundamental values include "Feelings associated with open space in a high-density area" and "Direct sensory experience with natural elements," both of which are affected by the acoustical environment (NPS 2012b). In an urban environment like Gateway, the acoustical environment and soundscapes fluctuate with the numbers of visitors who introduce human-caused sounds into the environment and with surrounding land uses.

The soundscapes of Gateway park lands, especially on their coastal edges and in their interiors, are less noisy than the park's urban surroundings.

The NPS is required to preserve, to the greatest extent possible, the natural soundscapes of parks. NPS *Management Policies 2006* (Section 4.9, "Soundscape Management") and Director's Order 47: *Soundscape Preservation and Noise Management* (NPS 2006a, 2000), recognize that soundscapes are a park resource and state that the NPS is to restore degraded soundscapes to natural conditions whenever possible and protect natural soundscapes from degradation due to noise (i.e., undesirable human-caused sound). In addition, the NPS recognizes the value of cultural soundscapes, which play an important role in connecting park visitors to the history and heritage of NPS cultural resources. NPS Management Policies 2006, Section 5.3.1.7, states, "[t]he Service will preserve soundscape resources and values of the parks to the greatest extent possible to protect opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established" (NPS 2006a).

The soundscapes of Gateway park lands, especially on their coastal edges and in their interiors, are less noisy than the park's urban surroundings. Noise is generally defined as unwanted or objectionable sound that alters or disturbs quality of life or communication. It also affects physical health if it is very loud or continuous. Most environmental noise, particularly in urban areas, consists of a variety of frequencies of common, distant noises that create relatively constant background noise levels. In New York City, the primary source of noise in most areas is traffic (NYCPC 2013). Average decibel levels in the region range between about 60 and 74 A-weighted decibels (dBA), but can fluctuate from as low as about 55 dBA to as high as 84 dBA (NYCPC 2012, 2013). Comparable sound levels are human conversation, 60–65 dBA; a heavy truck passing at 15 meters (80–90 dBA); or background noise in an office (50 dBA) (Cowan 1994). Periodic loud noises, such as construction sounds, horns honking, road noise, trucks driving by, or low-level aircraft, are easily perceived above background noise levels. Many of Gateway's natural areas offer a unique opportunity to find a relatively quiet place amid a loud urban soundscape.

Acoustical environments include natural, cultural, and human-caused sounds. Natural soundscapes include all naturally occurring sounds, such as birdcalls or thunder. They also include the "natural quiet" that occurs in the absence of human-caused sound. The opportunity to experience natural sounds and quiet is a fundamental part of visitor experience at Gateway.

The most common human-caused sources of noise at Gateway are listed below. Some of these sound sources, such as watercraft and operational noises, temporarily impact the acoustical environment. In contrast, the sounds of streets and human voices are part of the acoustical environment of an urban park, such as Gateway.

Watercraft. Noise from motorized watercraft and other vessels on Gateway's waters, as well as ship noise, can be heard at the park. These noise sources include the Staten Island Ferry horn, which is particularly acute at Fort Wadsworth.

Vehicles. The busy thoroughfares, traffic patterns, and city streets surrounding Gateway's park lands generate sounds such as honking, emergency vehicle sirens, road noise, road construction, and trains. The Verrazano-Narrows Bridge is a significant source of transportation noise at Fort Wadsworth.

Aircraft. Commercial airplanes fly low over several of the Jamaica Bay park lands as they approach and departure from John F. Kennedy International Airport. This noise is particularly loud on the waters of Jamaica Bay and at the Jamaica Bay Wildlife Refuge. Commercial helicopter flights also fly low over several areas of park lands and impact the park experience. In addition, banner planes advertise along the beaches and impact the natural beach soundscape.

Airports and Development. As airports seek to enhance their services and facilities, the interface between national parks and airport areas increases.

Human Voices. The voices of people recreating and picnicking, as well as associated sounds of human use, including radios, can be heard throughout the park. Popular recreation destinations like Miller Field and Jacob Riis Park tend to be crowded with visitors and this activity amplifies the sound of human voices. These noises are also intensified during special events hosted on the park lands (e.g., tournaments at Miller Field, the New York Marathon at Fort Wadsworth).

Park Operations and Maintenance. Temporary sounds from park operations and maintenance include lawnmowers, construction, heavy machinery needed for natural resource restoration projects, generators, and the park's and partners' trucks.

Human-caused noise is perceptible throughout most of the park lands in the Staten Island and Jamaica Bay Units and to a significantly lesser degree in the more remote Sandy Hook Unit. These human-caused noises, however, dissipate as one moves into the interior of most of Gateway's park lands, and the sounds and quiet of the natural soundscape become

apparent. The coastal edges of Gateway's park lands, in particular, are soundscape "havens," where the natural soundscape is perceptible and the noises of the urban surroundings is diminished.

The peninsula of Sandy Hook is isolated and is, therefore, a place almost free of human-caused sounds in Gateway. Away from visitor facilities, crowded beaches, and Hartshorne Drive, most of the sounds heard are natural and include waves, wind, and birdcalls. At the campground, in recreation areas on the bayside, on northern beaches (e.g., North Beach and Gunnison Beach), and along the multiple use paths, the natural soundscape predominates and there are few human-caused sounds other than human voices. Although there is more activity at Fort Hancock and the sounds of other visitors, cars, and the ferries create human-caused noise, it is still a relatively quiet environment where visitors can appreciate the natural soundscape.

In the Staten Island and Jamaica Bay Units, the quietest places where visitors can retreat from the noises of the urban surroundings include Crooke's Point at Great Kills Park, Breezy Point Tip, Fort Tilden, Jamaica Bay Wildlife Refuge, Bergen Beach, and Floyd Bennett Field's North Forty area.

Education, Interpretation, and Understanding

In addition to the recreational opportunities throughout the park, Gateway offers varied experiences to visitors through interpretation, education, and stewardship programs, including the only overnight tent camping program in New York City for school and youth groups. The Gateway Interpretation and Education Division manages various interpretive and educational activities for individuals, youth, school groups, and families, which are designed to illuminate and build appreciation for Gateway's history and ecology. The interpretation and education division is responsible for connecting people to the park and is heavily engaged in community outreach. Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor. Programs offered by the park and its partners range widely from living history reenactments to ranger-led wildlife observation walks to lantern tours of the coastal defense forts.

In addition to the recreational opportunities throughout the park, Gateway offers varied experiences to visitors through interpretation, education, and stewardship programs, including the only overnight tent camping program in New York City for school and youth groups.

The Gateway interpretive and educational programs were noted and supported during public scoping. It was suggested that programs and activities should target a wide range of ages, from youth to senior citizens, and should be offered throughout the day and the year to accommodate different schedules. Several people suggested that expanding the number of partnerships with local educators and educational institutions, nonprofit groups, community organizations, and interest groups would increase the capacity of Gateway's educational programming. In the Sandy Hook Unit, there are several partners who provide the majority of education programs, and similar arrangements would be desirable in the Jamaica Bay and Staten Island Units.



Pre-visit Information and Orientation

According to anecdotal information collected by park staff, most visitors to Gateway rely on information from friends and relatives who have been to the park, the Internet, and the park website. The park website contains helpful trip planning information, including directions, operating hours, fees and reservations, description of park activities and recreational opportunities, photos and media, background information and interpretive media, photos and multimedia, downloadable maps, and general park management news. Additionally, the park website is updated regularly and is a valuable source of information during park alerts and/or closures due to adverse weather conditions.

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible. Because of poor wayfinding and a lack of NPS visibility at parks like Fort Wadsworth, visitors not familiar with the area or with Gateway often become confused and disoriented. The park is trending toward using new methodologies and technologies such as Quick Response tags and other mobile phone technologies to better inform visitors and potential visitors.

Park bulletin boards and information kiosks throughout the park include standardized "You Are Here" map boards and information about Gateway and the particular unit visitors are in. This is the primary source of orientation for many park visitors, especially in areas that have no staffed contact station.



Interpretation

Interpretation is delivered through various media and at several locations. Learning opportunities range from self-guided tours of historic settings to formal educational programs. Visitor and park information centers are at Jamaica Bay Wildlife Refuge, Floyd Bennett Field, and Fort Wadsworth's Mont Sec House as well as at Horseshoe Cove, Sandy Hook Lighthouse, and Fort Hancock History House on Sandy Hook. At these facilities, visitors can interact with rangers, view exhibits, and learn about activities such as ranger-led tours, self-guided tours, and recreation opportunities. The visitor contact stations at Fort Wadsworth and Canarsie Pier are no longer staffed or open to the public.

Park staff interprets Gateway resources by several methods, including exhibits, ranger tours and talks, educational brochures, campfire programs, and outdoor interpretive panels (known as wayside exhibits). Digital media, including podcasts and social media posting, are also used to share information about the park's resources and history. At Sandy Hook and Fort Wadsworth, NPS partners conduct living history programs.

Educational Programming

The Education and Interpretation Division offers natural and cultural resources education programs to school groups, youth groups, and community organizations. The programs provide hands-on opportunities for learning and promote the protection of natural and cultural resources in the park and the environment as a whole. These programs support the curriculum goals of New York and New Jersey schools.

Environmental education programs are offered in several Gateway sites. For example, at Ecology Village in Floyd Bennett Field, the NPS provides curriculum-based overnight camping programs for school groups and nonprofit organizations, as well as teacher training sessions. Other park sites that have environmental education programming, such as naturalist and wildlife hands-on studies, include the Jamaica Bay Wildlife Refuge, Education Field Station at Great Kills Park, Fort Wadsworth, and Sandy Hook.

Junior Ranger Program

The Junior Ranger Program is available for students and families at the Jamaica Bay, Staten Island, and Sandy Hook Units. The program provides young people age 7 to 12 an enjoyable and meaningful way to explore the resources and history of the park. Upon completion of the program, junior rangers receive a certificate and a patch.

Volunteer Stewardship

Gateway volunteer programs offer opportunities for visitors to become involved in stewardship of the park. In 2012, Gateway had 4,929 volunteers who worked 87,255 hours, with most volunteers ranging in age from 26 to 55. Volunteer programs typically involve cleanups, defined construction projects, habitat restoration, and conservation. One volunteer activity is the BioBlitz, a 24-hour rapid assessment of what lives in a particular area at a given time orchestrated by park staff, partners, and volunteers. In 2011, nearly 150 volunteers and students participated in the Sandy Hook BioBlitz, which was conducted by a partnership between the NPS and the American Littoral Society. The BioBlitz and other natural resource stewardship activities bring school-age young people, college students, naturalists, and community residents to the park, offering them a deeper connection with park lands and exposure to the natural, cultural, and recreational resources that Gateway offers. Other volunteer programs include the Historic Airplane Restoration Project, Floyd Bennett Garden Association, Ranger Rick at the Ecology Village in partnership with National Wildlife Federation, and the Sandy Hook Association working with Clean Ocean Action.

Partner Involvement

Partners play a role in promoting understanding, education, and interpretation. Partner organizations like the Audubon Society, the American Littoral Society, and the National Wildlife Federation develop and operate independent interpretive activities such as birding tours and naturalist walks. Gateway also partners with local nonprofits and other partners to offer introductory recreational programming, such as kayak lessons. Finally, "friends" groups are instrumental in securing funding to help maintain historic structures, fund programs, and develop new initiatives.



The program provides young people age 7 to 12 an enjoyable and meaningful way to explore the resources and history of the park.

Health and Safety

Gateway experiences safety issues similar to those found in any national park as well as facing additional visitor safety challenges due to its urban location. Although the park staff makes considerable efforts to provide safety information in easily accessible locations and

formats, there are many points of entry into Gateway, and visitors are sometimes unaware of and unprepared for potential hazards.

Gateway's more remote natural areas and expansive waters can create hazards for visitors. The lack of lights creates problems for some urban visitors, accustomed to having streetlights and other ambient lighting, who are unprepared for darkness. This can result in people becoming lost or hurt when trying to navigate in the dark.

Gateway's waters, which include the Atlantic Ocean as well as Jamaica Bay, Sandy Hook Bay, New York Bay, and Rockaway Inlet, have associated dangers. Between 2000 and 2010, 33 visitors drowned in the waters of Gateway. Several of the drownings involved multiple victims, as people attempting to rescue the initial victim also drowned. The primary causes of the drownings are alcohol consumption, inability to swim, and swimming in deceptively calm areas that in reality have steep underwater drop-offs and strong currents. Serious injuries to swimmers in the ocean surf are primarily neck and back injuries caused by diving into shallow water and dislocations caused by pounding surf. Additionally, boat traffic and heavy winds on the water bodies create hazards for small, human-powered watercraft such as kayaks.

The most frequent injuries received by visitors occur from slips, trips, and falls. These occur primarily while climbing on rock jetties or other structures; from loose gravel, ice, or wet leaves on multi-use pathways; and while ice-skating at the concession-run sports complex.

Given the high level of visitation at Gateway, conflicts between users can sometimes pose safety problems, such as those between vehicles and pedestrians and between vehicles and bicyclists. Occasionally, incidents are also reported between walkers and bicyclists sharing the multi-use paths and greenways. Visitor use conflicts also exist between surfers, swimmers, fishers, and boaters, which can lead to serious injuries.

Closed or unmaintained cultural resources and facilities also pose risks to visitors who explore them. Many coastal defense structures across the park are in very poor and unsafe condition. They present climbing hazards with unstable surfaces and sharp objects. Although these structures are not open to public access, they are unfenced or inadequately fenced.

Health Benefits and Physical Activity

Located in a major metropolitan area, Gateway can help improve the community's health by offering residents opportunities for personal fitness, active recreation, and other physical exercise, as well as healthy food from the park's community gardens.

With its many opportunities for recreation and for connecting with nature, Gateway improves the psychological and physiological health of the New York City area residents. The park's open spaces and natural areas provide healthy retreats from the congestion of high-density urban living. They also offer healthy environments for young people to recreate and to explore and connect with the natural world.

Radiation Remediation at Great Kills Park

In 2010, sections of Great Kills Park were closed to visitation due to health and safety concerns following the discovery of radium (NPS 2010d). This section of the park remains closed today.

Small sources of radium were found in discrete areas at Great Kills Park. These radium sources, found buried more than a foot below the ground's surface, have been removed; however, since then, additional areas exhibiting above-background radiation readings have been identified within the footprint of the historical landfill at this park site. Investigation into the source of the radium contamination is ongoing; based on the limited information available, it is believed that the radium came from discarded medical treatment sources brought to the landfill site (NPS 2010d). Radium present in these items has probably leaked over time, resulting in contamination of the soil directly surrounding the sources. To ensure public safety, the NPS initiated a wider investigation into the extent of radium at the site in the form of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) process in 2010. The goals of this CERCLA process are to determine the nature and extent of the contamination, evaluate and select an option for cleanup, and return the park to a condition unencumbered by contamination. As they are identified, the sources of radium are removed from the site for proper storage and disposal at an out-of-state facility. As of 2010 when the CERCLA process was initiated, the NPS (with technical assistance from the USACE) had removed radioactive sources and surrounding contaminated soil from the five locations with the highest radiation readings (NPS 2010d). The radiation at these sites averaged 4.12 milliroentgens per hour (mR/h) and dropped to 0.46 mR/h 3 feet away. Background radiation for this area is 0.02 mR/h (NPS 2010d).

Exposure to radiation can cause cancer, and the improper handling and disposal of radium sources can be harmful to the public. For this reason, the NPS has restricted access to portions of Great Kills Park since 2010. These areas of the park will remain closed until the matter is thoroughly investigated and appropriate cleanup is implemented.

Social and Economic Development

The social and economic conditions of the New York and New Jersey metropolitan area influence Gateway and how it is managed. Conversely, the park contributes to the social and economic conditions of the area as a whole. This section describes the existing conditions related to this relationship by highlighting the park's quality-of-life benefits as well as the New York and New Jersey metropolitan area's demographic and economic trends.

This section summarizes the existing social and economic conditions of the Borough of Staten Island, portions of the Boroughs of Queens and Brooklyn in New York City, and portions of Middlesex and Monmouth Counties in New Jersey. Discussions with NPS staff have indicated that although there are visitors to Gateway from Manhattan, the preponderance of visitors are from these three areas. These three areas have been identified as the primary market drawing areas (PMDAs) for the majority of visitors to Gateway.

The "Social and Economic Environment" section typically includes projections for how the PMDA is projected to change over the next 20 years. However, after the October 2012 impact of Hurricane Sandy, local city and county officials from New York and New Jersey are still estimating the hurricane's impacts on the economic and demographic profile of these market drawing areas. As such, the following analysis is primarily a summary of what was known prior to the hurricane with regard to economic and demographic profile and estimated long-term projections. As information becomes definitely available from New York City and New Jersey regarding post hurricane resettlement, these findings could be reevaluated.

The Importance of Parks to a Community

Park and open space areas in and around an urban area are key contributors to the quality of life in the community. This becomes even more significant in very large metropolitan areas, where population densities and travel distances to open, public lands are greater. The PMDA falls within the New York Metropolitan Statistical Area, which is the largest metropolitan area in the United States. Thus, in addition to parks and open space in New York City and Middlesex and Monmouth Counties in New Jersey, Gateway plays a vital role in sustaining and enhancing the quality of life for the residents of the New York and New Jersey area.

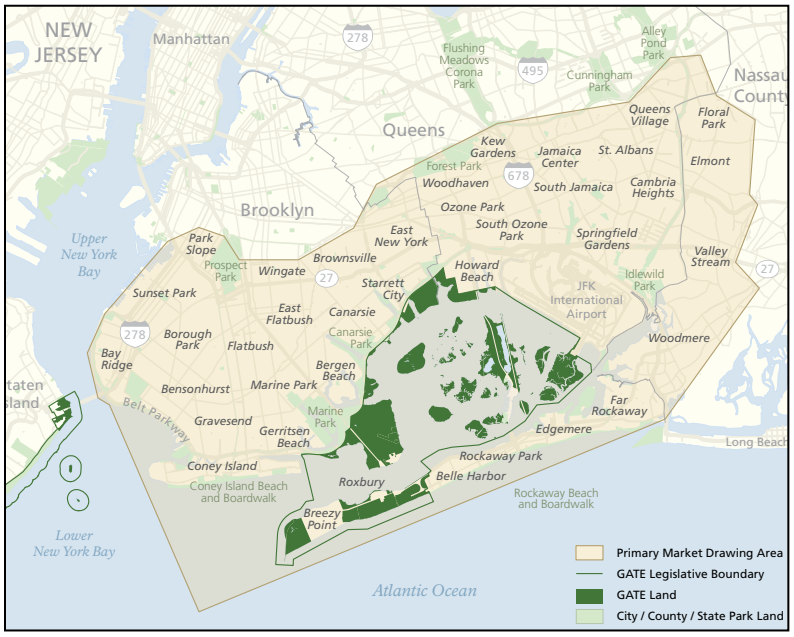
Population and Community Trends

The current and future management of Gateway is directly affected by the population dynamics and composition of the communities that surround it. As the population grows, there will be an increase in visitor use and demands for the park to accommodate traditional and new outdoor recreation opportunities.

Information in this section was developed through interviews with the NPS based upon their understanding of the visitor profiles to each unit in Gateway. This affected area has been identified in this report as the PMDA for activities at Gateway. In New York City, the PMDA includes the Borough of Staten Island for the Staten Island Unit and portions of the Boroughs of Queens and Brooklyn for the Jamaica Bay Unit. The Jamaica Bay Unit's PMDA was developed through comparison of the neighborhood tabulation area developed for New York City Comprehensive Waterfront Plan to a market drawing area developed as part of the NPS Gateway National Recreation Area Supply and Demand Analysis. The PMDA for the Sandy Hook unit includes Middlesex and Monmouth Counties. Figures 3-16 through 3-18 are maps of each of the sub-elements of the PMDA.

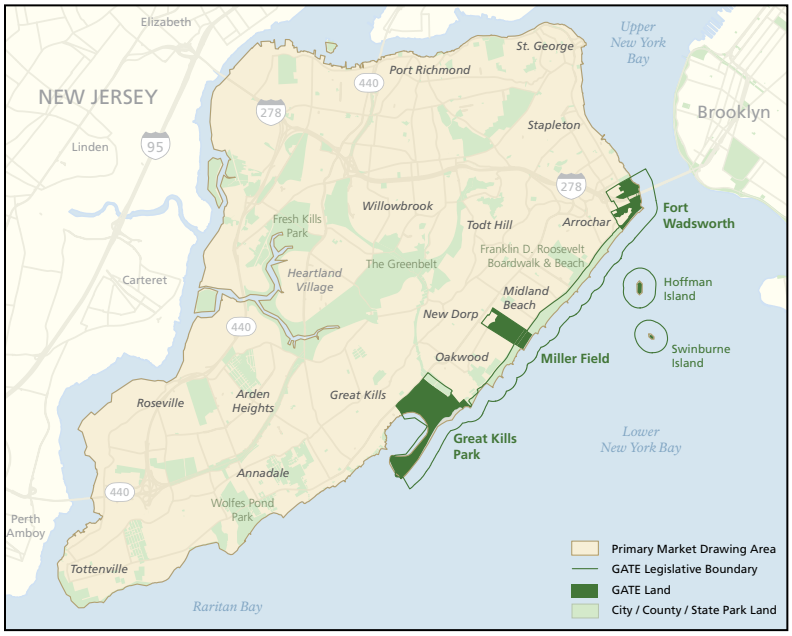
Long-term population forecasts within the range of a 20-year planning horizon are typically part of the GMP process. The planning authorities in New York City and New Jersey have developed planning documents that include 30-year forecasts. The New York City Department of Planning undertook a 30-year population forecast in December of 2006. Recent interviews with the New York City Department of Planning indicate that a revision of these population forecasts was planned for the spring of 2013. With the impact of Hurricane Sandy, these projections are now planned for revision by the summer of 2013. Therefore, the New York City Planning Department is of the opinion that the 30-year population forecasts should be evaluated more for their overall trends rather than for specific population data.

Figure 3-16. Gateway National Recreation Area PMDA by Unit – Jamaica Bay, New York.



The New York City population projections by age/sex and borough for the period 2000 to 2030 estimated population growth by borough. In this study, Staten Island was projected to increase its population by 24.4 percent by 2030; Queens by 15.1 percent; and Brooklyn by 10.3 percent. The 2006 study indicated that the preponderance of growth was estimated to occur within the first 5 years of the projection period (2000 to 2005) (NYCDCP 2006). If the 30-year growth rates were converted to equal annual growth rates, this would equate to 0.81 percent annual growth for Staten Island, 0.50 percent for Queens, and 0.34 percent for Brooklyn.

Figure 3-17. Gateway National Recreation Area PMDA by Unit - Staten Island, New York



The New Jersey Department of Labor and Workforce Development also developed 30-year population projections (NJDLWD n.d.). The NJDLWD notes that "these projections, which are neither predictions nor forecasts, reflect identifiable long-term economic and demographic trends which have been implicitly or explicitly incorporated into the models. In other words, the projections are an extrapolation of past and current trends into the future. These projections are best used as a reference framework for planning, research, and program evaluation." These data, developed prior to Hurricane Sandy, indicated that within the New Jersey component of the PMDA, Middlesex County was proposed to grow by 21 percent and Monmouth County was projected to grow by 11 percent by the year 2030. Converting these 30-year growth rates to equal annual growth rates would equate to an annual growth rate of 0.7 percent for Middlesex County and 0.36 percent for Monmouth County.

Using 2010 census data, ESRI has forecasted the PMDA for the Gateway National Recreation Area at an estimated population of 4.66 million in 2012 (U.S. Census Bureau 2010; see figure 3-19). Prior to Hurricane Sandy, this PMDA was projected to experience an increase in population to 4.77 million by 2017, for a compound annual growth rate of 0.60 percent. This estimated annual growth rate is within the range of the individual forecasted 30-year annual averages mentioned previously. However, should the population basis change as a result of Hurricane Sandy, the future growth rate may also change.

Figure 3-18. Gateway National Recreation Area PMDA by Unit - Sandy Hook, New Jersey.

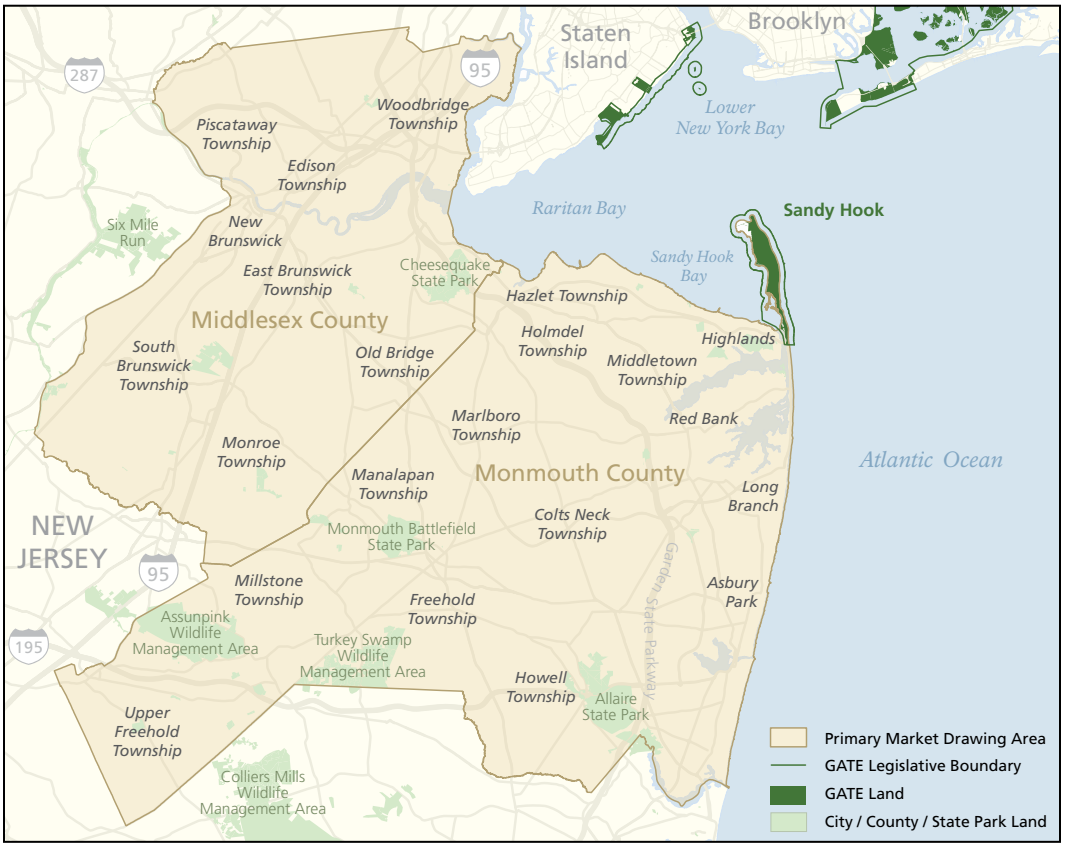
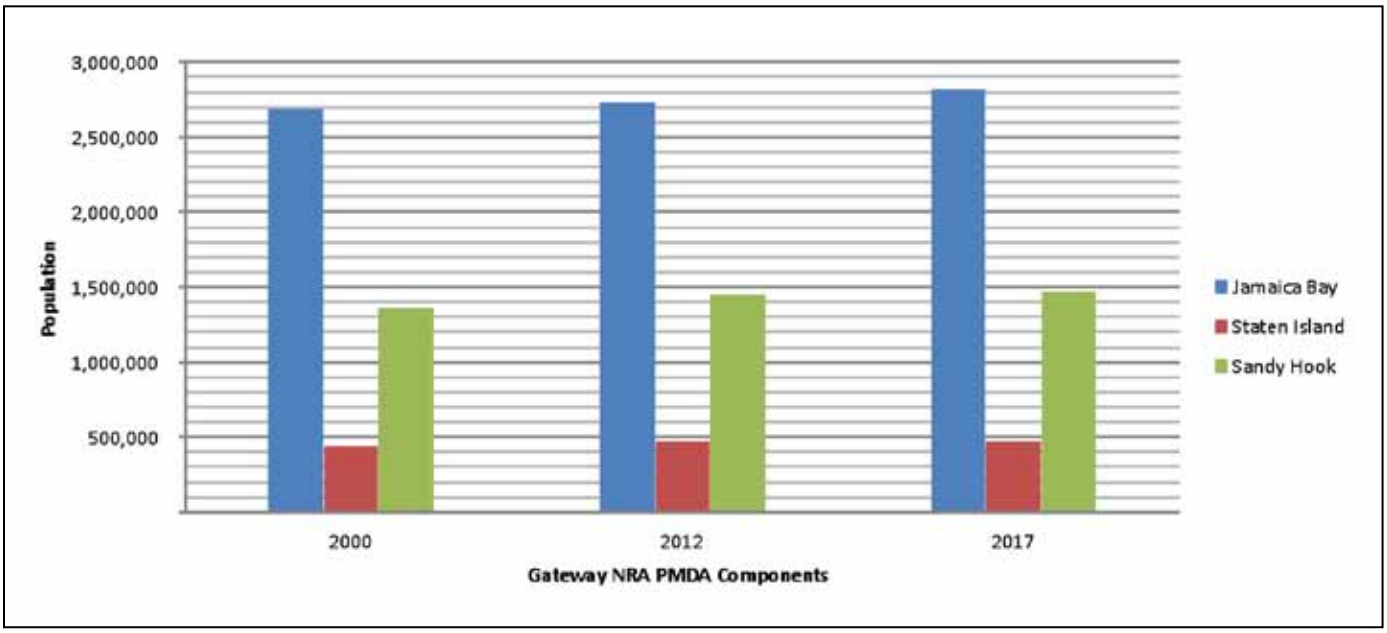


Figure 3-19. 2000-2017 Estimated Population Growth, Gateway PMDA by Unit.



Source: U.S. Census Bureau 2010.

People and Households

In addition to assessing the status and forecast for overall population growth within the PMDA, understanding the changing characteristics of area residents and the composition of the community's households is important. This section discusses the community characteristics of median age, household size, race, income, poverty levels, and education levels.

Median Age and Household Size

As of 2012, the PMDA sub-elements had a median age of 36.2 for Jamaica Bay, 38.6 for Staten Island, and 39.2 for Sandy Hook. The average household size within the PMDA sub-elements was 2.89 for Jamaica Bay, 2.78 for Staten Island and 2.73 for Sandy Hook. (U.S. Census Bureau 2010). The data summarized in table 3-8 show that the median age is anticipated to increase for all the sub-elements and that the average household size is anticipated to decrease for Jamaica Bay but increase slightly for Staten Island and the Sandy Hook PMDA.

A review of the New York City Planning Department population projections by age/sex and borough for the period 2000 to 2030 indicates that the most significant population age cohort that is anticipated to increase is the elderly population. The aging of large baby boom cohorts, a decline in fertility, and improvements in life expectancy all contribute to a general aging of the population, despite more pronounced migration losses. The New York City Planning Department population projections estimate that by 2030, the school-age population and the population age 65 and over will have nearly converged, accounting

Table 3-8. Median Age and Average Household Size for Gateway PMDA by Unit (2010, 2012 and 2017)

PMDA Unit	2010		2012		2017	
	Age	Size	Age	Size	Age	Size
Jamaica Bay	36.0	2.88	36.2	2.89	36.7	2.88
Staten Island	38.3	2.78	38.6	2.78	39.0	2.79
Sandy Hook	38.9	2.73	39.2	2.73	39.5	2.74

Source: U.S. Census Bureau 2010.
Age = median age; size = average household size

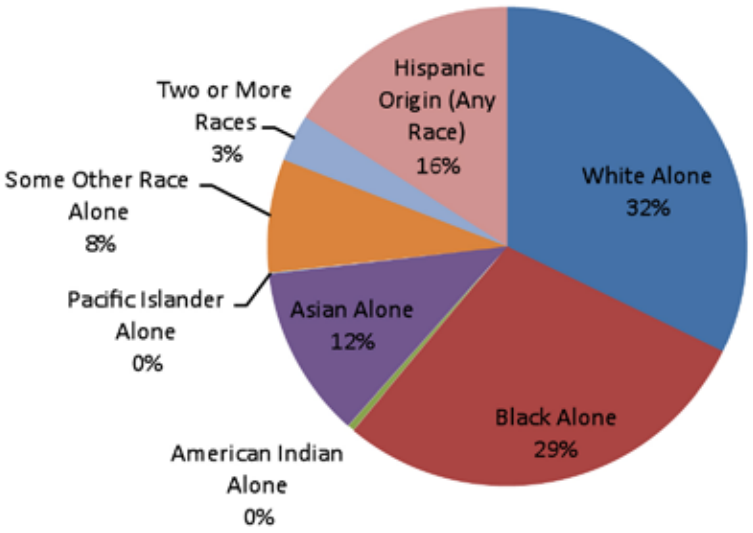
for 15.4 percent and 14.8 percent of the city's population, respectively. In New York City, it is estimated that Staten Island will see the largest percentage increase in the elderly population and that Brooklyn will continue to have the largest elderly population in the city. Overall, the study indicates that New York City's future population will be shaped by low fertility, continued net outmigration, and an aging population.

The New Jersey Department of Labor and Workforce Development population projections for age cohort in the Sandy Hook Unit PMDA provide a similar perspective. In 2010, it was estimated that the school-age population was approximately 26 percent of the population and the population over age 65 was 13 percent. By 2030, it was estimated that the school-age population would be 24 percent of the overall population and the population over age 65 would represent 20 percent.

Race

The PMDA for Gateway includes both densely populated city neighborhoods and suburban environments. The race/ethnicity of the PMDA sub-elements illustrates the diversity in users who are attracted to the outdoor recreation opportunities that Gateway offers. Figures 3-20 through 3-22 provide a 2012 estimate and percentages for each of the racial/ethnic groups

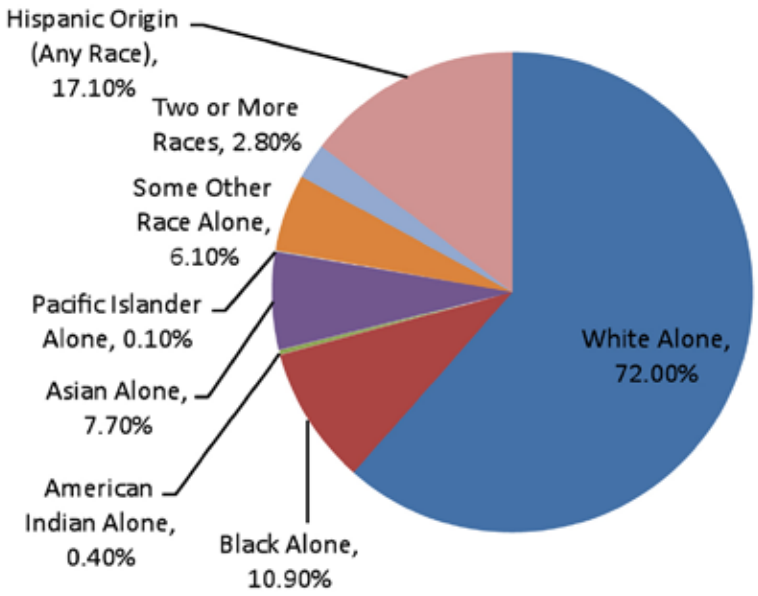
Figure 3-20. Population Estimates for Jamaica Bay PMDA - 2012



Source: U.S. Census Bureau 2010.

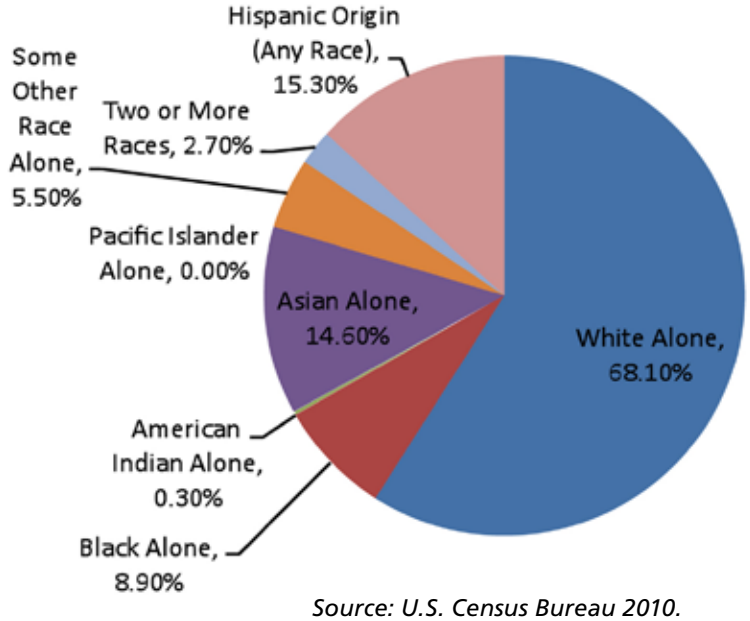
supporting each unit's PMDA. It is important to note that the methods that the 2010 census used for identifying race/ethnicity allows for a dual reporting of ethnicity. As such, the total percentages are greater than 100 percent.

Figure 3-21. Population Estimates for Staten Island PMDA - 2012



Source: U.S. Census Bureau 2010.

Figure 3-22. Population Estimates for Sandy Hook PMDA - 2012



Source: U.S. Census Bureau 2010.

From a park management standpoint, understanding the racial makeup of the community can help shed light on ways to make the park more inviting, develop better outreach with the community, and improve park program relevance. In addition, this awareness contributes to improving the quality of life in the community. As discussed in the "Visitor Use and Experience" section, many people from the PMDA's diverse racial, ethnic, and cultural groups are not visiting Gateway.

The U.S. Census uses the racial/ethnicity information to develop a diversity index for each area of analysis. This index represents the amount of diversity represented in the population. The Jamaica Bay Unit's PMDA has the highest diversity index, at 80.3 for 2012, and it is projected to increase to 81.1 by 2017. The Staten Island Unit's PMDA is similar to the Sandy Hook Unit's PMDA, at 61.9 and 63.5, respectively, in 2012, and these two diversity indices are estimated to increase to 64.8 and 67.0 by the year 2017. These trends reflect the national trends toward greater diversity. In the case of the Jamaica Bay Unit's PMDA, the anticipated increase in diversity is expected to consist of an increase in the Asian and Hispanic population and a corresponding decrease in the white and black racial/ethnic groups. In the Staten Island Unit's PMDA, the diversity trend is anticipated to involve an increase in the Hispanic population, as well as the Black and Asian race/ethnicity groups of the population. For the Sandy Hook Unit's PMDA, the diversity trend is based on an increase in the Hispanic, Black, and Asian race/ethnicity groups of the population. These immediate-term increases in population diversity emphasize the importance of NPS efforts to improve outreach and eliminate barriers that might keep people of all races and ethnic groups from experiencing the park.

Income, Poverty, and Education

Other factors that play a role in park management and visitation trends are the income levels and poverty levels of residents who live near the park. Per capita income varies significantly between the three Gateway PMDAs. The U.S. Census for 2010 and projections for 2012 indicate that the highest per capita income is in the PMDA for the Sandy Hook Unit, at $36,649, with the lowest per capita income at $23,155 for the PMDA surrounding the Jamaica Bay Unit. The Staten Island Unit's PMDA closely resembles that of the Sandy Hook Unit PMDA at $32,941. Forecasts of income over the next five years show moderate growth, but the position of these figures in relation to the others does not change (table 3 9).

Table 3-9. Estimated Income for Gateway Unit PMDAs (2012 and 2017).

PMDA Unit	2012		2017	
	MH Income	PC Income	MH Income	PC Income
Jamaica Bay	$48,261	$23,155	$56,216	$26,605
Staten Island	$72,905	$32,941	$82,484	$37,514
Sandy Hook	$78,710	$36,649	$89,316	$42,426

Source: U.S. Census Bureau 2010.
MH income = median household income; PC income = per capita income

The U.S. Census Bureau does the American Community Survey, the most recent of which was completed for the period from 2005 to 2009. This survey provides insight into poverty levels within census tracts. A review of the data from this survey supports the per capita income data of the PMDAs. Approximately 17 percent of the households in the Jamaica Bay PMDA were below the poverty level, whereas an estimated 10.3 percent of the Staten Island PMDA households and 6.7 percent of the Sandy Hook PMDA households were below the poverty level.

The level of education attained by community residents can often correlate to these income and poverty characteristics. Table 3-10 summarizes the percentage of residents in each area (25 years or older) who attained various levels of education as of 2009 (U.S. Census Bureau 2009). The Jamaica Bay PMDA has the lowest percentage of the population with college degrees, at 33.6 percent, compared to the Staten Island PMDA at 35.7 percent and the Sandy Hook PMDA at 44.7 percent.

Table 3-10. Percentage of Population to Reach Various Levels of Education by Gateway PMDA (2009).

Educational Attainment	Jamaica Bay	Staten Island	Sandy Hook
No Schooling	2.0%	1.0%	0.8%
Nursery to Grade 12 – No Diploma	18.6%	11.6%	10.0%
High School Graduate, GED, or Alternative	31.3%	34.0%	28.3%
Some College, up to 1 or More Years, No Degree	14.6%	17.7%	16.2%
Associate's Degree	7.2%	7.8%	6.7%
Bachelor's Degree	16.9%	16.6%	23.4%
Master's Degree	6.9%	8.3%	10.7%
Professional School Degree	1.9%	2.2%	2.5%
Doctoral Degree	0.7%	0.7%	1.5%

Source: U.S. Census Bureau 2009.
Note: Population surveyed included those 25 years of age or older

Employment Trends

Employment opportunities typically correlate to educational background and impact household income. Within the Gateway PMDA, the healthcare and social assistance industry is the largest employer, providing from 11.5 percent of overall employment for the Sandy Hook PMDA up to 19.8 percent for the Jamaica Bay PMDA (see table 3-11). The retail and educational services are the next-largest employment sectors for residents in the PMDA.

Table 3-11. Civilian Employment for Population age 16+ by Industry by Gateway Unit PMDA.

Industry	Jamaica Bay	Staten Island	Sandy Hook
Agriculture, Forestry, Fishing, and Hunting	0.1%	0.0%	0.3%
Mining, Quarrying, and Oil and Gas Extraction	0.0%	0.0%	0.1%
Construction	6.3%	7.2%	6.1%
Manufacturing	4.7%	3.3%	8.9%
Wholesale Trade	2.8%	2.4%	3.9%
Retail Trade	9.6%	9.5%	11.3%
Transportation and Warehousing	7.9%	6.3%	5.0%
Utilities	0.5%	1.1%	0.7%
Information	2.9%	2.6%	3.8%
Finance and Insurance	6.1%	9.9%	8.4%
Real Estate and Rental and Leasing	2.7%	2.7%	1.9%
Professional, Scientific, and Technical Services	5.8%	6.7%	9.2%
Management of Companies and Enterprises	0.1%	0.1%	0.1%
Administrative and Support and Waste Management Services	4.1%	3.9%	3.6%
Educational Services	9.0%	10.5%	9.8%
Health Care and Social Assistance	19.8%	15.9%	11.5%
Arts, Entertainment, and Recreation	1.6%	1.5%	1.8%
Accommodation and Food Services	5.7%	4.6%	5.2%
Other Services, Except Public Administration	5.5%	4.3%	4.2%
Public Administration	4.8%	7.7%	4.1%

Source: U.S. Census Bureau 2009.

Housing and Urban Growth

This section will identify current and projected trends in the housing market and highlight housing indicators such as home values, housing affordability, own/rent ratios, and single-family/multifamily dwelling ratios. The New York and New Jersey metropolitan areas are recognized for their high median home values. The composition of the household stock and ownership patterns within the PMDA is a function of the urban environment that surrounds Gateway. Table 3-12 illustrates that median home prices are highest in the Staten Island Unit's PMDA, followed by the Jamaica Bay and Sandy Hook Units' PMDA. The lower home value in the Sandy Hook Unit's PMDA may be attributed to the lower land values in the suburban environments. As would be anticipated, single-family detached homes (59.15 percent) and owner-occupied homes (64.2 percent) are found at a greater percentage within the Sandy Hook Unit's PMDA due to its suburban setting. The density of development is greater in the Jamaica Bay and Staten Island Units' PMDAs, and as such, the value of open space and supporting recreation areas is an important value provided by Gateway.

Table 3-12. Housing Value, Stock, and Ownership Patterns, Gateway Unit PMDAs

Housing Type	Jamaica Bay		Staten Island		Sandy Hook	
	2012	2017	2012	2017	2012	2017
Median Home Value	$423,011	$467,729	$441,256	$473,330	$327,749	$360,990
Household Stock						
Single-family Detached	18.8%	NA	33.9%	NA	59.1%	NA
Multi-family Attached	81.0%	NA	65.7%	NA	39.8%	NA
Household Stock						
Owner Occupied	35.4%	36.6%	58.7%	59.9%	64.2%	64.6%
Renter Occupied	56.9%	56.3%	35.1%	34.0%	29.0%	28.6%

Source: U.S. Census Bureau 2009.
NA = not applicable

Economic Effects of the Park on the Community

Just as population growth and community demographics have effects on the management and use of Gateway, the park also has effects on the economy of the community around it. Like many other economic engines in the New York and New Jersey area, Gateway contributes to the local and regional economy by generating business and revenue, creating jobs, and indirectly fueling economic growth in other industries. This section identifies these economic impacts of the park and provides a synopsis of the overall PMDA economies.

Park Contributions to the Economic Stability of the Area

The park has many direct and indirect positive effects on the area's economy. This impact can be traced to several sources and attributes, such as money spent by visitors at local businesses, jobs created at these local businesses due to visitor demand, NPS jobs created at

the park, NPS contracts with local businesses, and other area tourism generated by the park. This section will highlight some of these factors and explain the relevance to the overall PMDA economy.

Contributions to Local Economy from Gateway Visitor Expenditures

Each year, millions of park visitors contribute hundreds of millions of dollars to the region surrounding Gateway. This money directly sustains the revenue stream and jobs at hotels, restaurants, and stores that serve park visitors. Primarily, businesses in the boroughs of Staten Island, Queens, and Brooklyn and Monmouth and Middlesex Counties in New Jersey that are adjacent to Gateway are the direct beneficiaries of this economic contribution. In addition, the visitor money stream can also have other indirect, or secondary, effects. For example, this injected money that directly supports local businesses and jobs eventually recirculates into the local economy and beyond. This recirculation happens when the local businesses in the communities surrounding Gateway buy products or services from other sources (e.g., from wholesale suppliers), or when employees at the local businesses use their income earned at the local businesses in communities surrounding Gateway at other businesses in the area to sustain their lifestyle (e.g., grocery shopping, entertainment). This secondary effect is often referred to as an economic "multiplier," because one dollar injected into the local economy often has more than one dollar's effect on the local economy.

With funding from the NPS Social Science Research Program, researchers at Michigan State University have created the NPS "Money Generation Model 2" (MGM2) to measure these direct and indirect contributions from visitors to local economies. Stynes and Propst used the MGM2 to analyze the effect that visitors to units of the NPS had on the local economies in 2011. This is the most recent data set available for analysis. The 2011 data is based on spending profiles from 2010 adjusted to 2011 using Bureau of Labor Statistics consumer price indices for each spending category. Consumer prices remained fairly stable between 2010 and 2011, except for an increase of 26 percent in gas prices and a 10 percent increase in transportation costs. Visitor segment mixes were assumed to be unchanged except as reflected in overnight stays or new visitor surveys. Except for parks with new visitor surveys, average party sizes, lengths of stay, and reentry factors were assumed to be unchanged from 2010. Visit and overnight stay figures for all parks were updated to 2011 from the NPS public use statistics. Table 3-13 provides an overview of Gateway's spending, economic, and payroll impacts on the local economy.

As an urban park, as opposed to a destination park, the preponderance of Gateway visitation is in the form of day-use recreation visits. Although overnight visitors spend significantly more than day visitors, the size of the day-use market results in significant economic impacts on the surrounding area. In total, park visitors spent $150 million in the local region surrounding the park in 2011. This spending figure excludes airfare and other trip spending outside a 60-mile radius from the park, as well as any durable goods and major equipment.

The model also estimated how this injected money circulated through the local economy, as summarized in table 3-13. Jobs include full-time and part-time jobs, with seasonal positions adjusted to an annual basis. Labor income covers wages and salaries, including income of

Table 3-13. Spending, Economic and Payroll Impacts of Gateway on Local Economy.

Type of Visitation/Spending	Amounts
Public Use Data	
Recreation Visits	7,697,727
Overnight Stays	8,165
Visitor Spending	
All Visitors	$150,947,000
Non Local Visitors	$60,712,000
Impact of Non-local Visitor Spending	
Jobs	668
Labor Income	$30,724,000
Value Added	$50,537,000

Source: Yue, Mahoney, and Herbowicz 2013.

sole proprietors and payroll benefits. Value added is the sum of labor income, profits and rents, and indirect business taxes. The $150 million of total visitor spending result supports 668 jobs, labor income of $30.7 million dollars, and value added of $50.5 million.

Contributions to the Local Economy from National Park Service Operations

The employment offered by the NPS also contributes to the local economy. The social and economic benefits of this job base are twofold. First, the jobs made available by the park and its partners provide hundreds of residents with a steady income that helps sustain their lives and those of their families. Secondly, similar to the economic effects of revenue generated by park and monument visitation (as previously explained), the income earned by park and partner employees also has direct and secondary effects on the local economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community. This spending directly supports local businesses and their growth. The local communities also benefit directly via the sales tax generated by this spending. In addition, secondary economic benefits (i.e., the multiplier effect) are realized when this money eventually circulates further into the PMDA economy and beyond. Because NPS employees reside throughout the entire region, the economic effect of their earned salaries (and subsequent spending in their respective communities) extends throughout the area as well.

Business and Industry Trends

The PMDA provides employment opportunities to local residents as well as residents from other areas. A review of the business types within the PMDA provides insight into the industries that surround Gateway. As table 3-14 illustrates, retail trade establishments are the largest category of businesses within the PMDA. This is followed by other service businesses; professional, scientific, and tech services; and construction firms. This table provides confirmation that the PMDA provides a diverse economic base.

Table 3-14. Percentage of Businesses by North American Industry Classification System Code in the Gateway PMDAs (2011).

Types of Businesses within Areas	Jamaica Bay	Staten Island	Sandy Hook
Agriculture, Forestry, Fishing, and Hunting	0.1%	0.1%	0.3%
Mining	0.0%	0.0%	0.1%
Utilities	0.1%	0.1%	0.2%
Construction	6.8%	11.2%	9.4%
Manufacturing	3.0%	2.3%	3.4%
Wholesale Trade	5.1%	4.0%	5.1%
Retail Trade	19.1%	14.2%	15.0%
Transportation and Warehousing	3.5%	2.2%	2.7%
Information	1.9%	1.9%	2.0%
Finance and Insurance	4.0%	5.3%	5.0%
Real Estate, Rental, and Leasing	4.9%	4.3%	4.8%
Professional, Scientific, and Tech Services	6.4%	8.7%	9.8%
Management of Companies and Enterprises	0.1%	0.1%	0.1%
Administrative and Support and Waste Management and Remediation Services	4.0%	6.3%	5.8%
Educational Services	3.2%	3.1%	2.7%
Health Care and Social Assistance	8.4%	8.2%	8.0%
Arts, Entertainment, and Recreation	1.0%	1.7%	2.0%
Accommodation and Food Services	8.6%	8.5%	6.8%
Other Services (Except Public Administration)	15.8%	13.4%	10.9%
Public Administration	0.8%	1.3%	2.6%
Unclassified Establishments	3.1%	3.2%	3.4%

Source: Infogroup 2012.

Transportation

Each park unit in Gateway has a unique history and associated purpose, which has influenced visitation and reflects how visitors access each unit, circulate among and within the units, and find their way around each unit. For example, some units have no water access, some are not served internally by public transportation, and some reach capacity on a regular basis during peak season. Due to the geographic separation and differing visitor attractions among park units and park sites within a unit, regional transportation access to each area and means of internal circulation are very distinct. In addition, dedicated transportation facilities are also unique within each unit and park site.

Transportation is intricately tied to the varied visitor activities provided in each unit. For example, the Sandy Hook Unit draws beachgoers, sailboarders, surfers, and kite boarders, who sometimes transport large recreational gear, whereas Fort Wadsworth (in the Staten Island Unit) is popular with cyclists and pedestrians seeking ranger-led tours. At Great Kills Park on Staten Island, waterways and water transportation modes are crucial. The Jamaica Bay Unit provides fishing, kayaking, wildlife sightseeing, and beach and cycling opportunities. Each unit also offers different types of alternative access. Access to and within each unit varies by transportation mode, and each unit provides varying degrees of parking and wayfinding.

Some facilities such as the Jamaica Bay Wildlife Refuge are so unique that they draw visitors from throughout the region, while other facilities that provide more standard recreational amenities such as the ball fields at Miller Field tend to draw from the immediately surrounding areas.

In October 2012, Hurricane Sandy came ashore in the New York area, resulting in damage from wind and flooding from rain, overflowed rivers, and storm surge, which in some areas exceeded 13 feet. Damage to transportation-related structures from Sandy included the following, reported by park unit.

In the Jamaica Bay Unit (NPS, pers. comm. 2012f):

- Jamaica Bay Wildlife Refuge East and West Ponds were breached, and the West Pond remains breached, resulting in damage to trails and a subway route.
- All of Fort Tilden was flooded from both the ocean and bay side, damaging transportation infrastructure.
- The Shore Road and fisherman's parking lot were covered in sand.
- At Jacob Riis Park, winds covered much of the park north of the beach in sand.
- Bicycle and pedestrian paths were damaged.

In the Staten Island Unit:

- Wind and storm surge carried sand to cover parking lots and block roads at Great Kills
- Nichols Marina was extensively damaged at Great Kills Park.
- Bicycle and pedestrian paths were damaged.

In the Sandy Hook Unit, which the NPS identified as the park unit mostly heavily affected by Hurricane Sandy:

- Flooding damaged all NPS infrastructure (NPS 2012c).
- A significant loss of beach sand occurred, covering roads and parking lots with sand.
- Bicycle and pedestrian paths were damaged.

Most of the repairs needed to open the park for the summer have been completed as of July 2013. Some damaged roads or paths have not yet been repaired, but planning and implementation of repair strategies may occur outside the context of the GMP. Therefore, this section describes the transportation conditions that exist as a result of the storm, as well as conditions that existed prior to the storm, such as congested roads and parking areas, assuming that such issues would likely return once the storm damage has been repaired and the closed park units reopen. Data were collected from various park and local information sources, from maps, and through examination of the park's transportation facilities during field visits in 2010 prior to Hurricane Sandy. Unless otherwise noted, the condition of the park facilities was generally good during field visits in 2010.

Regional Transportation Overview

The park units that compose Gateway and the regional transportation routes that serve them are shown in figure 3-23. Despite being in an urban area with the most extensive public transit in the nation, the three Gateway units are not connected to each other by transit, and function as independent destinations in a transit riders eyes. Only one public transit service, a single bus route, links Brooklyn and Staten Island, but it does not serve the NPS parks in both those boroughs (it originates and terminates in Bay Ridge). No public transit links the Sandy Hook and Staten Island or Jamaica Bay units to each other.

Jamaica Bay Unit

The Jamaica Bay Unit is on the southwestern tip of Long Island in the boroughs of Brooklyn and Queens, New York. Composed of multiple districts, Jamaica Bay is accessible by car via several key routes and bridges. The Belt Parkway and Flatbush Avenue provide access to Canarsie Pier and Floyd Bennett Field districts from the north, east, and west. Continuing across the Marine Parkway Bridge allows access to Jacob Riis Park, Fort Tilden, and Breezy Point. ~~although Breezy Point is currently open only to pedestrians due to the damage resulting from Hurricane Sandy (IMT 2012j).~~ Belt Parkway and Woodhaven Boulevard provide access to the Jamaica Bay Wildlife Refuge from the north, east, and west. These routes connect to Cross Bay Boulevard, which extends across the Joseph Addabbo-North Channel Bridge into the Jamaica Bay Wildlife Refuge. Routes from the south and local roadway access include Rockaway Freeway, Beach Channel Drive, and Rockaway Point Boulevard.

Regional transit access to the districts of Jamaica Bay can be made via bus connections to subway stations at Flatbush Avenue, Rockaway Park/Beach 116th Street, Rockaway Parkway, and Broad Channel. Ferries run between Riis Landing on Rockaway, the Brooklyn Army Terminal in Bay Ridge, and Pier 11 on Wall Street. New York Beach Ferry service is available

during summer weekends and holidays. ~~As a result of the closure of the A train following damage from Sandy, New York Water Taxi service was established weekdays throughout the year. It is uncertain what the availability of the water taxi service will be once A train service resumes.~~

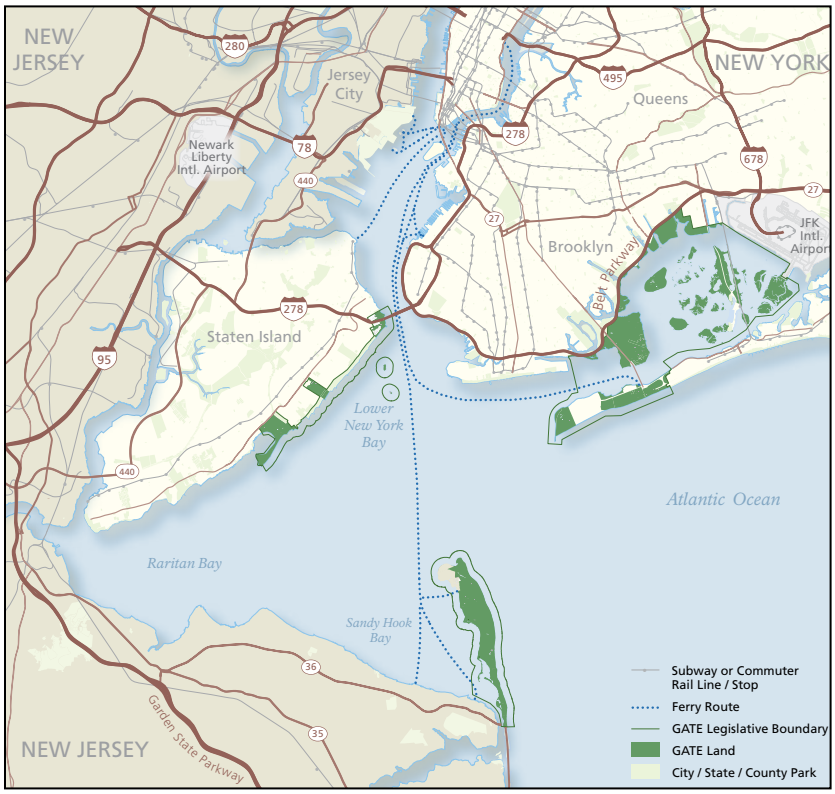
Staten Island Unit

The Staten Island Unit, which is composed of three park sites located along the east and southeast shores of Staten Island, is accessible by car via the Verrazano-Narrows Bridge from Brooklyn or the Goethals or Bayonne Bridge or the Outerbridge Crossing from New Jersey to the Staten Island Expressway (Route 278). The Staten Island Ferry service from Lower Manhattan also provides public transit access and connections to local bus routes at the Saint George Ferry Terminal.

Sandy Hook Unit

The Sandy Hook Unit is a barrier spit that lies along the Atlantic shores of eastern New Jersey. From North Jersey and New York, Sandy Hook is accessible by car via the New Jersey Turnpike, Garden State Parkway, and Route 36 through the Highlands. From South Jersey, roadway access is via Garden State Parkway and Route through the Town of Sea Bright. New Jersey Transit operates one bus route near the park entrance, and commuter bus service to Highlands is available from New York. During the summer season, direct ferry service is available to Sandy Hook from Manhattan daily, with internal shuttle bus service providing

Figure 3-23. Regional Transportation Networks.





beach access in the park. The ferry docks sustained damage from Hurricane Sandy, but are identified by the NPS as a high priority for repairs (IMT 2012j). Year-round ferry service between Manhattan (Pier 11 and East 35th Street) and Highlands, New Jersey, is also available, providing access within approximately 3 miles of the park.

Bicycle Facility Classifications

Various types of bicycle facilities exist in or near some park units. While trails, greenways and bike lanes do connect several of the park districts within Gateway, there is currently no bike sharing infrastructure and bike rentals have only recently been introduced. The Aviator Sports and Events Center (an NPS concessionaire) at Floyd Bennett Field does rent bicycles for $7 per day during spring and summer. There are currently bike rentals at Fort Hancock on Sandy Hook and in the summer of 2013 a commercial use authorization was issued for bike rentals to be established at Canarsie Pier, Riis Park and Riis Landing. There is a need for additional roadway markings (i.e. bicycle lanes or shared lane markings) and signage to make navigating Gateway's park units clear and comfortable for most bicyclists and park users.

Cycling culture is well established in New York City and cycling is growing in popularity as a convenient general means of travel for accessing park and recreation. PLANYC and other programs supported by city agencies actively promote cycling. In 2010, it was reported that the city's bike network of on-street, and physically separated cycle tracks has grown to over 150 miles of painted bicycle lanes and this bike infrastructure continues to grow (NPS 2010g). NYCDCP's 2009 Bike Share Opportunities report indicated that bicyclists make up 0.6 percent of all commuters in New York City.

The breakdown of modal share for accessing Gateway's parks has not been determined so it is unknown how many park users access the park via bicycle. Previous transportation planning reports have recommended that NPS develop a survey to distribute to park visitors inquiring about their mode of access and travel times to Gateway, and also to gauge their interest in non-motorized alternatives.

Bicycle facilities are generally classified as follows:

- Separate Facility (Class I) – A non-motorized facility, paved or unpaved, physically separated from motorized vehicular traffic by an open space or barrier. Also called bicycle path, bike trail, non-motorized trail, multi-purpose trail, or some combination thereof.

- Bike Lane (Class II) – A portion of a roadway that is designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Often done in pairs, each one being one-way and adjacent to the outside through-travel lane. Also called bicycle lanes.

- Bike Route (Class III) – A segment of road designated by the jurisdiction having authority, with appropriate directional and informational markers, but without striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Also called bicycle route.

- Bike Friendly (Class IV) – A roadway not designated by directional and informational markers, striping, signing, nor pavement markings for the preferential or exclusive use of bicyclists, but containing appropriate bicycle-friendly design standards such as wide-curb lanes and bicycle-safe drain grates (International Bicycle Fund 2011).



Individual Park Units

Jamaica Bay Unit

Overview

The Jamaica Bay Unit is along the southeastern tip of Long Island on a peninsula that includes Jamaica Bay, the Jamaica Bay Wildlife Refuge, Floyd Bennett Field, Jacob Riis Park, Fort Tilden, Canarsie Pier, Breezy Point, Plumb Beach, and Bergen Beach. It is bounded by the Belt Parkway (New York State Route 27) to the north, John F. Kennedy International Airport to the east, Sheepshead Bay to the west, and the Atlantic Ocean to the south (FHWA 2006). Several city-owned parks, beaches, small towns, industrial areas, and community areas are also located along the peninsula between the ocean and Jamaica Bay. Under the Cooperative Management Agreement that NPS signed with the City of New York in July 2012, and with the City as a Cooperating Partner in the GMP process, these adjoining lands will be increasingly managed collaboratively and represent a unified destination for some users.

Jamaica Bay can be accessed via private car, city bus, subway, ferry, bicycle, or kayak, or on foot. The Marine Parkway Bridge connects Jacob Riis Park to Floyd Bennett Field and Brooklyn. The Cross Bay Bridge connects the southern side of the peninsula to Jamaica Bay. Some districts in Jamaica Bay are within walking distance from residences via existing sidewalks. All of the parks within the Jamaica Bay Unit, with the exception of Floyd Bennett Field are within walking distance of residential neighborhoods. Riis Landing abuts the Roxbury neighborhood, Jacob Riis Park abuts the Neponsit neighborhood, and the new NPS site at Pennsylvania Avenue is located near the Spring Creek Towers housing development. Bicycle/pedestrian access is enhanced by the Belt Parkway Bikeway that runs along the northern edge of Jamaica Bay, including the entire frontage of the new sites at Pennsylvania and Fountain Avenues. In recent summers, entrepreneurial, for-profit van services have sprung up to bring beach-goers from parts of Brooklyn to points on the Rockaway Peninsula.

The Jamaica Bay Greenway Missing Links Study (NPS 2010g) identified a number of issues with the existing road infrastructure affecting both access and safety for pedestrians and bicyclists, including the following:

- High-volume, high-speed arterials with commercial traffic and conflicting turning movements
- Complex traffic weaving/merging
- Lack of signs and wayfinding to key destinations
- Lack of north/south connector roads accommodating to bicyclists and pedestrians
- One-way street patterns that make travel by bicycles circuitous and non-intuitive

Floyd Bennett Field

Private Vehicle and Waterborne Transportation Parking Facilities

Two large parking lots provide a total of 200 spaces at Ryan Visitor Center at Floyd Bennett Field. Informal parking also exists along the tarmac, taxiway, and runway areas. Parking areas are typically only fully utilized during special events. During extremely large special events, drivers are directed to park on runways and tarmac areas. Several thousand cars could be parked in this manner if desired.

According to traffic data collected in 2004 and compiled in the Jamaica Bay Transportation Studies report by Federal Highways Administration (FHWA 2006), Flatbush Avenue carries approximately 26,000 vehicles per day on weekdays and about 19,000 vehicles per day on weekend days. Excluding the summer season, there are approximately 1,600 vehicles per weekday entering/exiting Floyd Bennett Drive and about 1,000 vehicles per weekend day. During the summer months, traffic activity (exclusive of special events) can be up to 3,000 vehicles per day on both weekdays and weekend days. Typical peak hour traffic on Flatbush Avenue is 1,500 (AM) to 1,900 (PM) vehicles per day weekdays and 2,100 vehicles per day on Saturday midday. Peak hour traffic using Floyd Bennett Drive is 150 vehicles (AM) to 200 vehicles per day (PM). Saturday midday peak hour traffic is slightly more than 200 vehicles per day (FHWA 2006).

The Gateway Marina, adjacent to Floyd Bennett Field, provides 500 slips for private watercraft and includes picnic areas, restrooms, and shower facilities. Transient dockage is available daily, monthly, or for longer stays.

Public Transportation Services

One public city bus route (Q35) serves Floyd Bennett Field. This route travels south from Brooklyn, stops at the Brooklyn Marine Park located on the southwest side of Floyd Bennett Field and continues south terminating in Rockaway Park; northbound, it also stops near Aviator Complex. Bus service includes all weekends and holidays (with some service reductions on holidays).

Train access includes the Red/2 to Flatbush Avenue, Blue/A to Rockaway Park / Beach 116th Street. A transfer to the Q35 bus is required to access the park from either train stop. Train service includes all weekends and holidays (with some service reductions on holidays).

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The Belt/Shore Parkway Bikeway at the northern edge of Jamaica Bay connects to the Rockaway Greenway Bikeway, a paved multi-use path adjacent to Floyd Bennett Field and Jamaica Bay Wildlife Refuge. Biking is allowed on the Floyd Bennett Field historical runways and Fort Tilden trails. The Aviator Sports and Events Center (an NPS concessionaire) at

Floyd Bennett Field rents bicycles for $7 per day during spring and summer. The Jamaica Bay Greenway heads south from Floyd Bennett field and crosses the Marine Parkway Bridge (a "must walk" bridge) providing a linkage to Riis Landing. However, there is no separated multi-use path (Class I) connecting from Riis Landing to Riis Park.

Floyd Bennett Field has a designated launch and landing site for the New York City Water Trail.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information.

Plumb Beach

Private Vehicle and Waterborne Transportation Parking Facilities

Plumb Beach is accessible by automobile via Belt Shore Parkway. There is a parking lot at Plumb Beach that NPS operates in partnership with New York City Parks. Plumb Beach is a designated launch site for the Jamaica Bay Kayak Trail.

Figure 3-24. Jamaica Bay Transportation Services and Facilities.



Table 3-15. Jamaica Bay Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Jamaica Bay Greenway		Parallel to Belt Parkway from Plumb Beach to 78th Street	Yes	NA	No	Yes	Multi-use	Paved	Yes
Floyd Bennett Field									
Hiking Trails		North Forty trail system, N end of Floyd Bennett Field							
No	Yes	Yes	Yes	Ped	Dirt	Yes			
Access Path		Goldenrod and Tamarack Campgrounds	No	No	No	Yes	Ped	Dirt	Yes
Hiking Trails		Saltmarsh, Express Return, and Milestone Trails, SW end of Floyd Bennett Field							
No	No	No	Yes	Ped	Dirt	Across Flatbush Dr at Ranger Station			
Bike Lane		Marine Parkway–Gil Hodges Bridge	Yes	Yes	No	Yes (must use sidewalk on W side)	Bike	Paved	Yes
Jacob Riis Park/Fort Tilden/Breezy Point Tip									
Access Path		Rockaway Point Yacht Club NE end of Breezy Point Tip	No	No	No	Yes	Ped	Paved	No
Hiking Trails		Maritime Forest Trail System, Fort Tilden	No	No	Yes	Yes	Ped	Dirt	Yes
Access Paths		10 paths on Atlantic side of Fort Tilden to beach	No	No	No	Yes	Ped	Sand	W side only
Boardwalk		Outside park; parallels Atlantic Ocean from Beach St 126 E to Beach St 80	No	No	No	Yes	Ped	Boardwalk	No

Table 3-15. Jamaica Bay Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes (continued).

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Boardwalk		S side Jacob Riis Park	No	No	No	Yes	Ped	Boardwalk	Yes
Jamaica Bay Wildlife Refuge									
Bike Lane		Cross Bay Veterans Memorial Bridge	Yes	Yes	No	No	No	Paved	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Dirt	Yes
Hiking Trails		W pond	No	Yes	Yes	Yes	Ped	Dirt/sand	Yes
Hiking Trails		E pond	No	Yes	Yes	Yes	Ped	Dirt/sand	Yes
Bike Lane		Frank M. Charles Memorial Park	Yes	Yes	No	No	Bike	Paved	Yes

NA = not applicable; N = north; ped = pedestrian; SW = southwest; W = west; NE = northeast; E = east; S = south

Jamaica Bay Wildlife Refuge

Private Vehicle and Waterborne Transportation Parking Facilities

Private vehicles can park at the visitor center for the Jamaica Bay Wildlife Refuge. No overflow lots or other informal parking spaces are available, which puts a strain on the existing facilities when the main lot is full.

Public Transportation Services

The Cross Bay Boulevard is a major four-lane arterial in the Broad Channel neighborhood that connects the Jamaica Bay Wildlife Refuge to the New York City Transit Broad Channel station and the Veterans Memorial Bridge. The Veterans Memorial Bridge leads to the Rockaways and connects to NPS districts around Jamaica Bay.

Two limited-stop bus routes, Q52 and Q53, provide access to the refuge from the same bus stop immediately adjacent to the visitor center entrance. Bus service includes all weekends and holidays (with some service reductions on holidays). The Q52 travels between Elmhurst in Queens and Arverne near Rockaway Park. The Q53 travels between Woodside, Queens, and Rockaway Park.

Train access includes the Blue/A to Broad Channel Station in conjunction with a 0.75-mile walk to the park. Train service includes all weekends and holidays (with some service reductions on holidays). Damage to the A Line track bed, signal, power, and communication systems from Hurricane Sandy forced a complete shutdown of the train service in the immediate aftermath of the hurricane. ~~Work is currently underway to restore A Line service to the Rockaways; the MTA is aiming for a summer restoration~~. The two major breaches have been rebuilt and the railroad tracks have been fully restored. All structurally compromised areas have been fixed and major work continues on refurbishing critical operational systems for signals, communications, power, and electrical (MTA n.d.).

Figure 3-24 shows the location of these facilities.



Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Bicycle lanes and a paved multi-use pathway next to Cross Bay Boulevard provide bicycle and pedestrian access to the refuge. A two-way multi-use path parallel to Cross Bay Boulevard is available for cyclists and pedestrians traveling to the Jamaica Bay Wildlife Refuge. Additionally a boardwalk edges the East Pond. Given gaps in the bike infrastructure south of Veterans Memorial Bridge there is limited connectivity between the refuge and the Rockaway peninsula. Proposed improvements to establish bike routes and lanes south of the bridge would allow for greater connectivity to Riis Park via Rockaway Beach Boulevard.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information about them, which was gathered prior to Hurricane Sandy.

Jacob Riis Park/Fort Tilden/Breezy Point Tip

Private Vehicle and Waterborne Transportation Parking Facilities

Jacob Riis Park provides one large parking lot with over 5,000 spaces. The parking lot is significantly over sized and does not fill up even on busy summer weekends.

Jacob Riis Park generates 100 vehicular trips (65 entering and 35 exiting) during the weekday morning peak hour and 210 trips (60 entering and 150 exiting) during the weekday evening peak hour (2006 FHWA). During the Saturday midday peak hour, the Park generates 540 vehicular trips (450 entering and 90 exiting). Approximately 30 percent of the traffic to the Jacob Riis Park beach area arrives from the east and most vehicles use Rockaway Beach Boulevard. On Saturday midday, the hourly volumes on Rockaway Beach Boulevard are approximately 500 vehicles, including 150 (30%) that are related to Jacob Riis Park beach activities (2006 FHWA).

Two kayak launch spots are located in Jacob Riis Park: Riis Landing and Rockaway Point Yacht Club. Riis Landing is centrally located on the northern side of the park near the Marine Parkway Bridge. Rockaway Point Yacht Club is located on the northwestern edge of the park. No water access is provided at Breezy Point or Fort Tilden (NPS n.d.k).

Public Transportation Services

The Q35 provides bus service from Brooklyn to Jacob Riis Park, continuing eastbound along Rockaway Beach Boulevard to Rockaway Park. The Q22 provides bus service between Rockaway Point and Jacob Riis Park, continuing across the Rockaway Peninsula to Rockaway Park and Far Rockaway. Bus service includes all weekends and holidays (with some service reductions on holidays).

Train access includes the Red/2 to Flatbush Avenue and the Blue/A to Rockaway Park / Beach 116th Street. These train routes require taking the Q35 bus from either location or the Q22 bus from Rockaway Park / Beach 116th Street. Train service includes all weekends and holidays (with some service reductions on holidays).

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Jacob Riis Park contains two sections of the Jamaica Bay Greenway multi-use path. The greenway is an off-street path for cyclists and pedestrians that serves as a bicycle commuter path for local residents. One section travels along the northern edge of Jacob Riis Park parallel to Beach Channel Drive. This section extends from the eastern boundary of Jacob Riis Park to Marine Parkway Bridge, where it continues north across the bridge toward Floyd Bennett Field and south along Beach 169th Street to connect with the Jacob Riis Park Promenade section. Cyclists must dismount on the bridge (Jamaica Bay Greenway Missing Link Study 2010).

Jacob Riis Park contains two sections of the Jamaica Bay Greenway multi-use path. The greenway is an off-street path for cyclists and pedestrians that serves as a bicycle commuter path for local residents.

The Jacob Riis Park Promenade is a boardwalk in the southern portion of Jacob Riis Park. This section of the boardwalk extends east from the Jacob Riis Park boundary and terminates at Beach 193rd Street. The boardwalk suffered damage during Hurricane Sandy; further assessment is needed to identify any safety hazards to visitors (IMT 2012j). A short path also veers north from the promenade at Haan Road to terminate at Steele Road (RPA 2012).

A "protected bike path" connects to the Jamaica Bay Greenway at the intersection of Beach 169th Street and Rockaway Point Boulevard. Per the Regional Plan Association for New York, New Jersey, and Connecticut, a protected bike path is differentiated from a bicycle lane, which is defined as an "on-street striped route," and from a shared lane, which is defined as an "on-street marked route." Therefore, it is assumed that a protected bike path is a Class I separate facility (RPA 2012). The bike path extends approximately 4 miles east to the Fort Tilden park boundary. The bike path was covered in sand by Hurricane Sandy (IMT 2012j).

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information.

Riis Landing

Private Vehicle and Waterborne Transportation Parking Facilities

Riis Landing provides one 84-space parking lot for the entire site. This lot is generally not heavily used nor filled given the relatively low level of activity that currently occurs on the landing. It is only during a marine charter excursion, that the parking lot fills and visitors must park across Rockaway Point Boulevard in one of the parking lots located at Fort Tilden (2006 FHWA).

Fort Tilden parking areas are used when the Riis Landing parking is full. Fort Tilden's T-4 parking lot is used for after-school activities and during evenings. Daytime restrictions on the T-4 lot discourage use.

Figure 3-24 shows the location of these facilities.

Canarsie Pier is a popular local fishing location and offers several recreational opportunities, such as seasonal kite-flying activities, youth group paddling, and a summer concert series.

Public Transportation Services

The Q35 bus route provides bus service from Brooklyn to Jacob Riis Park, continuing eastbound along Rockaway Beach Boulevard to Rockaway Park. The Q22 bus route provides bus service between Riis Landing and Rockaway Point, continuing northbound across Broad Channel into Queens. The New York Water Taxi travels between Riis Landing, Brooklyn Army Terminal (Bay Ridge), and Pier 11 Wall Street. The Water Taxi operates weekdays throughout the year. The New York Beach Ferry also provides service to Riis Landing on summer weekends and holidays. Connections are available from Pier 11, which is near South Street Seaport, Manhattan, and a short walk from Wall Street. Ferry service has been inconsistent and caters to different travel markets (e.g., visitor and commuter). Current facilities lack appropriate access and parking to support increased use.

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Riis Landing contains two sections of the Jamaica Bay Greenway multi-use path mentioned under "Jacob Riis Park/Fort Tilden/Breezy Point." A protected bike path connects to the Jamaica Bay Greenway at the intersection of Beach 169th Street and Rockaway Point Boulevard. The bike path extends approximately 4 miles east to the Fort Tilden park boundary (RPA 2012).

Figure 3-24 shows the location of these facilities. Table 3-17 provides more detailed information.

Canarsie Pier

Canarsie Pier is a popular local fishing location and offers several recreational opportunities, such as seasonal kite-flying activities, youth group paddling, and a summer concert series. NPS rangers lead paddling trips from a kayak launch and provide fishing demonstrations (NYHP 2012).

Private Vehicle and Waterborne Transportation Parking Facilities

Canarsie Pier is located on Brooklyn's mainland, allowing for more direct access than some other districts. The pier is immediately adjacent to the Belt Parkway where it intersects Rockaway Parkway. The pier provides parking for approximately 300 private vehicles.

Public Transportation Services

The B42 bus route travels Rockaway Parkway from the L subway station to Canarsie Pier and back. The B42 bus route operates daily, all times. Train access includes the Gray/L to Rockaway Parkway in conjunction with the B42 bus to the pier entrance.

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The ~~Rockaway Gateway~~ Jamaica Bay Greenway parallels the Belt Parkway and Jamaica Bay's shoreline, providing a connection to Canarsie Pier from the north and south. No hiking trails or paths exist in the Canarsie Pier district itself. Recreational kayakers can paddle a loop route into the bay from Canarsie Pier. No designated blueways connect the pier to other areas. However, paddlers could connect with kayak launches at Floyd Bennett Field southwest of Canarsie Pier and Jamaica Bay Wildlife Refuge east of Canarsie Pier.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information about them, but reflects pre-Sandy conditions.

Staten Island Unit

The Staten Island Unit is on the southeastern shore of Staten Island in Lower New York Bay and includes Fort Wadsworth, Miller Field, and Great Kills Park.

Fort Wadsworth

On the easternmost tip of Staten Island, Fort Wadsworth is bisected by the Verrazano-Narrows Bridge, which connects the island to Brooklyn. Visitors access Fort Wadsworth via private car, city bus, or bicycle, or on foot. No internal shuttle service is provided within the site. Fort Wadsworth is not accessible by water and no functional dock exists to facilitate water access.

Private Vehicle and Waterborne Transportation Parking Facilities

Interior roads in Fort Wadsworth are closed to private vehicles. Four visitor parking lots are provided for visitors traveling from New York Avenue and USS North Carolina Road; two are paved and two are composed of gravel or gravel and grass. No water access is provided, although there is a non-functional dock known as Torpedo Wharf that could be used for watercraft. The dock is west of the Verrazano-Narrows Bridge and Battery Weed. The National Parks of New York Harbor Conservancy offers a "Gateway to America" water tour created by the conservancy and the NPS. Although this tour includes the Statue of Liberty, Brooklyn Bridge, Ellis Island, and the Narrows between Staten Island and Brooklyn, it does not include Fort Wadsworth (NYHP 2010). However, the conservancy's "America's Frontline" tour does feature Fort Wadsworth.

Public Transportation Services

Two public city bus routes, the S51 and S81, travel through Fort Wadsworth along Battery Road and New York Avenue. The S51 operates daily between Lincoln Ave/Richmond Rd and the St. George Terminal via Fort Wadsworth between 6:00am-7:00pm. During the weeday afternoon peak perio, the S81 runs limited-stop from the St. George Ferry Terminal to Lincoln Ave/Richmond Rd via Fort Wadsworth. Although the S51 operates 24 hours, the segment through Fort Wadsworth only operates during the span mentioned above. Also the

S81 only operates during the peak afternoon period. Route S53 and express routes X4, X5, X7 and X8 are near the park, with stops at the intersection of Lily Pond Avenue and Battery Road. The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate 24 hours daily. Schedules vary, with more frequent service during morning and afternoon rush hours. Only folding bicycles are allowed aboard local and limited Staten Island buses, and a $5 lifetime bicycle permit is required. The Staten Island Ferry does accommodate bicycle use.

The Staten Island Railway stops at the town of Clifton, north of Fort Wadsworth at Bay Street, where the S51/S81 bus routes also stop. Visitors traveling by train could take the S51 or S81 bus from the Clifton train stop into Fort Wadsworth or could cycle along the Class 3 bicycle route that follows Bay Street to the park site. Standard bicycles are not allowed on the Staten Island Railway trains during morning and afternoon rush hours, although folding bicycles are allowed on trains at all times. Train schedules vary from approximately every 5 to 10 minutes during the morning/evening rush hour to every 30 minutes other times during weekdays. Train schedules are approximately every 30 or 60 minutes on weekends.

No public water access is provided to or from Fort Wadsworth, although Torpedo Wharf could be used for public ferries. Figure 3-25 shows the location of these services.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

An unmarked paved walking route leads to Mont Sec History House; Batteries Catlin, Weed, Bacon, Turnbull, Barbour, and Duane; the overlook; Fort Tompkins; and Camp Hudson. The route follows a paved sidewalk and paved roadway (authorized vehicles only). Several dirt access paths provide access to designated fishing areas on the southeast side of the park.

The New York City Greenway, a paved multi-use path, enters the southernmost corner of the park, connecting Miller Field to Fort Wadsworth. This path suffered damage from Hurricane Sandy, particularly to the pavement, drainage, and guardrails (IMT 2012j). Several additional bicycle lanes or routes exist or are proposed for the area (described under "Cumulative Impacts" in the "Environmental Consequences" chapter). An existing Class 3 bicycle route enters Fort Wadsworth from the north on Bay Street, which becomes New York Avenue once inside the park. A Class 2 bicycle lane follows Father Capodanno Boulevard from Midland Avenue, just north of Miller Field, to Lily Pond Avenue, which traverses Fort Wadsworth's western boundary. This bicycle lane connects with the Class 3 route on Bay Street mentioned above. While biking is popular at Fort Wadsworth, there are no bicycle parking facilities in Fort Wadsworth.

Figure 3-25 shows the bike paths, greenways, blueways, hiking trails, and pedestrian routes for this unit. The map key symbols correspond to Table 3-15, which provides more detailed information about these facilities (gathered prior to Hurricane Sandy).

Figure 3-25. Fort Wadsworth Transportation Services and Facilities.

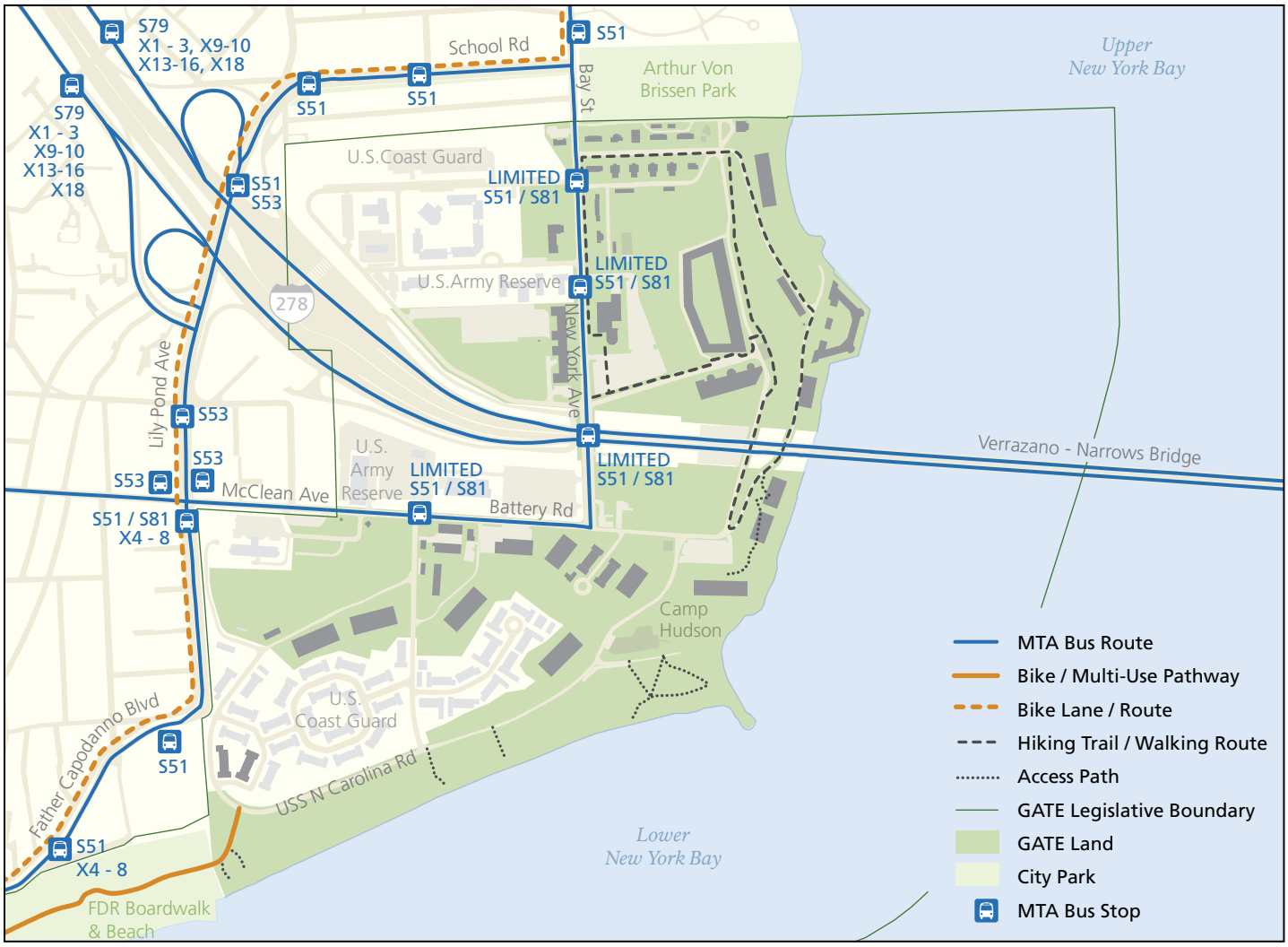


Table 3-16. Fort Wadsworth Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Walking Route		Begins/ends B120 parking lot	Yes	No	No	Yes	Ped	Sidewalk + paved	Yes
Access Path		On walking/ biking route – S of Battery Barbour	No	No	No	Yes	Ped	Dirt	No
Gravel Drive		Range Road – parking lot	No	No	No	Yes	Ped	Gravel	Yes
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	Yes
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	No
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	No
Access Path		USS NC Rd – S of Battery Dix	No	No	No	Yes	Ped	Dirt	No
Access Path		USS NC Rd – N of USS TN Rd	No	No	No	Yes	Ped	Dirt	No
Bike Path (New York City Green-way)		USS NC Rd – S of USS TN Rd	Yes	Yes	No	Yes	Multi-Use	Paved	No
Access Path		Bike path – S of USS NC Rd	No	No	No	Yes	Ped	Sand	No
Access Path		Bike path – S of access path	Yes	No	No	Yes	Ped	Sand	No
Proposed Bike Route		Proposed bike route through park	Yes	Yes	No	NA	Bike	Paved road	No
Class 2 Bike Lane		Existing Class 2 bike lane W of park	Yes	No	No	NA	Bike	Paved road	No
Class 3 Bike Route		Existing Class 3 bike route N of park	Yes	No	No	NA	Bike	Paved road	No

S = south; ped = pedestrian; USS NC = USS North Carolina; N = north; USS TN = USS Tennessee; NA = not applicable; W = west

Miller Field

South of Fort Wadsworth, Miller Field is home to a variety of sports fields, a bocce court, playgrounds, and picnic area. Recreation is the focus at Miller Field, particularly team sports. Like Fort Wadsworth, Miller Field can be accessed via private car, city bus, or bicycle, or on foot.

Private Vehicle and Waterborne Transportation Parking Facilities

Nine visitor parking lots, all of which are paved, exist at Miller Field. Traffic congestion forms at Miller Field during parking lot turnover, creating a line of cars waiting to enter and exit the park. None of the parking lots required permits, although sports groups needed a permit to use the site's facilities. According to the Gateway State of the Park 2008, the parking facilities have been renovated, allowing easy access to the sports fields. No water access is provided (NPS 2008).

Public Transportation Services

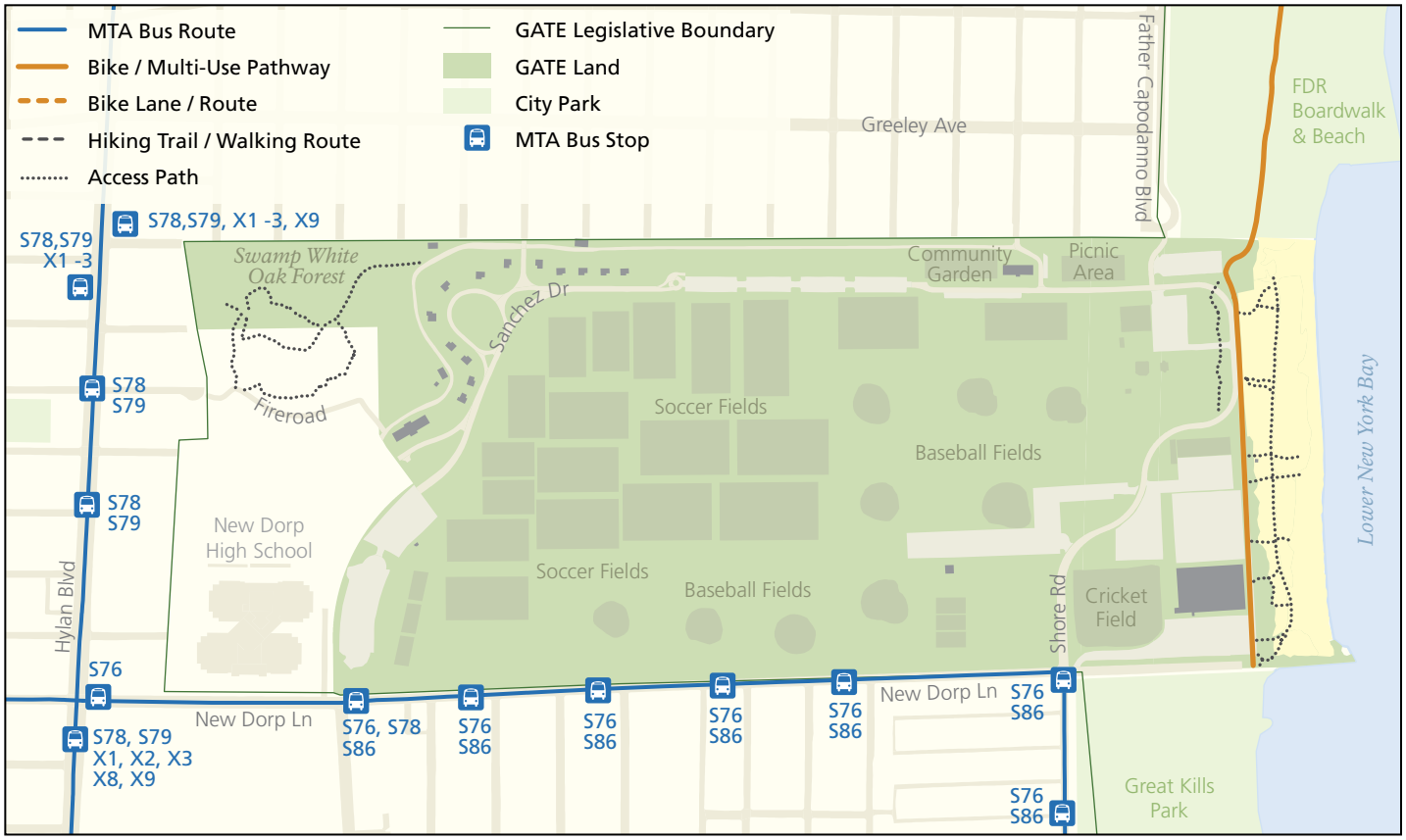
One limited-stop bus, the S76/S86, travels between Oakwood Beach and the St. George Ferry Terminal. No bus routes enter Miller Field, unlike Fort Wadsworth. Other routes travel nearby on Hylan Boulevard, stopping where it intersects New Dorp Lane: the S78, S79, and express routes X1, X2, X3, X8, and X9. The X1 epxress route operates weekdays, Saturdays, and Sundays. The S78 route travels between Tottenville and Saint George Ferry Terminal. The S79 Select Bus Service (SBS) travels between the Staten Island Mall and the Bay Ridge in Brooklyn. The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate daily. Schedules vary, with more frequent service during morning and afternoon rush hours. Bicycle restrictions and transit services are as described for Fort Wadsworth.

The Staten Island Railway stops where the rail line intersects New Dorp Lane. Visitors traveling by train could take the S76/S86 bus from the train stop directly to either of the Miller Field park entrances. Bicycle restrictions and train schedules are as described for Fort Wadsworth. No public water access is provided to or from Miller Field. Figure 3-26 shows the location of these services.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Several segments of walking routes and access paths exist in Miller Field. Like Fort Wadsworth, numerous access paths lead to fishing locations along the coastline, but no water access and no public docks are provided. A gravel road, used for hiking, begins at Miller Field's northeast entrance near the visitor's contact station and leads to the swamp white oak forest at the park's northwestern corner. This route was in fair condition prior to the hurricane. Where the gravel road ends, a fire road continues farther into the forest.

Figure 3-26. Miller Field Transportation Services and Facilities.



An access path leads from Memorial Circle, where the New York City Greenway begins, to Shore Road. Several access paths lead to the designated fishing area along Lower New York Bay. These paths filled with sand during the hurricane (IMT 2012j).

The New York City Greenway multi-use path begins and ends at Miller Field, paralleling the Lower New York Bay north to Fort Wadsworth. The greenway enters Miller Field near Memorial Circle in the northeast corner of the park, where the route begins and ends. As mentioned above, this route provides a connection to Fort Wadsworth. Figure 3-26 shows the location of these facilities. Table 3-16 provides more detailed information.

Table 3-17. Miller Field Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Bike Path (New York City Greenway)		Bike path – N of Memorial Circle	Yes	Yes	No	Yes	Multi-use	Paved	Yes
Access Path		Swamp white oak forest	No	No	No	Yes	Ped	Other – dirt	No
Access Path		NW of Shore Rd	No	No	No	Yes	Ped	Paved	Yes
Access Path		Parallel to Shore Rd	No	No	No	Yes	Ped	Paved	No
Access Path		SE of Memorial Circle	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		NE from parking lot	No	No	No	Yes	Ped	Sand	No
Access Path		NE from parking lot	No	No	No	Yes	Ped	Sand	No
Access Path		NE of historic hangars	No	No	No	Yes	Ped	Sand	No
Access Path		E of historic hangars	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Gravel Road		N end of park	No	No	No	Yes	Ped	Gravel	No
Class 2 Bike Lane		Existing Class 2 bike lane N of park	Yes	No	No	NA	Bike	Paved road	No
Proposed Bike Route		Proposed bike route S of Miller Field	Yes	No	No	NA	Bike	Paved road	No
Proposed Bike Route		Proposed bike path from New York City Greenway S to Oakwood Beach	Yes	Yes	No	NA	Bike	Paved road	No

N = north; ped = pedestrian; NW = northwest; SE = southeast; NE = northeast; E = east; NA = not applicable; S = south

Great Kills Park

Great Kills Park is on a peninsula that features an inlet harbor, barrier ocean beach, and open space. Like Fort Wadsworth and Miller Field, Great Kills Park can be accessed via private car, city bus, or bicycle, or on foot. Waterways and water access are crucial components of this Staten Island site, unlike Fort Wadsworth and Miller Field.

Private Vehicle and Waterborne Transportation Parking Facilities



Several paved and gravel lots, some requiring permits, provide parking at Great Kills Park. Parking lots provide access to boating, fishing, trailheads, and an educational field station. Prior to the hurricane, a total of 15 parking facilities were available to visitors, although the lot at the model airplane flying field and at ball fields 1, 2, and 3 were closed due to environmental contamination issues (radiation). ~~Two standard bicycle racks—one at the educational field station and one north of Nichols Marina—were provided.~~ The "Entrance Parking East" lot is not on NPS property and is maintained by the city. Two lots at Crooke's Point require permits.

No public watercraft access, such as a public ferry, is provided. Prior to Hurricane Sandy, Great Kills Park provided watercraft access and docking facilities at Nichols Marina for private boaters. The marina was open only to slip leaseholders. A boat ramp was also provided for visitors to the northeast of the marina. Hurricane Sandy damaged the marina in 2012; the permanent docks are now gone. Most of the boats that were moored at the docks were badly damaged or lost. ~~A floating pile of debris at the boat ramp was the responsibility of the New York Department of Environmental Compliance, which is also planning for its removal. Up to 13 boats are sunk in the water next to the Great Kills shoreline and are the responsibility of the U.S. Coast Guard to retrieve and remove. Numerous boats on the Great Kills beaches are the responsibility of the individual owners to retrieve and remove. The NPS has provided supervision for removal by private towing companies thus far.~~ The parking lot and roadway to the marina were also heavily damaged (IMT 2012j).

New York City established a temporary ferry to Manhattan from Great Kills as a result of Hurricane Sandy. Launched on November 25, 2012, the temporary ferry service from Great Kills to Manhattan brought relief to, and eased the commutes of, neighborhoods that saw some of the worst damage from Hurricane Sandy. The schedule ran from Great Kills Park to Pier 11 at Wall Street, continuing on to 35th Street. Vessels left from a newly installed temporary landing near the marina in Great Kills Park along Buffalo Street, and three parking areas in Great Kills Park were available to ferry riders arriving by car. Additionally, a shuttle bus provided by New York City Transit links the ferry landing with the S78 and SBS S79 bus stop at Buffalo Street and Hylan Boulevard and parking areas. The ferry service concluded January 25, 2013, and there are no plans to extend the service at this time (NYCDOT 2013).

Public Transportation Services

Several public city bus routes travel Hylan Boulevard, which parallels Great Kills Park's northwestern boundary, stopping at the park entrance and at an access path into the park. These routes include S78 and S79 Select Bus Service (SBS), described under "Miller Field," and express routes X1, X4, X5, X7, X8, and X24.The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate daily. The X1 express route operates weekdays, Saturdays and Sundays. Schedules vary, with more frequent service during morning and afternoon rush hours. Bicycle restrictions are as described for Fort Wadsworth.

The Staten Island Railway stops where the rail line intersects Bay Terrace Avenue, which is northwest of the park. However, no bus routes access this train stop. Train users with bicycles could potentially cycle along roads that are not official bicycle lanes or routes to the proposed bicycle route that would follow Hylan Boulevard to the park entrance. Bicycle restrictions and train schedules are as described for Fort Wadsworth. Figure 3-27 shows the location of these facilities.

Figure 3-27. Great Kills Park Transportation Services and Facilities.



Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A combined paved and gravel (wheelchair-accessible) multi-use path begins at the entrance to Great Kills Park, roughly following Buffalo Street and extending 1.5 miles to the swimming beach and Nichols Marina. The path offers opportunities for walking, jogging, cycling, and rollerblading. As a result of the hurricane, erosion of sand near the walkway is a potential hazard to path users but could be mitigated through sand relocation. An area of approximately 150 feet was washed out or damaged during the storm, posing a potential safety risk to community users. The Blue Dot Trail, a 1.5-mile path paralleling Hylan Boulevard along the park's northwestern boundary, offers views of diverse wildlife and natural habitats (NYHP 2009). A footbridge near Hylan Boulevard needs to be assessed for damage from the hurricane (IMT 2012j). Three additional hiking trails exist at Crooke's Point on the tip of the Great Kills Peninsula: White Trail, Orange Trail, and Yellow Trail. Access paths extend from the White Trail and the parking lots (by permit only) in this area to fishing areas that surround the peninsula. Other access paths in the park provide access to the bay or harbor. However, the access path from ball field 3 to the Blue Dot Trail is currently closed due to radiation (see "Health and Safety" in this chapter for more information). Trail repairs and bike path repaving due to Hurricane Sandy began in the winter and will continue until they are complete.

The New York City Water Trail (New York City Water Trail) also designates a kayak landing area at Great Kills Park district, without identifying a specific location (NYCDPR n.d.). Figure 3-27 shows the location of these facilities.

Table 3-18. Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Multi-use Path		Hylan Blvd and Buffalo St	Yes	No	No	Yes	Multi-use	Paved	Yes
Access Path		Parking Area A	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		S of beach center	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Hiking Trail		White Trail	No	No	Yes	Yes	Ped	Other – dirt	Yes
Access Path		Access from hiking trail	No	No	No	Yes	Ped	Other – sand	No

Table 3-18. Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes (continued).

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Hiking Trail		Orange Trail	No	No	No	Yes	Ped	Other – dirt	No
Hiking Trail		Yellow Trail	No	No	No	Yes	Ped	Other – dirt	Yes
Hiking Trail		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Crooke's Point Harbor Parking Lot	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Overflow launch/ trailer parking	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Buffalo St	No	No	No	Yes	Ped	Crushed gravel	Yes
Access Path		Education Field Station	No	No	No	Yes	Ped	Crushed grave	Yes
Hiking Trail (Blue Dot Trail)		Hylan Blvd/Buffalo St Entrance to Bulkhead Rd	No	No	No	Yes	Ped	Other – dirt, paved	Yes
Access Path		Access from Hylan Blvd to Blue Dot Trail	No	No	No	Yes	Ped	Paved	No
Access Path		Blue Dot Trail to Ball Field 3 Parking Lot	No	No	No	Yes	Ped	NA	Yes
Access Path		NW park boundary and Wetland Rd	No	No	No	Yes	Ped	Crushed gravel	No
Class 3 Bike Route		Proposed bike route on Hylan Blvd	Yes	No	No	NA	Bike	Not yet developed	No
Proposed Bike Route		Proposed bike path through park	Yes	No	No	NA	Bike	Not yet developed	No
Class 3 Bike Route		Proposed bike route on Mansion Ave (outside park)	Yes	No	No	NA	Bike	Not yet developed	No

Ped = pedestrian; S = south; NA = not applicable

Sandy Hook Unit

Gateway's Sandy Hook Unit is a barrier beach peninsula on the northern tip of the New Jersey shore. Like the Staten Island sites, Sandy Hook is primarily accessed via private car, by bicycle, or on foot. In addition, prior to Hurricane Sandy, a seasonal (summer-only) ferry provided access between the Fort Hancock Historic District and Manhattan. A shuttle bus connection took visitors from the ferry landing to attractions throughout the park and back.

Sandy Hook was perhaps the most damaged unit of Gateway by Hurricane Sandy in 2012. A 13-foot storm surge washed over Sandy Hook, depositing 5-foot drifts of sand along 3 miles of the main road (Foderaro 2012). Restoration work to date has included clearing roads and trails, stabilizing park facilities, and redistributing sand that had filled roadways and parking lots. Due to the extensive damage resulting from Hurricane Sandy, the Sandy Hook Unit was closed to the public until park facilities were restored in May 2013 (IMT 2012a).

Private Vehicle and Waterborne Transportation Parking Facilities

Within the Fort Hancock Historic District in Sandy Hook prior to Hurricane Sandy, 8 visitor parking facilities were provided, with an additional 13 facilities outside Fort Hancock, for a total of 21 parking facilities. Two of these facilities—one at the visitor center and one at Gunnison Beach—provided bicycle parking, offering a total of 11 spaces. The majority of Sandy Hook's car parking lots required permits. Visitors accessing the fishing beach on the ocean side just north of the visitor center parked along a paved road leading from Hartshorne Drive. However, Hartshorne Drive was damaged by Hurricane Sandy and the road edge was in need of repair. Parking lots provided access to boating, fishing, trailheads, and an educational field station. Parking near Pennington Drive in Fort Hancock was in fair condition prior to Hurricane Sandy, showing some cracks and shallow holes in the pavement. Some of the lots in Fort Hancock, particularly overflow lots, were gravel and were heavily damaged by the storm (IMT 2012j).

Although the park includes more than 4,000 parking spaces at highly visited beaches and concessions, as well as approximately 900 spaces elsewhere (primarily at Fort Hancock and fishing access at Parking Lot F), the current parking supply is not sufficient to serve all of Sandy Hook's recreational visitors on peak summer weekends. During these times, vehicles approaching the park back up past the Shrewsbury Bridge into Highlands and Sea Bright, congesting local streets, blocking driveways, and increasing safety, air quality, and noise pollution problems. Regional traffic congestion becomes an even bigger issue when the park reaches capacity, because vehicles on Route 36 need to turn around and leave the Sandy Hook area when parking areas fill and the park gates are closed. Parking Area D, where long lines of cars form, is particularly problematic because many traffic-related incidents occur due to high turnover caused by the area's proximity to the primary beach concession area. Park rangers are required to direct traffic at Parking Area D when long lines of traffic there and on Hartshorne Drive become an issue. Hartshorne Drive becomes congested in the evening as beachgoers from the northern areas of the park leave for the day (Volpe Center 2003).

Although no private watercraft docking facilities are provided, Sandy Hook did provide public watercraft access prior to Hurricane Sandy. A seasonal ferry traveled between the Fort Hancock Historic District and Manhattan during the summer. Fares were approximately $40 round-trip. Repairing the docks was a high priority, and the ferry is once again operational during the summer months (IMT 2012j).

The NPS removed the one-sided barge that was in place at the Sandy Hook Bay Ferry Landing in Fort Hancock in 2009. Currently, there is a new NPS-owned barge/dock. The park began preparing an environmental assessment in 2009 for a new pier with wave attenuation devices, a floating ferry dock, improved parking, and a waiting area for ferry passengers. The new pier would be placed in the same location as the existing pier and barge, behind the Fort Hancock Chapel (NPS 2009i). As of July 2013, these facilities have not yet been built. Figure 3-28 shows the location of these facilities.

Public Transportation Services

Two bus routes—Academy route 36 and New Jersey Transit route 834—travel to the town of Highlands on the mainland near Sandy Hook. Route 36 travels between Long Branch, which is directly south of Sandy Hook, and the Port Authority. Route 834 travels between Red Bank, which is southwest of the park, and Highlands. Bicycles are permitted at all times on buses with bicycle racks on the front or with underfloor luggage compartments on a first-come, first-served basis. Currently half of the New Jersey Transit bus fleet is "bike friendly." Bicycles are not permitted on articulated buses.

Unlike the Staten Island Unit, which has bus routes immediately adjacent to park site boundaries, Sandy Hook has bus routes that approach the park unit but visitors need additional transportation to and through the park. Visitors dropped off near the park entrance would have to walk 2 miles to the nearest bathing beach (Volpe Center 2004).

The North Jersey Coast Line provides train service to the town of Red Bank, which is southwest of the park. Visitors accessing the park by train then have to transfer to bus route 834 to Highlands. However, as described above, no public transportation is available from Highlands to or through Sandy Hook. Collapsible bicycles are accommodated on all New Jersey Transit trains at all times. Standard-frame bicycles are permitted only in accessible cars except during rush hour, on holidays, on the days prior to holidays, and on the Friday after Thanksgiving. There is a limit of two bicycles or Segway® Personal Transporters per accessible car. There is no additional charge for bringing a bicycle on a train.

Public ferries access the town of Highlands and nearby Atlantic Highlands, traveling to and from various destinations in Manhattan. These ferries, some of which are private charters, operate year-round with varying frequency. However, once arriving in Highlands, no public transportation is available from Highlands to or through Sandy Hook.

A seasonal public ferry with a capacity of 400 people operates during the summer between a ferry landing at Fort Hancock and Manhattan. Visitors arriving by ferry at Fort Hancock can take a shuttle bus from the Fort Hancock Ferry Landing to the Fort Hancock Museum, North Beach, Gunnison Beach, and Beach Area E. The shuttle provides a connection to the multi-use pathway that runs most of the length of the peninsula. The shuttle bus does not travel to the entrance gate to transport visitors into the park. Figure 3-28 shows the location of these facilities.

Figure 3-28. Sandy Hook Transportation Services and Facilities.



Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A multi-use pathway starts at Sandy Hook's entrance, following Hartshorne Drive and ending in Fort Hancock. The NPS provides mobile bicycle racks at all beach locations when needed. The multi-use pathway was ruptured in several locations during Hurricane Sandy in 2012, but has since reopened (IMT 2012j). Prior to the hurricane, the multi-use pathway was being expanded to loop around Fort Hancock. Phases 1 and 2A of the pathway were complete. The first phase of the multi-use pathway, completed in 2004, was approximately 5.5 miles in length and provided non-motorized access from Sandy Hook's entrance to the Fort Hancock Ferry Landing. Phase 2A, which was completed in 2008 and 2009, added approximately 3.1 miles of trail and created a loop between the North Beach Plaza, the Gunnison Beach Plaza, and the Mortar Battery at Fort Hancock (NPS 2012h).

Hiking trails begin at the Sandy Hook visitor center and Area M near Nine-Gun Battery just north of Fort Hancock, which is a loop near North Pond. Several paths provide foot access to beach and fishing locations, including Gunnison Beach and North Beach. Sidewalks parallel some roads in Fort Hancock. Many of these trails and some boardwalks were damaged during Hurricane Sandy and needed repair. The NPS expects to reopen trails and fishing areas for summer 2013 (IMT 2012j).

Figure 3-28 shows the location of these facilities. Table 3-19 provides more detailed information about them, which was gathered prior to Hurricane Sandy.

Table 3-19. Sandy Hook Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Multi-use Path		Fee Plaza (Main Gate) to Parking Lot I	Yes	No	No	Yes	Multi-use	Paved	Yes
Hiking Trail		Old Dune Trail	No	No	Yes	Yes	Ped	Sand	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Boardwalk + sand	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Boardwalk	Yes
Hiking Trail		Holly Forest	No	No	Yes	Yes	Ped	Boardwalk + sand	Yes
Access Path		Gunnison Beach	No	No	No	Yes	Ped	Boardwalk + sand	No
Hiking Trail		Horseshoe Cove	No	No	Yes	Yes	Ped	Other – mixed	No
Hiking Trail		Observation deck	No	No	Yes	Yes	Ped	Sand	Yes
Hiking Trail		South Beach Dune Trail	No	No	Yes		Ped	Sand	Yes
Hiking Trail		Nike Missile Launch Site	No	No	Yes	Yes	Ped	Sand	Yes
Multi-use Path (Ft Hancock)		Continued from Fee Plaza (Main Gate)	Yes	No	No	Yes	Multi-use	Paved	Yes
Access Path (Ft Hancock)		Parking Lot G – Gunnison Beach walkway	No	No	No	Yes	Ped	Paved – sidewalk	Yes
Multi-use Path (Ft Hancock)		Knox Rd	No	No	Yes	Yes	Ped	Paved	Yes
Access Path (Ft Hancock)		Gunnison Beach Complex	No	No	No	Yes	Ped	Sand and boardwalk	Yes
Access Path (Ft Hancock)		North Beach Complex	No	No	No	Yes	Ped	Sidewalk	Yes
Access Path (Ft Hancock)		Sandy Hook Proving Ground	No	No	No	Yes	Ped	Sand and gravel	Yes
Sidewalk (Ft Hancock)		Hartshorne Dr	No	No	No	Yes	Ped	Paved	Yes
Sidewalk (Ft Hancock)		Magruder Rd, Kearney Rd	No	No	No	Yes	Ped	Paved	Yes
Sidewalk (Ft Hancock)		Sandy Hook Proving Ground	No	No	No	Yes	Ped	Gravel	Yes

Ped = pedestrian

Park Management, Operations, and Facilities

Staffing

The approved GMP will bring significant new challenges for Gateway operations and management that will be dependent on the availability and efficient management of additional funding and staff resources.

The park management team and staff are responsible for all day-to-day management and operations of Gateway. In 2010, the park was staffed by 316 full-time equivalent employees (FTEs), which include full-time, part-time, term, temporary, and student employment. The staff and volunteers of more than 70 park partners supplement the NPS staff, which fulfills critical roles in all aspects of park operations and maintenance. In Fiscal Year (FY) 2010, the park's operations appropriation was $26.5 million, the majority of which goes to pay salaries and benefits and fixed costs such as electricity, gasoline, and other utility costs. The park attracted some 9.4 million visitors in 2010.

Across all divisions of the park staff, volunteers (from retired seniors to youth conservation corps and college interns) supplement and assist with the work of the career NPS staff, providing volunteer labor to support the goals of the park, while gaining personal experience, knowledge, and professional experience. Going forward, the park will certainly benefit from a growing amount of such assistance.

Office of the Superintendent

The Office of the Superintendent includes managerial activities of the superintendent, the deputy superintendent, office of communication, volunteer coordinator, and strategic planning and initiatives, as well as administrative staffs. The Office of the Deputy Superintendent is responsible for park management, including staff, in the areas of administration, business management, cultural resources, interpretation, education, safety, facility/asset management, natural resources, science, planning and compliance, budget, human resources, IT, fleet and property management, and visitor resources and protection.

Resource Management Division

The division of planning, managed within the Resource Management Division, is responsible for planning, environmental review, transportation, and design. The staff provides park management with the technical expertise and policy guidance needed to plan for the preservation and protection of the park's natural and cultural resources, determines and provides for appropriate public use, and manages public involvement in the planning and decision-making process. The planning staff coordinates with other park divisions; park partners; other federal, state, and local agencies of government; and consultants to carry out their mission and responsibilities.

Cultural Resources

Cultural resource staff are responsible for the management of Gateway's cultural resources, including archeological sites, fortifications, historic structures and museum collections. This includes overseeing resource protection and preservation as well as assisting with interpretation of cultural resources.

Cultural resource staff are currently working with facility management to document the baseline conditions of all park cultural resources in an effort to guide future operations and programs. Volunteers are necessary to support the park staff, given the large number, diversity, and significance of the park's cultural resources.

All alternatives in this GMP/EIS envision the park "banding" cultural resources to identify those whose condition will stay the same or improve, those where some action will be taken to slow but not stop deterioration, and those historic structures that are ruins and that will receive no maintenance. The cultural resources management division, along with facility managers and others, would be tasked with accomplishing this objective to the extent possible depending on the availability of funding, staff, time, and resources.

Cultural resource staff are responsible for the management of Gateway's cultural resources, including archeological sites, fortifications, historic structures and museum collections. This includes overseeing resource protection and preservation as well as assisting with interpretation of cultural resources.

Natural Resources

Natural resource staff are responsible for the management of Gateway's natural resources including its land-based and marine habitats. Natural resource staff are involved in research, monitoring as well as resource protection and habitat restoration projects.

Resource and Visitor Protection Division

The environmental and safety offices, along with the U.S. Public Health Service, are responsible for environmental protection, occupational health and safety, and lifeguard and emergency medical services. It also manages the park's sustainability programs, including addressing best management practices related to minimizing the impacts of climate change. Minimizing the impacts of park operations, including energy use and carbon footprint, is a priority. The group also handles comprehensive water, energy, and hazardous and universal waste management; air permits; hazardous material and hazardous waste remediation projects; and all regulatory requirements associated with these activities.

The safety of Gateway visitors and the protection of resources are management priorities. Staff exercise appropriate safety awareness and law enforcement and ensure resource and visitor protection as well as adherence to park rules and regulations. The environmental and safety office's focus is on ensuring that employees and visitors are safe.

The park relies on the U.S. Park Police for resource and visitor protection in the New York units of the park (Jamaica Bay and Staten Island). Commissioned rangers provide visitor and resource protection in the Sandy Hook Unit. Existing staff resources are proactively managed to maximize law enforcement coverage and visitor safety. Ensuring a strong park ranger / law enforcement presence is a priority in controlling use and protecting resources.

In the New York units, structural and wildfire management is provided under an agreement between the New York City Fire Department (FDNY) with the assistance and cooperation of the NPS. Sandy Hook's structural and wildland fire management is the responsibility of the NPS with the support of local entities under mutual aid agreements.

Office of Asset Management

The asset management division is responsible for ensuring the physical integrity of park assets with a strong emphasis on facility maintenance and operations.

Physical assets that are the responsibility of the asset management division include all park buildings, utilities, roads, trails, grounds, housing, and historic structures, except for those facilities that have been transferred to park partners, lessees, or concessioners for their use. Maintenance responsibilities are divided geographically among the three units, as well as by asset types. Maintenance work performed is supplemented by crews from the conservation corps and by volunteers who assist with assigned projects throughout the park. These additional labor resources help reduce the backlog of needed repairs.

Finding viable contemporary uses for hundreds of historic structures is a priority preservation strategy for Gateway. The maintenance of historic infrastructure in the park is a constant challenge, requiring ever-increasing resources as these buildings age. Deferred maintenance is also challenging, and historically, a majority of asset management needs have gone unmet annually due to insufficient funding.

With over 27,025 acres of marshes, wildlife sanctuaries, and recreational and athletic facilities; miles of sandy beaches; indoor and outdoor classrooms; picnicking and camping facilities; hundreds of historic structures and military installations; airfields; a lighthouse; and ocean and bay waters, this park offers urban residents a national park experience in an urban area. Emergency stabilization of facilities and infrastructure due to damage from Sandy had been largely completed by early 2013, but many of these facilities will remain closed until recovery is accomplished later in the next two or three years.

Hurricane Sandy impacted infrastructure systems, buildings, fleets, and equipment in all three units of Gateway, leaving 92 of these facilities and systems in serious condition and another 74 in poor condition. The storm's impacts required more immediate decision making about the future of many of these facilities and systems than might have otherwise been the case, and Gateway is currently deeply engaged in critical decision making in full consultation with partner agencies, communities, and support organizations. Decisions are being made regarding which systems and facilities would be restored and fully used in park operations and visitor programs; which would be stabilized and maintained as contributing elements of the cultural landscape; and which would be allowed to deteriorate as part of a Ruins Subzone. Each decision on the future of individual buildings would be made by the NPS with all appropriate consultation, documentation, and compliance. Decisions made to date are discussed in the "Asset Management" section. All areas, including flooded buildings, have been stabilized so that their condition does not worsen.

Interpretation and Education Division

With 9.4 million visitors in 2010, Gateway is among the most heavily visited parks in the national park system. Visitors come from a wide diversity of socioeconomic backgrounds. The interpretation and education division is responsible for connecting people to the park, and is heavily engaged in community outreach. Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor.

The professional staff of the division strives to ensure that visitors are informed and oriented, both before they arrive and throughout their visit. Directing visitors to points of interest or appropriate interpretive opportunities is a major function of various interpretive strategies and tools, and requires constant vigilance and planning to promote visitor use and enjoyment while minimizing impacts on park resources. More actual and virtual interpretive programs are required to reach a broader audience and to increase visitor understanding and enjoyment of what they are experiencing. The GMP anticipates visitor services and facilities that are appropriately scaled and sensitively located to meet the needs of visitors, minimize impacts on park resources, and enhance visitor education and safety.

The demand for more education and interpretive programs far exceeds what the park is currently able to deliver. Many significant resources in the park are inadequately interpreted due to limited staff and funding for program development. Park partners are therefore called on to help meet public demand for educational and interpretive programs. All alternatives in the GMP/EIS envision increased partnership engagement using interagency agreements, concession contracts, leases, cooperative agreements, and other vehicles to increase and secure shared responsibilities for providing interpretive and educational programs at the park and in the adjacent communities.

Office of Business Services

The business services and partnership division oversees complex contracts and partnership agreements that provide key services within the park. The division also manages leases, concessions, and the legal aspects of park and partner projects.

Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor.

Partners and Other Entities

In addition to programs offered by the NPS, park visitors can enjoy programs provided by a number of nonprofit organizations. Park partners provide conservation, restoration, and protection; environmental education; outreach programs; and recreational opportunities that support the goals of the park while achieving their own organizational missions.

For example, since 2010, MillionTreesNYC and the NYCDPR have been helping to plant native trees and shrubs and weed out invasive plants at Floyd Bennett Field. Similarly, beginning in 2011, park staff and volunteers, with the assistance and skills of the NYCDPR, began a major vegetation restoration project at Crooke's Point, a 28-acre peninsula located at Great Kills

Park in the Staten Island Unit. Great Kills Park has severely degraded habitat dominated by several particularly aggressive invasive, nonnative plant species. Approximately 85 percent of the project area at Crooke's Point consists of invasive vines; without intervention, this degraded plant community would remain a poorly functioning habitat for many years. Starting with a 2-acre plot, members of this partnership are continuing to remove invasive, nonnative vegetation and replace it with species native to local maritime habitat.

Gateway is also exploring a new partnership with the NYCDPR to create a newly integrated partnership park around Jamaica Bay that would include New York City and NPS park lands. The goal of this partnership is to make a contiguous park that benefits people and wildlife while leveraging the use of limited tax dollars. Opportunities exist for a similar approach in the Staten Island Unit.

Eight official NPS cooperating partner organizations operate out of facilities at Fort Hancock, including the Marine Academy of Science and Technology (which teaches high school students), the Sandy Hook Child Care Center, the Sandy Hook Foundation (the park unit's official "Friends" group), the American Littoral Society, and the New Jersey Sea Grant Consortium, among others.

Concessioners provide critical services to enhance visitor experience at the park. There are nine operators providing food services, beach club facilities, equestrian services, golf, a sports complex, and marina facilities.

Each year, close to 5,000 volunteers in the NPS Volunteers in Parks Program contribute over 80,000 hours of their time to protect Gateway's natural and historical resources and to assist visitors. A major benefit of volunteering, in addition to the needed work accomplished, is that volunteers who work 250 hours can receive a pass entitling them to free entry to any federal lands for a year, including all national parks and forests.

Park Facilities

Because of Gateway's large size, in combination with its diversity of natural and cultural resources and history of land use, the NPS is responsible for managing and maintaining numerous facilities in the park. The park contains approximately 1,300 assets, including buildings, trails, utilities, and other structures and landscapes (see table 3-20).

Historic and Non-historic Buildings

Gateway has an infrastructure dominated by hundreds of historic buildings and cultural landscapes, as well as deeply impacted natural features. Much work is needed to bring the diverse infrastructure of the park up to a standard of care that would continue to accommodate a growing diversity and volume of visitors annually. As would be expected for older facilities, the identified deferred maintenance backlog for historic buildings is significantly higher than the identified deferred maintenance backlog for the non-historic buildings (see table 3-21).

The general condition of non-historic buildings is better than that of historic buildings, due to aging facilities and systems requiring maintenance and repair of worn, aged, and obsolete components. Table 3-22 presents the ranked condition of the historic and non-historic buildings as determined by the facility condition index values extracted from the Park Asset Management Plan (NPS 2012e) which is the multi-park coordinating plan for the NPS units in New York Harbor.

Buildings represent 47 percent of the assets at Gateway, a large associated operations and maintenance requirement, and a significant operations and maintenance expenditure (see table 3-23). The Base O&M Benchmarks in this table represents what is required to properly maintain the assets and this figure is significantly higher than the budget that has been allocated.

Table 3-20. Assets at Gateway National Recreation Area.

Asset Type	Number of Assets	Percent of Total
Roads	129	10
Parking	190	15
Trails	58	4
Maintained Landscape	70	5
Building	607	47
Water	27	2
Wastewater	20	2
Electrical System	49	4
Fuel System	12	1
Dam	9	1
Marina/Waterfront	23	2
Monument/Memorial	6	0
Archeological Site	6	0
Fortification	60	5
Towers	13	1
Other	22	2
Total	1,301	100

Source: NPS 2007c.
Note: Due to rounding, percentages may not add up to 100.

Table 3-21. Number and Type of Buildings and Cost to Bring them to Adequate Condition.

Asset Type	Asset Count	Deferred Maintenance Cost
Historic Buildings	211	$115,901,704
Non-historic Buildings	396	$68,675,416

Table 3-22. Condition of Historic and Non-Historic Buildings at the Park.

Rank	Historic Buildings		Non-historic Buildings	
	#	%	#	%
Good	80	38	265	67
Fair	25	12	22	6
Poor	69	33	84	21
Serious	37	18	25	6
Total	211	101	396	100

Source: NPS 2007c.
Note: Due to rounding, percentages may not add up to 100.

Table 3-23. Operations and Maintenance Cost, Funding, and Gaps for Park Buildings.

Asset Type	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Buildings	607	$2,780,307	$13,568,073	20%	$10,787,766

O&M = operations and maintenance

Nearly 35 percent of Gateway's buildings are historic, and so carry special legal and regulatory requirements for maintenance. A few buildings are managed and maintained by the partner or concession organization occupying them. For example, at Fort Tilden, the Rockaway Theatre Company offers live performances at the historic Post Theatre and the Rockaway Artists Alliance offers classes, exhibitions, and special events at two repurposed buildings.

Officers' Row at Fort Hancock is a fundamental cultural resource that the park struggles to maintain. The buildings are in disrepair and are vulnerable to the potential threat of future sea-level rise.

The bathhouse, batteries, and other historic structures located on the shorelines of Jacob Riis Park and Fort Tilden are also subject to potential damage from sea-level increases. Many cultural resources are less than 20 feet above sea level and therefore vulnerable to flooding during storm events.

Maintained Landscapes

Gateway maintains diverse natural and cultural landscapes for public use, such as vistas of Jamaica Bay, wetlands, historic parade grounds, and stretches of sandy beaches. Gateway's beaches and natural areas provide unique refuges from the noise and stresses of urban living. In some cases, the landscape attributes are surprising and unique. The grasslands at Floyd Bennett Field are the largest little bluestem old field grasslands in New York City, and provide bird habitat and a stopover for grassland birds in the heavily developed New York metropolitan area.

Although earthen landscapes that historically camouflaged coastal defenses (e.g., Battery Harris East at Fort Tilden) were typically managed as natural landscapes in the past, under this GMP such human-made landscapes will be managed as cultural landscapes and proactively maintained and interpreted as such. Many of the prominent structures are overgrown and unsafe for visitors; visitor access to these structures is prohibited until funds can be obtained to provide more proactive management. The park is currently prioritizing which of these structures are suitable for future park use; those whose condition will be improved; those that would be stabilized; and those that would be documented but allowed to continue to deteriorate or that would be removed and the site restored. Decisions to date are discussed in the "Asset Management" section.

Landscapes at the park can present a constant and demanding management challenge. In some cases, the landscapes are degraded and not sustainable, such as most of the estuaries within the park boundaries. The deterioration of the saltmarsh at Jamaica Bay is severe because the rate of replacement of saltmarsh cannot keep pace with a loss rate that approximates 30–50 acres per year. Because the deterioration is likely a result of many factors outside NPS control (including sea-level rise), the park is unable to maintain the landscape as it would like or as solely natural conditions would dictate.

Trails, Roads, and Parking

The park staff maintains paved and unpaved roads throughout the park. These roads are enumerated and described in the "Transportation" section in this chapter. Roads require continual maintenance and the lack of funding reduces the park's ability to maintain them at an optimum level.

Approximately 33 miles and 58 different trails at Gateway, ranging from paved surfaces to single-track paths, provide access for walkers and hikers to and through the park's developed and natural areas. Because Gateway is an urban park, the trails receive heavy use and require diligent maintenance and upkeep. The full, required budget and staffing for this maintenance is unavailable through NPS sources (see table 3-24) and would require supplemental sources.

Table 3-24. Required Funding for Operations and Maintenance of Roads, Parking and Trails.

Asset Type	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Roads	129	$422,610	$861,422	49%	$438,812
Parking	190	$605,669	$1,915,011	32%	$1,309,342
Trails	58	$260,761	$1,204,507	22%	$943,746

O&M = operations and maintenance

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible. Because of poor wayfinding and a lack of NPS visibility at areas like Fort Wadsworth, visitors not familiar with the area and with Gateway often become confused and disoriented. The NPS recently completed a comprehensive sign plan. Hurricane Sandy damaging or destroying many of the park's signs provides an opportunity to implement the sign plan sooner than would have been possible before the storm. Social networking, websites, use of quick response code tags, and other technological innovations in interpretive media and communications need to continue to be expanded to connect with broader audiences and potential visitors.

Gateway is accessible via public transportation systems (see the "Transportation" section in this chapter of the GMP/EIS), but the park and its regional partners continue to plan to improve transportation linkages for even better recreation and visitor access.

Utilities

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible.

Adequate water and wastewater capacity are critical to operating the facilities at all sites in the park. System needs vary over time and can be stressed by increases in use as well as by the age and level of maintenance of the infrastructure. Planning for utilities is critical in order to ensure excellence in operational effectiveness, sustainability, and conservation of water and energy resources. The wastewater treatment plant at Sandy Hook needs complete system replacement of all pumps, electronic controls, wiring, auxiliary power units, and all lift stations because of damage from Hurricane Sandy. In addition, all wastewater treatment piping and manholes need to be cleared from sand/debris incursion. Water system pumps, injection treatment systems, and controls need to be replaced. All water lines need to be disinfected. This process is estimated to require at least six months and planning is currently underway by the Denver Service Center of the NPS (NPS 2013j).

Park Maintenance Facilities

Maintenance facilities including maintenance yards and equipment storage facilities are located in all three units of the park. For efficient operations, park maintenance staff requires secured vehicle parking, the ability to receive cell and radio transmissions, access to arterial roads and highways for moving equipment, boat harbor access, and access to mass transit. Many of these criteria are not being fully met by the existing facilities.

At Sandy Hook, both the south and north maintenance shops, including vehicles, vehicle lifts, and associated equipment, were completely flooded by Hurricane Sandy. This has temporarily compromised the park's maintenance capability and imposed a major repair and restoration burden.

Public Safety Facilities

Currently, public safety staff shares space with other divisions throughout the park, with the exception of ranger stations and fire management facilities on Sandy Hook. This is less than ideal because there are certain public safety functions that need to be exclusive and secured.

Further, efficient operation requires adequate space for training and meetings, visibility to the public for reporting incidents, adequate cell and radio coverage, and access to public transportation for staff. Current public safety facilities do not meet these requirements in each location, and reassignment of space for public safety is desirable.

NPS Staff Housing

The park continues to provide a limited number of housing units for employees in all three units. Non-NPS housing in the New York area is some of the most expensive in the United States. Recruitment and retention of employees for the park is hindered by the high cost of housing and other living expenses.

Some staff housing was damaged by Hurricane Sandy. Most Sandy Hook housing units suffered basement flooding, a few experiencing flooding of the first floor, and seven units experienced no flooding. Fourteen park staff members and their families at Sandy Hook were made homeless as a result of the storm. Similar damage to park housing occurred at Fort Tilden in the Jamaica Bay Unit; basements were flooded in housing units, necessitating replacement of boilers, water heaters, and electrical panels as well as some mold abatement. The park housing at Fort Wadsworth was untouched and at Miller Field in the Staten Island Unit, only the electric service was impacted (NPS, pers. comm. 2013e).

Interpretive and Visitor Services Facilities

The condition of visitor facilities throughout the park requires extensive restoration and maintenance attention, in part due to the effects of Hurricane Sandy. For example, some visitor structures at Sandy Hook, such as the theater, suffered first-floor flooding. The theater needs all seating, carpet, and the stage replaced, with mold abatement throughout. At Jacob Riis Park, the historic bathhouse was damaged but is structurally sound, and the large parking lot was undercut in areas. The ferry docks, boardwalk, beach pavilion water fountains, lighting fixtures, and historic ships rail were damaged or destroyed. In contrast, the main park visitor center, the William Fitts Ryan Visitor Center, only had one broken window and the marina at Jamaica Bay was untouched. At Great Kills Park Marina on Staten Island, the docks were completely washed away, and access roads overwashed and covered in sand. The marina is currently closed, but the park staff intends to offer a three-year concession contract in 2013 to get it open again as quickly as possible.

Asset Management

With a large number of facilities and constrained funding, the park staff strives to address the challenge of maintaining assets in acceptable condition and sustaining them over time. Park staff is responsible for maintaining nearly 1,300 assets.

For the same NPS-occupied and NPS-maintained assets, annual special project funding of approximately $7.4 million covers only a small portion of its $300 million in deferred maintenance backlog.

Operations and Maintenance Funding Priorities

Assets maintained and managed by the park's maintenance division (e.g., non-partner assets) were categorized into priority levels based on a variety of factors (see table 3-25). Those factors include the importance of the assets to the mission of the park and the recognized level of maintenance needed to keep the assets operational to suit their intended functions.

Table 3-25. Operations and Maintenance Planned Funding Summary.

O&M Optimizer Priority Band	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Highest	116	$1,035,348	$2,457,972	42%	$1,422,625*
High	337	$3,047,951	$8,983,687	34%	$5,935,735*
Medium	483	$787,999	$3,224,858	24%	$2,436,859
Lower	76	$1,864	$252,081	1%	$250,217
Lowest	212	$2,027	$776,373	0%	$774,346
Totals	1,224	$4,875,189	$15,694,970	31%	$10,819,781

O&M = operations and maintenance
*Gap for bands 1 and 2: $7,358,360.

Funding is then directed towards the highest-priority assets, while lower-priority assets are maintained to the best level that limited available funding allows. However, even with prioritization, $7.36 million in priority band 1 and 2 assets would remain unfunded and therefore represent the most pressing unfunded needs for operations and maintenance.

Removal or Reuse of Assets

Removing unneeded, non-historic assets that are not mission related is essential to keeping the portfolio a manageable size and allowing available funding to be spent on a smaller pool of higher-priority assets. In developing the GMP, the park staff identified potential assets that could be disposed of over the life of the plan. The facilities identified through this process generally consist of non-historic structures in poor condition with no mission-related use existing or planned. Another major emphasis of the park needs to be the leasing or reuse by others of historic structures to maintain them without it being a drain on the park's limited budget.

Addressing Deferred Maintenance

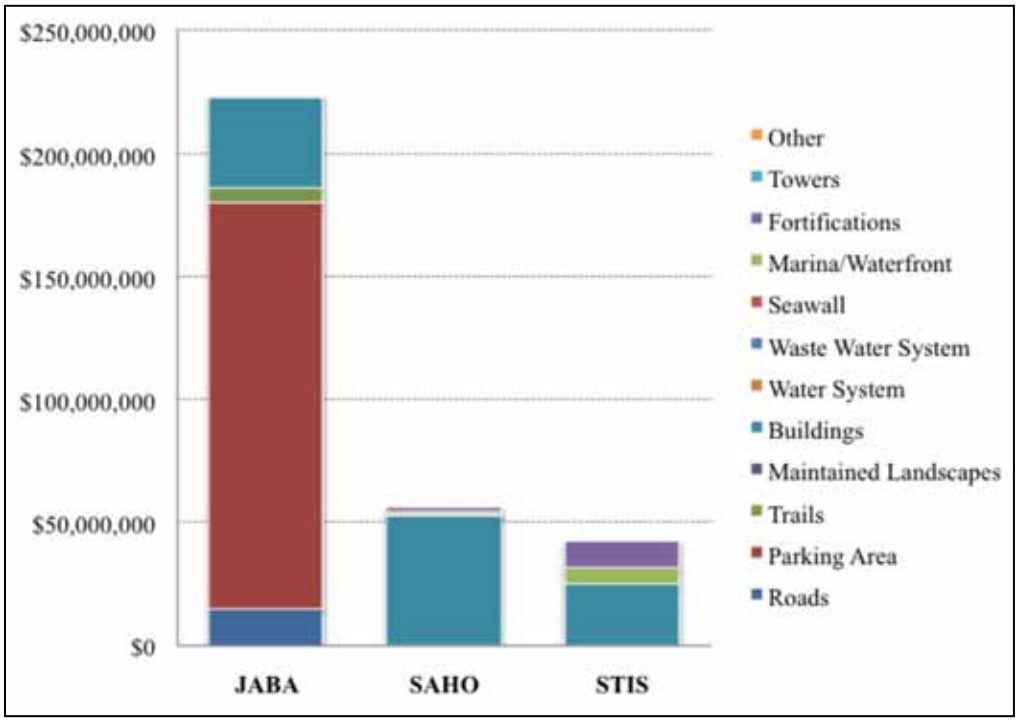
Recognizing that the park cannot reasonably address all of its deferred maintenance in the short run, the park has a schedule of facility projects that extends out 10 years (see figure 3-26). This plan addresses the highest-priority assets and most critical equipment needs. The condition of these more important assets would show the most rapid improvement,

measured by the facility condition index. If 100 percent of project funding were applied to critical needs and projected component renewal, the park would stabilize the condition of the critical components of its portfolio.

The GMP process has also identified deferred maintenance savings that would be achieved by taking the actions proposed. Deferred maintenance issues can be addressed through several actions recommended in the GMP/EIS alternatives, including removal, stabilization, restoration, renovation, and preservation of facilities.

Gateway has been among the most effective units in the national park system at using its authority to lease historic and non-historic structures to other entities that then operate and maintain them, thereby removing them from NPS maintenance responsibility. Many more such opportunities remain at Gateway.

Figure 3-29. Deferred Maintenance Backlog Summary by Asset Type.



JABA = Jamaica Bay Unit; SAHO = Sandy Hook Unit; STIS = Staten Island Unit

Improving Sustainability to Manage Assets

In a funding-constrained world, it is extremely helpful for the park to identify more efficient ways to operate and manage its assets. The park staff has identified goals for achieving a higher level of sustainability, including managing and tracking energy performance, using renewable fuels, conserving water in high-use areas, and continuing to enact best practices in waste management. The park managers also recognize the need to communicate sustainability goals to park staff and to collaborate with park partners. These measures are opportunities for the park to find cost savings and become more fiscally responsible.

Coordination between the GMP and the Park Asset Management Plan

The park continues operations under the coordinated Harbors Parks Facility Management Program. The current Park Asset Management Plan continues to provide guidance and will continue to be actively implemented. Asset data from the Park Asset Management Plan helped to inform the development of the GMP. The updates of the Park Asset Management Plan, in light of the planning process for the GMP, provide an extraordinary opportunity for park managers to promote sound asset management principles, incorporate the value and objectives of partnership relationships, and advance sustainability goals in a coordinated manner.

Sustainability: Energy Resources and Resource Conservation

The park has been taking measures to reduce its energy consumption and is pursuing sustainable practices whenever possible in decisions regarding park operations, facilities management, and development.

Sustainability can be described as the result achieved by doing things in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the short-term and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques.

Over the past several years, the federal government has been placing more emphasis on adopting sustainable practices. In 1993, the NPS Guiding Principles of Sustainable Design (guidebook) provided a basis for achieving sustainability in facility planning and design, emphasized the importance of biodiversity, and encouraged responsible decisions (NPS 1993). The guidebook describes principles to be used in the design and management of visitor facilities that emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors in natural and cultural settings. In 2012, NPS released the "Green Parks Plan," which articulates a vision for reducing the agency's carbon footprint and outlines approaches for sustainable park management (NPS 2012d). In accordance with the guidebook, the "Green Parks Plan," and Gateway's own "Climate Friendly Parks: Framework for Local Action Planning," the park is working to reduce greenhouse gases through increased awareness about climate change and management of transportation, buildings and facilities, grounds and lands, and waste (NPS 2003b). Park staff strives to minimize energy costs, eliminate waste, and conserve energy resources by using energy-efficient and cost-effective technology wherever possible.

The park has been taking measures to reduce its energy consumption and is pursuing sustainable practices whenever possible in decisions regarding park operations, facilities management, and development. Sustainability practices and projects recently implemented at the park include the following:

- **Adopting the U.S. Green Building Council's Leadership in Energy and Environmental Design** (LEED) standard's for new building projects. For example, the visitor center at Jamaica Bay Wildlife Refuge is a Gold LEED-certified building.

- **Enabling and promoting alternative modes of transportation for visitors.** The park has made bicycle and pedestrian improvements in all three units, including improvements to the Jamaica Bay Greenway; an extension of the Staten Island Greenway along the southern tip of Fort Wadsworth to connect NYCDPR parks; connecting Miller Field with the Staten Island Greenway; and extensions to the Sandy Hook Multi-use Path. Additionally, the park is working with partners to plan and secure funding for a project to improve bicycle and pedestrian connections along the eastern Staten Island shore from the Saint George Ferry Terminal to Great Kills Park. Additionally, the park is working with local governments and private groups to increase mass transit options for accessing the park including ferries, and express and local buses. With these transportation-related improvements, park access and visitor circulation is becoming less dependent on cars and vehicle miles traveled in the park are being reduced.

- **Increasing the use of fuel-efficient and/or alternative-fueled vehicles.** The park has begun to upgrade its fleet and replace aging fleet vehicles with energy-efficient vehicles.

- **Encouraging the adaptive reuse and rehabilitation of existing structures and buildings.** Rather than expending additional resources on the construction of new buildings, park management is committed to adaptively reusing existing structures to meet future administration, operations, and visitor needs.

- **Exploring options for renewable energy development.** Gateway is currently reliant on non-renewable energy sources, but park management has initiated discussions and begun exploring the feasibility of developing renewable energy on park sites such as the landfill sites in Jamaica Bay.

- **Developing interpretive programs that address sustainable park and non-park practices.** The park is currently developing an interpretive program that will discuss climate change at the Jamaica Bay Wildlife Refuge. In the context of climate change, the interpretive program will explain the park's efforts to reduce the emission of greenhouse gases as well as adapt to the changing climate.



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Chapter 4: Environmental Consequences







General Methodology for Analyzing Impacts

In accordance with the Council on Environmental Quality (CEQ) regulations, direct, indirect, and cumulative impacts are described (40 CFR 1502.16) and the significance of the impacts is assessed (40 CFR 1508.27). Where appropriate, mitigating measures for adverse impacts are also described and incorporated into the evaluation of impacts. The specific methods used to assess impacts for each resource may vary; therefore, these methodologies are described under each impact topic.

Geographic Area Evaluated for Impacts

The primary area of impact for the Gateway National Recreation Area (Gateway; the park) General Management Plan and Environmental Impact Statement (GMP/EIS) is the Jamaica Bay area of New York City (including in Queens and Brooklyn), Staten Island, and Sandy Hook in Monmouth County in New Jersey. The term "localized" is often used to describe impacts; generally this mean the impact would be confined to a small area of the park site.

Type of Impact

The types of impacts discussed in this GMP/EIS include the following:

Direct: Impacts that would occur as a result of the proposed action at the same time and place of implementation (40 CFR 1508.8).

Indirect: Impacts that would occur as a result of the proposed action but later in time or farther in distance from the action (40 CFR 1508.8).

Adverse: An impact that causes an unfavorable result to the resource when compared to the existing conditions.

Beneficial: An impact that would result in a positive change to the resource when compared to the existing conditions.

Cumulative Impact Analysis Methodology

In addition to direct and indirect impacts from the alternatives, the GMP/EIS evaluates cumulative impacts. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). In other words, cumulative impacts to each resource occur when the impacts of unrelated actions or events are added to the impacts of whatever changes (actions) Gateway is evaluating in its alternatives. A cumulative impacts analysis is intended to give a better picture of the additive or total impacts a given resource may experience when the impacts of unrelated actions or events

are added to the predicted impacts of the alternative being evaluated. Table 4-1 lists and briefly describes other actions and events that were identified by the planning team as contributing to cumulative impacts in combination with the impacts of the alternatives evaluated in this GMP/EIS. This list of these other actions and events is organized by impact topic. The impacts of climate change are not traditional cumulative impacts as they are not from past, present or reasonably foreseeable future actions taken by an agency or person. However, to the extent that they have additive impacts on many of the resources at the park, they are most accurately analyzed in the cumulative impact section for those resources.

Table 4.1. Larger Actions Contributing to Cumulative Impacts.

Soils and Geology
Dredging and filling of Jamaica Bay and depositing fill, rubble, and other materials in the bay to build height has altered natural sediments. Sediment continues to be trapped in borrow pits used for these excavations.
Pollutants from wastewater treatment and urban runoff pollutes the waters of Jamaica Bay, which in turn pollutes benthic bay sediments.
Beneficial cumulative effects from restoration efforts at Jamaica Bay could help fill borrow pits and reduce pollutants.
Hardening of coastlines and sediment-trapping devices like jetties, seawalls, and groins have interrupted and stopped natural ocean sand-transport systems, resulting in erosion of both ocean and bayside coastlines at several park sites. This reduces a site's ability to withstand strong storm surge, flooding, inlets, and overwash without severe loss of sand and even loss of inland soils.
Sea level rise and possible increases in storm severity related to climate change would increase erosion of shorelines
Air Quality
The air basin that includes the park is polluted by cars, buses, and other mobile transportation sources in the New York City and northern New Jersey area; this would continue regardless of any park action.
Stationary sources, including upwind power plants, contribute pollutants that also affect visibility at the park.
Construction of the Rockaway Lateral Pipeline will add pollutants associated with heavy equipment, including 20,000 tons of greenhouse gases.
Water Resources
Urban populations have diverted surface waters for use; urban development has reduced infiltration to groundwater and channelized runoff.
Freshwater into Jamaica Bay comes primarily from wastewater treatment plants and combined sewage and stormwater outfalls and is high in pollutants such as chlorine, heavy metals, pathogens, and unwanted nutrients.
Plans to improve water quality, including storage of combined sewer outflow, would improve water quality over existing conditions.
Dredging in Jamaica Bay has altered tides and depth and has decreased natural bay flushing.
Construction of the Rockaway Lateral Pipeline is expected to result in some spills of fuel or oil and to increase turbidity in both the ocean and Jamaica Bay.
Increasing sea-level rise, possible increased storm intensity, or extreme precipitation events linked to climate change can increase salinity onshore or in groundwater and carry polluted surface water over a wider area. Increasing temperature could increase evaporative losses.
Wetlands, Floodplains and Flooding
Location in a low-lying area of New York City means much of the park is exposed to flooding during coastal storms.
Storm surge and intensity of coastal storms may be increasing at least in part because of climate change. Scientists agree that climate change is accelerating; its effects could be to continue to increase the intensity, storm surge, and flooding effects of coastal storms.

Table 4.1. Larger Actions Contributing to Cumulative Impacts (continued).

Dredging, development of Jamaica Bay, and unknown factors have resulted in loss of saltmarsh habitat; excess nitrogen from wastewater effluent decreases saltmarsh vegetation productivity; and dense monocultures of invasive species outcompete native saltmarsh plant species.
Restoration efforts in Jamaica Bay have improved water quality, with associated improvements in wetland quality.
Sea-level rise would amplify tidal cycles and inundate saltmarsh along the shores and on islands in Jamaica Bay.
Marine Resources
Coastal urbanization, ocean dumping and waste disposal, port development, agricultural practices, transportation, mining, and non-point pollution have degraded marine resources in the vicinity of the park.
Altered sand transport has reduced available vegetation habitat.
Construction of the Rockaway Lateral Pipeline would have significant impacts on fish, marine mammals and benthic species from crushing, noise and siltation. Some of these species are threatened or endangered.
Extensive recreational use of coastal open space sites disturbs intertidal wildlife and eliminates habitat for marine plant and animal life; any additional proposed development in the coastal zone or plans for additional recreational use would contribute additional adverse impacts.
Sea level rise inundates coastal habitat, displaces marine vegetation and wildlife; possible increases in storm intensity can destroy nests of marine wildlife
Vegetation
The historic use of fill, garbage, and discarded building materials to create higher-elevation land created an unnatural habitat for native species in many sites now on park land.
Alteration of the soils, hydrology, and water quality in Jamaica Bay has eliminated eelgrass and changed saltmarsh plant species. Although these same impacts continue, restoration of island habitat in Jamaica Bay benefits saltmarsh.
Accelerated sea-level rise and possibly increased storm surge would swamp saltmarsh, making resultant species changes likely; increasing temperature changes ranges of some vegetation; fluctuations in climate favor invasive species with displacement of native species possible.
Altered sand transport has reduced available vegetation habitat, particularly for coastal or intertidal species.
Wildlife
The urbanization of the New York City area eliminated habitat for many wildlife species. Habitat continues to be scarce, especially large contiguous habitat or habitat that is undisturbed by human activity or presence.
Sea-level rise and other factors have resulted in loss or degradation of saltmarsh habitat, an impact that is expected to worsen as sea-level rise accelerates.
Invasive species have degraded wildlife habitat quality.
Increased storm surge that may be associated with climate change could drown beach-nesting species; increasing temperatures favor invasive species and cause mistiming between migrating species and the availability of their food resources.
Species of Special Concern
Urbanization and development of habitat in the New York City area and along migration routes have reduced population sizes for most listed species. These impacts may worsen as development increases, particularly along migration routes.
Human uses, including for products like dredge soils or to receive wastewater effluent or other pollutants, and the introduction of invasive species, including feral predators, have worsened the quality of existing habitat. This is expected to continue, although restoration efforts at Jamaica Bay would improve habitat quality for saltmarsh species of concern.
Possible increasing storm surge and sea-level rise could inundate nests or habitat used by species of special concern. These effects are likely to worsen as sea-level rise accelerates.
Historic Structures and Districts
Historic land uses have buried and destroyed structures and remnants.
Severe storms and flooding have damaged historic structures; these and other climate change effects could worsen from sea level rise, particularly for coastal structures.

Table 4.1. Larger Actions Contributing to Cumulative Impacts (continued).

Development has resulted in loss of historic structures in the New York City area.
A portion of the proposed Rockaway Lateral Pipeline would be constructed on Gateway NRA lands and would affect an historic airplane hangar complex at Floyd Bennett Field Historic District.
Archeological Resources
Past development, grading, and filling for structures/infrastructure and maintenance activities have likely altered or destroyed archeological resources.
Erosion, waves, wind, etc. have damaged archeological resources. These effects have increased because of rising sea levels, possibly from greater storm intensity, and may continue to worsen.
Future development activity by other agencies/parties--recreational facilities/amenities, environmental restoration/enhancement, miscellaneous development—have potential to impact archeological resources, both negatively and positively.
Museum Collections
Past storm events have threatened the park's museum collection.
Visitor Use and Experience
Noise from airplanes, construction, and city streets disrupt the visitor experience; light pollution from adjacent urban areas degrade the night sky.
New York City is restoring habitat, stabilizing shorelines, and adding new and expanded parks along its waterfront; this could draw more visitors and increase the quality of the visitor experience at Gateway, particularly in the Jamaica Bay Unit.
Noise from construction of the Rockaway Lateral Pipeline would have adverse cumulative impacts on visitors.
Urbanized development means nearby open spaces are well used; however, new and expanding residential development would add potential visitors but could diminish the experience of the night sky, quiet areas, or visitors seeking solitude.
Storm surge and intensity have resulted in damaged park facilities and closures; these effects may worsen.
Social and Economic Environment
Implementing the Vision 2020 plan (NYCDCP 2011) could change spending patterns and increase job opportunities, particularly in transportation and warehousing, which are 5–8 percent of employment in communities adjacent to the park.
Transportation
Substantial growth in the New York City area has put pressure on existing transportation systems; a major infrastructure rehabilitation in 1988 improved systems, and funding for continued maintenance and rehabilitation is expected to continue, with beneficial cumulative impacts on transportation.
City waterways are often difficult to reach because of bridges and elevated highways, and congestion-reducing ferry systems are largely unavailable because of inaccessibility. The New York City Department of Transportation (NYCDOT) is partnering with other agencies to provide improvements to ferry structures, parking, and bridges to improve access.
New York City has built numerous bike lanes and facilities and the NYCDOT is partnering with other agencies to provide improvements to ferry structures, parking, and bridges to improve access, with beneficial cumulative impacts.
In Staten Island, commuters use bridges and ferries for access. Ferry access is expected to increase because National Parks of New York Harbor Conservancy (NPNYHC) is proposing a ferry link to include Fort Wadsworth.
Some bike routes exist to link neighborhoods. These links would incorporate multimodal connections between neighborhoods and between as well as between neighborhoods and park sites if alternative B or C is selected.
In the Sandy Hook Unit, bridges have been built to provide access, including access for pedestrians and bikes. However, current bridge access is often congested and stalled when the unit is closed after capacity is reached. Monmouth County implements elements of its closure plan to mitigate impacts.
Hurricane Sandy damage included ~~to damage to~~ roads in Sandy Hook and other park sites. This kind of damage may increase as sea-level rise and storm intensity accelerate, which may occur.
Park Management, Operations, and Facilities
Climate change and storm surge, heat waves, and possible increases in intense wind could damage buildings further.

In defining the contribution of each alternative to cumulative impacts, the following terminology is used:

Imperceptible:
The incremental effect contributed by the alternative to the overall cumulative impact is such a small increment that it is impossible or extremely difficult to discern.

Noticeable:
The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impact.

Appreciable:
The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

Assessing Impacts Using CEQ Criteria

The impacts of the alternatives are assessed using the CEQ definition of "significantly" (1508.27), which requires consideration of both context and intensity:

(a) Context – This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity – This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect would be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, parklands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

Context depends on comparative or surrounding information to help give impacts meaning. Comparisons can include geography, population size, uniqueness of the resource, affected individuals, agency mandates, and more. For example, the impact of a proposal to cut 10 acres of trees in a 100,000-acre lodgepole pine forest managed by an agency with a "use" mandate is different than cutting 10 acres of the only remaining 15 acres of old growth sequoia managed by an agency with a "conservation" mandate.

The National Park Service (NPS) is an agency with a "conservation" mandate and identifies fundamental resources and values in its general management plans, defined as those resources or values that are critical to achieving a park's purpose or maintaining its significance. These resources and values collectively capture the essence of the park and provide overall context for evaluating the relative severity of an impact; e.g., the degree to which an alternative would help or hurt these resources would be important in assessing whether impacts of that alternative are significant.

Fundamental resources identified for Gateway are described in chapter 1 of this GMP/EIS. For each impact topic analyzed, an assessment of the potential significance of the impacts according to context and intensity is provided in the "Conclusion" section that follows the discussion of the impacts under each alternative. In addition to the overall context of the park's purpose and significance, resource-specific context is presented in the "Methods" section under each resource topic and applies across all alternatives. Intensity of the impacts is discussed by considering the relevant factors from the list under CEQ definition item b, "Intensity," above. Intensity factors that do not apply to a given resource topic and/or alternative are not discussed.

Natural Resources



Soils and Geology

Geology at the park is not expected to be affected by any actions in any of the GMP/EIS alternatives; however, soils or coastal processes may be. Neither soils nor coastal processes are named as fundamental resources or values by Gateway, but soils are important to all ecosystems and coastal processes and are an essential piece of beach, dune, and maritime-influenced shrublands and forests.

Laws and Policies

The National Park Service (NPS) has several guiding principles with respect to geology and soils, as outlined in the "Geologic Resource Management" section of the NPS *Management Policies* 2006 (NPS 2006a). These include the following: (1) assess the impacts of natural processes and human activities on geologic resources, (2) maintain and restore the integrity of existing geologic resources, (3) integrate geologic resource management into NPS operations and planning, and (4) interpret geologic resources for park visitors.
It is NPS policy not to intervene or to permit intervention into natural geologic processes except under the following circumstances:

- It is directed by Congress.

- It is considered necessary in the case of emergencies that threaten human life and property.

- There is no other feasible way to protect natural resources, park facilities, or historic properties, or intervention is necessary to restore impacted conditions and processes, such as restoring habitat for threatened or endangered species.

Management action is taken by NPS superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soils. Soil conservation and soil amendment practices may be implemented to reduce impacts. When soil excavation is an unavoidable part of an approved facility development project, the NPS minimizes soil excavation, erosion, and off-site soil migration during and after the development activity.

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on soils or coastal processes using NPS and other reports for guidance.

Resource-specific contexts for assessing the impacts of the alternatives on soil resources and coastal processes include the following:

- Impacts from development, the primary proposed action that changes among alternatives, would be local.

- Soils over many areas of the park have been highly altered by dredging, covering with fill, or other manipulation.

- Soils are not considered unique for the most part and are not named as a fundamental resource of the park.

- The submerged lands of Jamaica Bay and natural areas at Floyd Bennett Field (among others) are considered fundamental resources.

Alternative A: No Action

The no-action alternative would, for the most part, continue current management practices for the foreseeable future. Exceptions to this statement include cleanup and repair efforts related to Hurricane Sandy and any approved projects or plans the park would implement.

Impacts of Alternative A

Soils

This section (impacts of the no-action alternative) focuses on the impacts of current management actions that could be altered if an action alternative is selected. Sources of impact on soils under current management that could change in the action alternatives include the historical filling of wetlands at Floyd Bennett Field, development of parking lots and buildings, and trails and camping facilities in many park sites. Equestrian use at Bergen Beach would also change in action alternatives; currently, equestrian use likely results in increased nutrients to soils at this park site. Continuing to keep wetlands at Floyd Bennett Field filled or runways at Floyd Bennett Field paved, covering soils with development of roads and other facilities across park sites, etc. do have the potential for continued, ongoing adverse impacts on soils.

Development and visitor use, including foot traffic, over-sand vehicle use, or bike or other vehicle use on unpaved trails or roads can compact soils, which causes a number of changes generally considered adverse. When it is compacted, the amount of open pore space in soils decreases, reducing water and air movement through the soil and worsening conditions for vegetation and healthy root systems (Iowa State University Extension 2009). If they are compressed but not paved, compacted soils are more susceptible to erosion and loss, particularly on steeper slopes. On flat land, compacted soils can create drainage and flooding problems. Paving soils can help in preserving deeper layers, although the loss of surface soils may be particularly detrimental to its future ability (if paved surfaces are removed, for example) to support vegetation. This is because the surface is where root systems are most likely to grow, where gas exchange takes place and water is stored, and where naturally occurring nutrients are most available.

Conversely, continuing current park management practices of keeping areas like Breezy Point Tip or the holly forest relatively free from human disturbance can have localized benefits to soils by reducing foot traffic and the potential for compaction. Generally, foot traffic from visitor use would be most likely to adversely affect soils with large naturally occurring pore space for water or air storage, such as wetland soils containing peat, which are highly susceptible to compaction (Van Asselen, Karssenberg, and Stouthamer 2011). Sandy soils are far less likely to be permanently compressed from foot traffic, especially if they are regularly covered and redistributed by tidal flows (NPS 2010e).

Ongoing efforts at Great Kills Park to clean up contaminated soils (refer to the "Health and Safety" section of "Visitor Use and Experience" in chapter 3) and continued partnering with New York City to improve water quality in Jamaica Bay would benefit soils at these park sites.

Coastal Processes

The park is conducting beach nourishment in at least two park sites, Sandy Hook and Plumb Beach. At Sandy Hook, sand is taken from areas offshore of where it is accumulating on the north end and is carried via a pipeline to the south end. Although erosion at the south end is to some degree a function of the direct north–south orientation of Sandy Hook and parallel longshore transport of sand, it is also partially human caused (by the seawall and groins to the south of the park site). Continuing to deposit sand from the northern end of Sandy Hook (where it is naturally accreting because of its northeast orientation and intersection with northward littoral drift of sand) would maintain beaches in the south. This is primarily a benefit for recreational or facilities resources at the park rather than the sediment itself, but to the extent that coastal erosion is exacerbated by groins and the seawall to the south, is also a benefit for coastal processes at Sandy Hook. It would also be an adverse impact on the accretion area, because it alters natural coastal processes that lead to the accumulation of sand.

Beach nourishment and shore stabilization efforts at Plumb Beach are also directed not at soils or natural coastal processes, but at ensuring the Belt Parkway remains intact in the face of future shoreline erosion from strong waves and storms. However, as described in the "Affected Environment" chapter, longshore transport of sand to Plumb Beach has been stopped in part by human activities related to the Rockaway Inlet and a navigation channel to Sheepshead Bay. To the extent that the stabilization and beach nourishment projects offset the adverse effects of these actions, they are beneficial to restoring the natural coastal processes at this park site. Because they also contribute to unnatural coastal processes, they are also adverse. In either case, impacts are localized but expected to be in effect throughout the lifetime of the GMP.

Cumulative Impacts

Efforts by New York City (in addition to its partnership with the NPS) to improve water quality in Jamaica Bay via projects described in its waterfront agenda (NYCDCP 2011) would in turn improve the quality of benthic soils. Adverse cumulative impacts to soils include those

from urban development and current use. Hardening of the shoreline to accommodate development exacerbates erosion and loss of soils, and pollutant streams from wastewater effluent and other sources continue to contaminate bay soils. In addition, sediment is trapped in deep pits that were excavated in the bay bottom to provide fill for development in the bay's fringing wetlands (Rafferty, Castagna, and Adamo 2011).

Hydrodynamic modeling indicates that there is little deposition of sediment within dredged navigation channels; however, deep pits, such as Grassy Bay, may serve as sinks for fine sediments (Wilson and Flagg 2008, as cited in Rafferty, Castagna, and Adamo 2011) that could otherwise be transported to the marsh surface. Inorganic sediments are moved by tides through the inlet and deposited in the western bay. During storm events, sediments are subsequently transported to the eastern portion of the bay, including Grassy Bay (Renfro et al. 2010, as cited in Rafferty, Castagna, and Adamo 2011).

Sediment supply to marshes may be insufficient to maintain marsh elevation in the face of natural subsidence and accelerated sea-level rise. In response to the loss of saltmarsh habitat island, the park has conducted an experimental 2-acre restoration at Big Egg Marsh (beginning in 2003) and applied findings to a larger project with several partners to restore saltmarsh at Elders Point (Rafferty, Castagna, and Adamo 2011).

Columbia University summarized findings on climate change for the area and reported that it is expected to bring with it accelerated sea-level rise, heavy rainfall and prolonged drought, and possible increases in storm frequency and intensity.

Columbia University summarized findings on climate change for the area and reported that it is expected to bring with it accelerated sea-level rise, heavy rainfall and prolonged drought, and possible increases in storm frequency and intensity. Severe winter nor'easters are predicted to occur more frequently than hurricanes (Columbia University 2011). From 1932 until 2011, the average sea-level rise at Sandy Hook, for example, was 1.54 inches per decade. This rate is expected to double in the 21st century (Horton 2007, as cited in Columbia University 2011). Ocean levels are expected to rise 2 to 5 inches by the 2020s, 7 to 12 inches by the 2050s, and as much as 23 inches by the 2080s. The New York City panel on climate change has characterized sea-level rise as "extremely" likely, more frequent and damaging coastal storms as "very" likely, and brief, intense rainstorms alternating with droughts as "more likely than not" (New York Academy of Sciences 2010).

The increases in sea level and possibly increases in the intensity and frequency of storms would be expected to have substantial impacts on the park's maritime resources, including sediment budgets and the movement of sand. Marsh soils, including those on Jamaica Bay islands, would likely be submerged if the rate of sea-level rise outpaces that of sediment deposition.

As noted in the "Affected Environment" chapter, when sediment budgets are positive, the coastline accretes either in the direction of longshore transport or laterally. When it is negative, erosion occurs and the beach can form steep scarps or be lost (see description of coastal processes for Plumb Beach for example). Groins and jetties that are positioned updrift of the longshore transport of sand capture it before it has a chance to nourish park beaches at Sandy Hook and at the park sites on the Rockaway barrier spit. A long wastewater effluent pipeline also stops sand transport at the Great Kills Park site, and development associated with the Rockaway Inlet has cut off transport to Plumb Beach. While these structures have greatly affected the supply of sediment to park beaches, the source of

material to both Sandy Hook and to sites on the Rockaway barrier spit is also diminishing. This leaves the coast more vulnerable to the strong waves and storm surge (short-term high water due primarily to wind-induced piling up of water along the shore), with flooding, overwash, breaching, and loss of sand from dunes and even more upland areas. These changes took place during in 2012, with extensive flooding, loss of beach and dunes, and movement of sand inland and across Sandy Hook spit, for example.

The vulnerability to continued flooding and erosion from storms as sea level rises is calculated using a coastal vulnerability index. The index includes consideration of several factors for each coastal area, including geomorphology, coastal slope, relative sea-level rise rate, mean significant wave height, mean tidal range, and the sediment budget. Coastal vulnerability index values calculated by a team of U.S. Geological Survey scientists (USGS 2005) indicated the following: 24 percent of the park's coast is highly vulnerable (all the areas considered highly vulnerable were on the ocean side of Sandy Hook); 24 percent is highly vulnerable; 28 percent is moderately vulnerable; and 24 percent is considered of low vulnerability. Nearly all land considered of low vulnerability lies along the Staten Island coast between Fort Wadsworth and Miller Field. It is possible or even likely that these numbers are already outdated although no new CVI has been calculated for the park's coastline since 2005.

Given the combined substantial and adverse cumulative impacts of declining sediment sources, human-built interruptions of sediment transport processes, sea-level rise, and possibly increasing storm intensity, it is unlikely that continuing to supply beach sand to southern Sandy Hook or to Plumb Beach in alternative A will have more than a noticeable offsetting effect into the 2020s and an imperceptible effect later in the 21st century.

Although past and current practices of using Jamaica Bay to receive wastewater, untreated sewage and stormwater, and non-point contaminants from the urbanized watershed in which it sits, as well as dredging and filling and hardening of shorelines for development, have worsened soil erosion and quality, continuing efforts by New York City, the NPS, and their partners as described in alternative A to improve water quality will also noticeably benefit benthic and saltmarsh soils.

The vulnerability to continued flooding and erosion from storms as sea level rises is calculated using a coastal vulnerability index. The index includes consideration of several factors for each coastal area, including geomorphology, coastal slope, relative sea-level rise rate, mean significant wave height, mean tidal range, and the sediment budget.

Conclusion

The no-action alternative would continue to keep hardened surfaces for trails, roads, and other development, including covered surfaces such as at Floyd Bennett Field, in place, with adverse effects on soils from compaction and reduced infiltration. Beach nourishment projects would result in both beneficial localized impacts on areas affected by human-built interruptions of sand transport and adverse effects on natural coastal processes from borrow locations. Soils are not named as a fundamental resource at the park, but beach and dune systems at several park sites are named as fundamental resources. Adverse or beneficial impacts on park soils from implementing alternative A would not be considered significant. Although beach nourishment does improve the availability of sediment, it is not a natural process and the benefit is therefore not likely to be a significant one. The contribution of impacts from alternative A to cumulative adverse impacts on soils would not likely be more than imperceptible in the long term, with the exception of continuing efforts to improve water quality in Jamaica Bay, an action that may produce noticeable cumulative benefits for benthic soils in Jamaica Bay.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Floyd Bennett Field

Both action alternatives envision locating the Jamaica Bay Science and Resilience Institute (JBSRI) somewhere near Jamaica Bay and likely on park lands, which would support protection projects and similar urban ecology projects. The location is yet unknown, but could be at Floyd Bennett Field. If so, preliminary work envisions it located on an approximately 20-acre site on the northeast side of Floyd Bennett Field, allowing it to take advantage of existing buildings for reuse, renovation, or potentially for expansion (Happold 2012). The institute would be a campus-like collection of buildings, with possible temporary housing or food service for visiting researchers, research and lab facilities, and docks and related infrastructure for a small boat fleet. Should the wetlands center also be approved (as proposed in alternatives B and C, although size and layout differ), it and the JBSRI would potentially be co-located to share resources, dock facilities, parking, and road access.

Although the degree of development of visitor facilities at Floyd Bennett Field would differ under alternatives B and C, the impacts on soils would not. This is because any adverse impacts from construction of facilities would not affect any natural soils at the site.

Soils at Floyd Bennett Field are characterized in an early document as varying from "dredge fill" or urban rubble composed of coal, metals, crushed brick, and cinders, to more natural mudflats, marshes, and sand dunes (Friedberg et al. 1980). Soil borings also indicated the presence of municipal wastes and garbage fill. Floyd Bennett Field was built over nearly forty small and larger islands, creeks, and lagoons, including the larger Barren Island. The organic or marsh layer underneath the surface fills, rubble, or wastes varied in depth, but was exposed along the shorelines (Friedberg et al. 1980). Although originally soil sampling found no contaminants, the use of the site and nearby Flatbush Avenue for garbage disposal as well as more recent sampling indicate that contamination in some parts of the site may be an issue (WWT 2011). Soils at Plumb and Bergen Beach were found to have poor load-bearing qualities, as would any area at Floyd Bennett Field filled with municipal waste, garbage fill, or similar. The report also noted that although surface soils over much of the site could carry the structural load of a single-story, light frame building, heavier loads would require piles or other treatment to stabilize them.

The Wildfowl and Wetlands Trust Ltd. study (WWT 2011) indicated additional information from soil samples was required, but that virtually the entire site could be underlain by contaminated fill or garbage incapable of sustaining new structures. The 1980 sampling found that much of the central part of Floyd Bennett Field is composed of dredge fill. In this area, alternatives B and C propose continuing the current maintained grassland wildlife area and hiking trails, as well as increasing the density and/or type of camping ~~over much of~~ within or adjacent to the North Forty. Some of the North Forty (the western portion) is also underlain with rubble or other urban materials. Reuse of existing structures in the Hangar B area for a variety of visitor, interpretive, educational, and recreational uses, including a new

wetlands center and the JBSRI, would be likely under both alternatives B and C. The 1980 soil testing indicated that soils in most of this already paved and developed area are composed of dredge fills. In the vicinity of Raptor Point and the North Forty is an area designated as a site for constructed wetlands whose soils are urban rubble. Garbage fill was found to the north of Dead Horse Bay, in an area near the Ryan Visitor Center and proposed for undefined future development by park alternatives.

Generally, except for the excavation of parts of the North Forty area to create fresh- and saltwater wetlands, impacts on soils at Floyd Bennett Field would remain the same as they are currently. It is possible that where additional visitor, recreational, or JBSRI facilities are proposed on undeveloped sites in the North Forty or at Dead Horse Bay, soils could be affected. However, because this additional development is proposed on sites already covered in urban rubble, dredge fill, or other unnatural soils, impacts on natural soils would be negligible or nonexistent. If contaminated materials are removed and clean fill used instead, relative benefits to visitors but not to natural soils could result. A small amount of Jamaica Bay benthic soil would need to be dredged to install the wetlands center marina. Impacts would likely be adverse and localized.

The potential for erosion was also assessed in the 1980 study. Plumb Beach, the south edge of the site west of the Marine Bridge, and the south shore of Bergen Beach were all found to have highest potential for shoreline erosion.

Both alternatives include implementing a proposal to control erosion with added groins and an offshore reef at Plumb Beach; provisions to work with neighboring landowners at Jacob Riis Park and Great Kills Park to restore sediment transport processes; and the control of beach erosion and maintenance of natural beach and dune habitats at Plumb Beach, Bergen Beach, Miller Field, Fort Wadsworth, and Sandy Hook. Each of these actions would have beneficial impacts on sediment budgets at these park sites, with the restoration of sediment transport particularly widespread and beneficial because it returns a natural process.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Jamaica Bay Unit

Floyd Bennett Field

As noted in the analysis of impacts common to both action alternatives, although Floyd Bennett Field would not be as developed under alternative C as under alternative B, the impacts on soils would be virtually the same. This is because no natural soils (i.e., only dredged fills and urban rubble or similar nonnatural soils) would be affected.

Both alternatives also include creating wetlands and wetland connections, although less so under alternative B than C. Alternative B calls for the softening of shorelines, restoring a connection between Jamaica Bay and former wetlands at Floyd Bennett Field, and the



Although returning 100+ acres of Floyd Bennett Field to natural conditions would affect only a small percentage of this park site, and a smaller still percentage of habitat modified by humans in Jamaica Bay, it is still a potentially important beneficial impact because natural areas at Floyd Bennett Field are considered fundamental.

creation of at least 100 acres of estuarine, marine, self-sustaining saltwater wetland, and constructed freshwater wetland habitats, returning a substantial amount of soil to its natural state. The submerged lands of Jamaica Bay and natural areas at Floyd Bennett Field are considered fundamental resources of the park. Although returning 100+ acres of Floyd Bennett Field to natural conditions would affect only a small percentage of this park site, and a smaller still percentage of habitat modified by humans in Jamaica Bay, it is still a potentially important beneficial impact because natural areas at Floyd Bennett Field are considered fundamental.

Park Sites on the Rockaway Peninsula

Soils at Fort Tilden and Jacob Riis Park are a combination Hooksan sands, loamy sands, and pavement or construction debris. The soils at these park sites are deep, well drained, and windblown, with wind moving sand into large, generally sparsely vegetated dunes (NRCS et al. 2001). Much of the sand has been deposited by longshore transport and reworked by wind and water until it is fine grained.

Fort Tilden and Jacob Riis Park are located on the Rockaway barrier spit. They are part of a coastline that is covered by beach groins attempting to slow and trap sediment traveling in the longshore current from east to west. There are 48 stone and concrete groins in the shoreline from Jacob Riis to Fort Tilden, with 11 at Fort Tilden (Psuty et al. 2009). The beach narrows, and the foredune is more affected from east to west along the Fort Tilden shoreline because of these structures, although foredune topography continues throughout Fort Tilden. A long, high groin at the eastern end of Jacob Riis Park has produced a sand-starved beach for much of that park site, making it mobile and subject to loss of sand during storms.

Alternative B would include new lodging and a variety of camping opportunities to be developed at the ~~parade ground~~ post area and in Fort Tilden's backcountry environments contingent upon furthers consultation with the USFWS. The ~~parade ground~~ post area would become the hub for lodging and activities that support camping, community uses, and recreational uses, including hiking along an enhanced set of trails at the site. The dunes at Fort Tilden (which have been overwashed and eroded by Hurricane Sandy) would be restored and remain in relatively natural condition subject to natural coastal processes, although Riis Landing on the Jamaica Bay side of this park site would be built up into a visitor service area that uses existing infrastructure and building stock. If more site specific analysis indicates it can be accomplished without impacts to sensitive resources, tent ~~Tent~~, cabin, and pod camping would be located in the more inland parts of Fort Tilden, including on disturbed open areas and in shrublands.

No new visitor uses or facilities that might affect soils in the Breezy Point Tip area are anticipated.

Impacts on soils from reusing existing facilities at Jacob Riis Park or Fort Tilden would be negligible; however, the development of new facilities would require excavation, grading, and stockpiling and would result in erosion and soil loss from the site. Fill material or stabilizing piles or other structures for heavier or taller buildings may be needed in sandy soils. Deeper excavation for the water skills park would also be required. Combined, the

construction of these new trails, camping areas, structures, and recreation facilities could result in the loss of a high percentage of existing undeveloped soils at both park sites, an adverse localized impact. This would be somewhat offset by efforts to restore and stabilize dunes on the coastal side of both parks and by the use of removable facilities, such as tent platforms and camping pods, when they are available. Benthic soils, likely to be sandy in nature, may need to be dredged to expand the Riis Landing ferry terminal. If so, impacts would be adverse but localized.

Alternative B also includes a provision to partner with New York City and other landowners to improve coastal resiliency and help restore natural coastal processes such as the longshore transport of sand at Jacob Riis Park. If natural coastal processes are restored here by removing groins, jetties, riprap, or bulkheads, it could result in substantial benefits for not only this park site, but also at Fort Tilden and even Breezy Point because they are downdrift of Jacob Riis Park. Benefits include reducing these park sites' vulnerability to degradation and soil loss from projected possible increased winds and storm surge associated with climate change. This is because a positive or balanced sediment budget can be a primary, or even the primary, factor in determining differences in coastal vulnerability index values along the coast (Psuty and Silveira 2010; USGS Woods Hole Science Center 2004).

Alternative B also includes a provision to partner with New York City and other landowners to improve coastal resiliency and help restore natural coastal processes such as the longshore transport of sand at Jacob Riis Park.

Pennsylvania Avenue and Fountain Avenue Parks

The 110-acre Pennsylvania Avenue ~~Landfill~~ former landfill and the 297-acre Fountain Avenue site on the Jamaica Bay shoreline were used from 1956 to 1983 for construction waste and demolition debris until they were closed by the New York State Department of Environment Conservation (NYCDEP 2010). Both former landfills have been capped and planted with grass, shrubs, and trees. The city's design for ~~the landfills~~ these sites includes increasing the diversity of native plant species and, if possible, introducing rare or even locally extirpated species. Soils at the base of each landfill are sand overlying the original tidal marsh soils. A cap of fill, geocomposite, and a 12-inch protection layer covered with up to 2 feet of topsoil covers both landfills. Methane is currently pumped from the landfills and flared; leachate from the landfills is collected and pumped to a disposal site. The soil that forms the top layer is generally a loam or sandy loam where it is available for plant growth. Alternative B calls for opening both landfill sites to visitors and developing them with a wide range of recreation facilities and community gathering spaces, including a new community gathering area and a trail system. A larger dock to provide water access would be built at the Fountain Avenue Landfill. The possibility of using some of each site to generate solar power is also part of this alternative. Although these facilities would require the removal of existing topsoil, this soil is nonnative and is essentially clean fill deposited by the city as part of the remediation effort. Because of this, impacts would be minimal. These sites are not coastal, and no impact on coastal processes would occur from activities proposed under alternative B.

Other Park Sites in the Jamaica Bay Unit

The following improvements and additions are part of alternative B for park sites in the Jamaica Bay Unit other than those described above: visitor amenities such as bathrooms, food trucks, ~~spectator seating at Plumb Beach,~~ a new nature trail at Bergen Beach, expanded

picnic and open spaces at several sites (Bergen Beach, Canarsie Pier, Spring Creek, etc.); new small-scale visitor facilities at Spring Creek and Frank Charles Memorial Park sites; a new network of trails at Jamaica Bay Wildlife Refuge; and possible guided tours or other NPS led low impact educational or interpretive activities". ~~possible backcountry camping on Canarsie Pol.~~ Many of these would have no effect on soils, but creating new trails or clearing and grading for a picnic area might. Tours and NPS activities are unlikely to to affect soils in any noticeable way because the events would occur only infrequently and be led by rangers or other NPS personnel. ~~Camping on Canarsie Pol is unlikely to affect soils in any noticeable way because it is anticipated that this would be backcountry tent camping that would happen infrequently.~~ To the extent that natural soils are graded or removed for any of these small-scale amenities, localized adverse impacts on soils would occur. If the removed soils are artificial fills or urban rubble, no impacts on native soils would take place. No impacts on coastal processes from any of these actions would be expected.

Staten Island Unit

Fort Wadsworth

Alternative B includes proposed camping and lodging at Fort Wadsworth near the shoreline and near the cultural sites at this location, as well as additional built trails for visitors to experience a wider range of recreational opportunities. Alternative B also includes ~~creating a water trail around Swinburne and Hoffman Islands and a possible dock at Hoffman, as well as~~ preserving natural beach or dune habitats at Fort Wadsworth. Impacts from these facilities on natural soils would be minimal because the beach and both islands are products of fill materials. None of these actions would affect coastal processes at Fort Wadsworth.

Great Kills Park

Sediment was dredged from the Great Kills bay to create the current boat basin, and was deposited in the surrounding upland. Some of the artificial upland reestablished a connection between the mainland and Crookes Point. Recently, portions of the Great Kills Park area have been closed to visitor use because of the discovery of radium ~~radon~~, presumably from medical waste in fill and waste disposed of at this site. Radium levels and appropriate mitigation or removal are being investigated. Because additional areas associated with the historic landfill at Great Kills have exhibited above-background radiation readings, the NPS is working with the US Army Corps of Engineers and contractors and is continuing the clean up effort under CERCLA, common known as the "Superfund" law. Of the 443 acre Great Kills site, 223 acres are part of the landfill that is contaminated. The landfill was created and filled in the 1930s and 1940s before Great Kills Park became part of the NPS. Alternative B proposes expanding current pathways, adding water-based recreation and some introductory camping opportunities, and rebuilding the marina (damaged by Hurricane Sandy) into a water-based recreation facility in a different portion of the harbor. Ferry service may be added. The impact of onshore facilities on natural soils would be minimal, both because facilities are limited and because soils are mostly fills from the dredged harbor and other sources. Impacts from rebuilding and relocating the marina and adding infrastructure and facilities to support a water-based recreation facility have the

potential to result in the dredging and displacement of natural marsh or estuarine soils from the harbor. However, because soils here are already severely altered from dredging to create the harbor, the relative impact of additional dredging is likely to be inconsequential.



Both alternatives B and C include a provision to work with neighboring landowners and partners to implement solutions to improve the resiliency of beach and dune habitat at Great Kills Park and Crooke's Point. To the extent that this includes removing or modifying groins and a sewage outfall pipe to restore natural longshore transport of sediment, benefits to natural coastal processes at these park sites could be substantial and localized, as well as consistent with NPS *Management Policies* 2006 (NPS 2006a).

Miller Field

Activities that may affect soils at Miller Field include improving the current network of trails through the swamp white oak forest and providing signs and clear delineation of the trail. The park would also create a kayak launch site at the ocean and a trail that minimizes foot traffic on beach and dune habitat created. The improved trails could stop or slow erosion in the forest, an important localized benefit for soils in this rare vegetative community, and in the dunes. Creating a kayak launch area has the potential for minimal adverse impact on beach sediments. Improvements to the sports playing fields at Miller Field could also help stabilize soil erosion and loss. Each of these beneficial or adverse effects would be small scale and localized.

Alternative B also calls for increasing the resiliency of the shoreline at Miller Field. Currently, the shoreline is maintained by two groins, a constructed dike, and placement of artificial fill. Removing these structures and restoring natural coastal processes may result in the loss of this beach and dune area, an adverse impact on beach soils if it occurs.

Sandy Hook Unit

Although many new recreational and visitor uses are proposed in this alternative for Fort Hancock, most would not affect natural soils because these uses would take place inside buildings or make use of existing facilities. A possible exception is the expansion of ferry and water taxi use, which, to the extent it requires the removal of benthic soils, would have an adverse and localized impact.

On the bayside of Sandy Hook ~~(such as near the Horseshoe Cove area)~~ and eastward into the upland portion of this park site, alternative B would increase camping opportunities, trail networks, and water-based recreation if supported by site specific analysis. Each of these could have adverse localized impacts on soils. ~~, including those more characteristic of saltmarsh habitat if located near Horseshoe Cove.~~ However, alternative B also calls for increasing sand nourishment on the bayside to help in reducing erosion and supporting restoration efforts, and controlling beach and dune erosion. On the ocean side, ~~additional camping options would be created~~, shade structures ~~increased,~~ and rebuilding with sustainable facilities would occur as needed. Beach centers would be rebuilt making maximum use of portable facilities to avoid impacts from storms. Current management

of coastal sands via a slurry system described under alternative A would continue under alternative B. Adverse impacts from new facilities would be likely to be adverse but minimal, but benefits from restoring sediment availability on the bayside could be more widespread and substantial.

Cumulative Impacts

Impacts of the other actions that contribute to cumulative impacts (i.e., those not related to alternative B) on soils and geology are the same as described under alternative A. Under alternative B, localized adverse impacts from soil loss related to new development would occur at several park sites, but would add only an imperceptible increment to the overall adverse cumulative impacts from past dredging, filling, and other soil manipulation at these sites. However, restoring marsh soils to 100+ acres of Floyd Bennett Field would contribute a noticeable beneficial increment to the overall cumulative impacts on soils. Alternative B could also contribute a noticeable beneficial increment to help offset adverse cumulative impacts on natural coastal processes through partnerships and discussions with neighbors to remove barriers to longshore transport of sand at Jacob Riis Park, Fort Tilden, and Great Kills Park.

Conclusion

Although building new facilities could remove most remaining open land at Jacob Riis, this still amounts to a small area here or at Fort Tilden; although soil loss would be adverse, it would not be considered significant because soils are not a fundamental resource of the park. Development at Floyd Bennett Field would not be expected to affect any natural soils. Restoring dunes at park sites, including Jacob Riis Park, Fort Tilden, Great Kills Park, and Miller Field, and particularly any successful effort to remove groins, jetties, or other structures that inhibit natural sand transport and deposition, would have areawide beneficial impacts as well as being consistent with NPS *Management Policies* 2006 (NPS 2006a). Because of this and because beach and dune systems at several park sites are considered fundamental resources, benefits may be considered significant. Although dunes and beaches at Sandy Hook, including on the bayside, are considered fundamental resources at the park, adding sand does not restore a natural coastal process and benefits would be unlikely to be considered significant.

Although returning 100+ acres of Floyd Bennett Field to natural conditions would affect only a small percentage of this park site, and a smaller still percentage of habitat modified by humans in Jamaica Bay, it is still a potentially significant beneficial impact on both these named fundamental resources.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Jamaica Bay Unit

Floyd Bennett Field

As noted above, although Floyd Bennett Field would not be as developed under alternative C as under alternative B, the impacts on soils from development would be virtually the same. This is because no natural soils (i.e., only dredged fills and urban rubble or similar nonnatural soils) would be affected.

Alternative C would build additional freshwater wetlands and connect a larger area of Floyd Bennett Field to the bay to create saltmarsh than alternative B. Under both alternatives B and C, wetlands would be created in the North Forty and Mill Basin area to the west of Raptor Point. A visitor center in the northern portion of this area on the shore ~~would~~ could make use of an existing concrete shelter and foundation. This alternative, like alternative B, would soften shorelines and restore the connection with Jamaica Bay. Over time, this would return soils to an area greater than 100 acres of combined saltmarsh, estuarine, and freshwater habitat, a substantial benefit for marsh soils in submerged lands of Jamaica Bay, considered a fundamental resource by the park.

Park Sites on the Rockaway Peninsula

Alternative C would result in less facility development at Jacob Riis and Fort Tilden than alternative B, with some visitor amenities provided on a seasonal basis using mobile facilities. Some camping in the backcountry of Fort Tilden would be offered, as would lodging in the post area. ~~area's parade ground.~~ Like under alternative B, trails through the backcountry would be developed.

Although the degree of development at open areas of these park sites would be less than alternative B, the impact from alternative C would still be considered adverse and localized. Soils may be graded to accommodate portable booths on the parade ground rather than being excavated for more permanent facilities. Instead of cabins built in the backcountry, the park may only allow pack-in/pack-out tent platforms. These small losses would be offset by dune restoration efforts, and by coastal and upland habitat protection and restoration. Like under alternative B, the NPS would work closely with neighboring landowners to restore coastal processes at Jacob Riis Park, an action that could result in widespread and important benefits for beach sands.

Pennsylvania Avenue and Fountain Avenue Parks

Impacts on soils from actions proposed at the former landfill sites would be the same as under alternative B, ~~even though this alternative proposes using only one for visitors rather than both.~~ This is because the soil in these areas is nonnative and is essentially clean fill deposited by the city as part of the remediation effort. Because of this, impacts would be minimal. In addition, these sites are not coastal, and no impact on coastal processes would occur from activities proposed in alternative C.



Like alternative B, alternative C includes a provision to work with neighboring landowners and partners to implement solutions to improve the resiliency of beach and dune habitat at Great Kills Park and Crooke's Point.

Other Park Sites in the Jamaica Bay Unit

Alternative C improvements for visitor uses at other park sites in this unit would generally be less intense than under alternative B. Many of these would have no effect on soils, but creating new trails or clearing and grading for picnic areas or open spaces. An exception to this may be at Plumb Beach, where observation decks, trails, outdoor education, and other facilities are proposed under alternative C. Although the removal of equestrian use from Bergen Beach would result in localized benefits to soil quality, the relocation to Fort Tilden could have similar adverse impacts on soils at this park site by adding unwanted nutrients. ~~Camping would not be allowed on Canarsie Pol in this alternative, and so the minimal adverse impacts associated with this action in alternative B would not occur.~~ To the extent that natural soils are graded or removed for any of these small-scale amenities, localized adverse impacts on soils would occur. If the removed soils are artificial fills or urban rubble, no impacts on native soils would take place. No impacts on coastal processes from any of these actions would be expected. Conversely, several of these park sites would have improved protection of dunes and beach habitat (Plumb Beach, Bergen Beach, Breezy Point Tip) or other coastal habitat (Spring Creek, Jamaica Bay Wildlife Refuge, Breezy Point). Collectively, these efforts could provide widespread benefits for beach and dune sands or wetland soils.

Staten Island Unit

Fort Wadsworth

Expanding c~~C~~amping and lodging are not part of alternative C at this park site, nor is access to Hoffmann Island. Because this reflects current conditions, there would be no impact on soils from development relative to the no-action alternative.

Great Kills Park

As in alternative B, alternative C proposes some introductory camping opportunities and rebuilding the marina (damaged by Hurricane Sandy) into a water-based recreation facility potentially in a different portion of the harbor. Other trails and amenities are not part of alternative C; however, since soils at this park site are not natural, differences in impacts from development between the two action alternatives would be inconsequential. Impacts from rebuilding and relocating the marina and adding infrastructure and facilities to support a water-based recreation facility have the potential to result in the dredging and displacement of natural marsh or estuarine soils from the harbor. However, because soils here are already severely altered from dredging to create the harbor, the relative impact on natural soils of additional dredging would likely be minimal.

Like alternative B, alternative C includes a provision to work with neighboring landowners and partners to implement solutions to improve the resiliency of beach and dune habitat at Great Kills Park and Crooke's Point. To the extent that this includes removing or modifying groins and a sewage outfall pipe to restore natural longshore transport of sediment, benefits to natural coastal processes at these park sites could be substantial, as well as consistent with NPS *Management Policies* 2006 (NPS 2006a).

Miller Field

Activities and impacts at Miller Field would be the same as for alternative B, with a number of localized beneficial and adverse effects possible.

Sandy Hook Unit

Fewer new recreational and visitor uses are proposed in this alternative for Fort Hancock than under alternative B, with localized adverse impacts on soils possible from an improved trail system. Like under alternative B, it is possible that all maintenance facilities in Sandy Hook would be relocated to an alternate building or buildings. If these are existing structures, no impacts on soils would occur. If it requires a new building or buildings, impacts on soils would likely be adverse and local, although a new building on dredged fill or other similar material placed by humans would have no impact on natural soils.

On the bayside of Sandy Hook ~~(such as near the Horseshoe Cove area)~~ and eastward into the upland portion of this park site, alternative C would increase day-use recreation opportunities, including new trails, boardwalks, blinds, outdoor programming, etc. Each of these could have adverse localized impacts on soils. ~~, including those more characteristic of saltmarsh habitat if located near Horseshoe Cove.~~ On the ocean side, fewer visitor use facilities than under alternative B would be built. Beach centers would be rebuilt only using portable construction, with fewer amenities than under alternative B. More intensive habitat protection and monitoring of beach and dune habitats would occur and rare habitats such as the holly forest, saltmarshes, and dunes would be highly protected. Impacts from new facilities would likely be adverse but minimal, whereas increased protection of habitats could have localized benefits for natural soils.

Efforts to restore and/or stabilize dunes would primarily benefit facilities, but could offer some benefits to coastal soils by increasing the supply. These benefits are unlikely to be significant because they nourish but do not restore natural sand transport processes.

Cumulative Impacts

Cumulative effects would be the same as those described above for alternative B.

Conclusion

Under alternative C, the adverse impacts from increased development at park sites in all three units would not be considered significant because localized development at Floyd Bennett Field would not be expected to affect any natural soils and because soils are not a fundamental resource. Efforts to restore and/or stabilize dunes would primarily benefit facilities, but could offer some benefits to coastal soils by increasing the supply. These benefits are unlikely to be significant because they nourish but do not restore natural sand transport processes. On the other hand, benefits from restoring sand transport processes at Jacob Riis Park could also restore them at Fort Tilden or even Breezy Point, and restoring transport processes at Great Kills could restore important mudflat or beach soils. Overall benefits may be widespread, and because beach and dune systems are named as fundamental resources, may be considered significant.

Although returning 100+ acres of Floyd Bennett Field to natural conditions would affect only a small percentage of this park site, and a smaller still percentage of habitat modified

by humans in Jamaica Bay, it is still a potentially significant beneficial impact on both these named fundamental resources.

Air Quality

Air quality is an integrating resource that can affect numerous resources and values in the park. Clean air is important to the visiting public and essential to supporting healthy ecosystems. Air pollution can impact human health and jeopardize park experience when it reaches unhealthy levels. Ozone and fine particulate (particulate matter less than or equal to 2.5 microns [PM2.5]) concentrations can exceed national health standards at times and can cause respiratory irritation in park visitors and staff. Aerosols can deposit in soils or bodies of water, causing acidification and increases in unwanted nutrients. Clean, clear air is also important to enjoying park views, which can be obscured by haze, a combination of fine particles and gaseous air pollution in the atmosphere.

Laws and Policies

In the Clean Air Act, Congress set a national goal "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic or historic values" (42 USC 7470[2]). This goal applies to all units of the national park system.

The act includes special provisions for 48 units, called Class I areas. Under the Clean Air Act, all other national park system areas are designated as Class II, including Gateway. Although the most stringent protections are provided to Class I areas, the legislation also aims to limit the level of additional pollution allowed in Class II areas, and potential impacts to these areas are to be considered.

The "Air Quality" section in chapter 3 of this GMP/EIS notes that the region that includes the park is in non-attainment status for nitrogen oxides (NOx), ozone, and PM2.5. According to section 176(c) of the Clean Air Act, any project sited in a non-attainment area must satisfy the general conformity rule of the Clean Air Act. Conformity ensures that projects do not cause or contribute to a new air quality standard violation, increase the frequency or severity of an existing violation, or delay timely attainment of a standard or any required interim emission-reduction milestone. To the extent that any alternative proposes actions that would result in increases in emissions, compliance would need to include a conformity determination.

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on air quality, with a focus on the indicators the NPS considers important (ozone, deposition, and visibility) and those with National Ambient Air Quality Standards (NAAQS) or attainment considerations. Standardized reference information on the types of impacts associated with mobile or stationary sources was consulted. Quantitative estimates are based on standardized U.S. Department of Transportation references for average emissions.

Resource-specific context factors for assessing the impacts of the alternatives on air quality include the following:

- Air quality in Class II parks is managed to protect natural and cultural resources, visitor and employee health, and visitor experience to the same desired condition as Class I parks.

- No air quality factor is named as a fundamental resource or value at Gateway; nor are viewsheds or visitor or employee health. Natural areas at some park sites and nature observation are named as fundamental resources or values.

- Current conditions for the three primary factors (ozone, deposition, and visibility) considered by the NPS to determine whether desired natural resource–based air quality conditions exist all indicate that concern is warranted.

- Gateway is located in an urban environment and its air quality reflects this; because of this, the park is unable to maintain or make significant changes to NPS desired conditions or meet NAAQS on its own.

Alternative A: No Action

The no-action alternative would for the most part continue current management practices for the foreseeable future. Exceptions to this statement include cleanup and repair efforts related to Hurricane Sandy and any approved projects or plans the park would implement.

Impacts of Alternative A

Mobile Source Emissions

Currently, emissions from activities in the park include those from automobiles, buses, and boats at the marinas, as well as from power generated for park needs off site and generators as needed at the park. The "Transportation" section in chapter 3 of this GMP/EIS (see "Regional Transportation Overview") describes regional options for accessing the park, which include some ferry, bus, and indirect subway connections (via bus to subway stations). Limited park shuttles to transport visitors to the beach at Sandy Hook, for example, exist, as do some bike paths and paved and unpaved walking routes. Generally, connections between park sites are unavailable and parking in many sites is limited. Most visitors arrive and explore park sites by car.

A 2003 study (NPS 2003e) found that highway and non-road vehicles at the park emit 45 tons of NOx, 226 tons of volatile organic compounds, 13 tons of particulates and 926 tons of CO per year. The majority of VOCs was from offroad vehicles driven primarily by park staff; the majority of CO was from highway vehicles. Of these, NOx and CO levels are high enough that they would be of concern under current NPS Air Resources Division (ARD) direction (NPS ARD 2011). (Emissions of volatile organic compounds [VOCs], methane, and some precursors to ozone are traditionally reported for mobile sources as total HC [EPA 2003]). The Jamaica Bay Unit accounted for the largest portion of the emissions of each pollutant. As noted in

the "Affected Environment" chapter, CO concentrations do not remain in the atmosphere for long and are usually limited to locations near crowded intersections, heavily traveled and congested roads, parking lots, and garages (NYCPC 2012b). The Jamaica Bay Transportation Studies (FHWA 2006) support this finding, noting that, with assumptions regarding reasonably foreseeable changes in environmental protection agency (EPA) regulations and compliance with those regulations, 1-hour CO concentrations would decrease from their current 6.3 parts per million (ppm) to 6.0 ppm in 2025. The same document predicts that 8-hour CO concentrations would also decrease from their current 4.4 ppm to 4.2 ppm in 2025. The NAAQS for CO are 35 ppm for the 1-hour and 9 ppm for the 8-hour standard. Air quality impacts from mobile sources on CO under current levels of car and bus uses would be therefore be localized and temporary and would continue to be well below federal standards. However, NOx contributes to ozone formation, which is not meeting NPS ARD-recommended desired future conditions and is out of compliance with the federal 1-hour standard. NOx concentrations at locations near to the park were measured at levels lower than the annual or 1-hour standards (see Table 3-1).

Emissions from Facilities Construction

The no-action alternative would include the implementation of an approved 2010 project to construct two terminal groins at the east and west limits of beach fill at Plumb Beach (NPS 2010f). The groins would be rubble mound structures designed to withstand up to a 100-year storm wave force. The environmental assessment for this project (NPS 2010f) indicates that heavy equipment would be used for the project and that CO and other pollutants would be emitted for a short time. Emissions would not exceed any NAAQS threshold.

Emissions from Hurricane Sandy Damage Repair or Restoration

Repair and restoration efforts resulting from Hurricane Sandy could also result in emissions from construction or deconstruction. For example, several roads and parking lots will need to be regraded and repaved, lifesaving stations and beach centers at Sandy Hook may be replaced or repaired, the Canarsie Pier restaurant building will be torn down, and culturally important buildings such as the Jacob Riis bathhouse may be restored or structurally stabilized. Each of these would result in temporary impacts from pollutants such as CO, HC, and particulates from heavy equipment use.

Other Emissions

The park emits pollutants as part of its day to day operations. A 2003 study (EPA and NPS, 2003) found non-mobile emissions (see above for mobile emissions) to total 3 tons of SO_2, 10 tons of NOx, less than one ton of volatile organic compounds or particulates and less than 6 tons of CO. Sources include space and water heating, generators, fuel storage tanks, fireplaces and wastewater treatment.

In addition to these criteria pollutants, the park greenhouse gas emissions were calculated as 3.8 tons of CO_2. Sources included direct combustion and purchased electricity.

Planting trees as part of the MillionTreesNYC program would increase the capacity of the park's vegetation to act as a carbon dioxide (CO_2) sink, reducing its contribution to greenhouse gases and its carbon footprint, a potentially widespread beneficial impact. For example, another national park system unit in California (Point Reyes National Seashore) predicted that the adverse impacts from the park's contributing over 8,000 tons of greenhouse gases each year from operations (including its need for power and heat from the local utility) would be offset by more than 30,000 tons of absorption of CO_2 by park trees and other vegetation, with a net benefit of over 20,000 tons of CO_2 equivalent per year (NPS 2009g). Figures for Gateway's contributions of greenhouse gases and its potential for offsetting adverse effects on air quality by planting trees are unknown.

Cumulative Impacts

The reporting of current conditions in the New York City/New Jersey area in the "Affected Environment" chapter is a summary of the impacts of cumulative actions in the area. These are primarily from mobile sources, although VOCs and other precursors to smog, or of aerosols of nitrogen and sulfur that fall as acid rain or increase unwanted nutrients in water bodies, can come from large stationary sources like power plants or industrial facilities much farther away. The park also contributes an imperceptible amount to cumulative air impacts from day-to-day operations that would be unchanged in any GMP/EIS alternative. The combination of these sources has resulted in levels of ozone, wet deposition of sulfur, and impacts on visibility that are of concern to the NPS in its assessment of natural resource–based air quality and the ability of Gateway to meet standards in section 4.7.1 of the NPS *Management Policies* 2006 (NPS 2006a). Ozone and small particulate (PM 2.5) concentrations also exceed NAAQS in the area, which is in non-attainment status for both. These conditions suggest that cumulative impacts from all sources not related to actions in the GMP/EIS are substantial and adverse. Future cumulative impacts to air quality would come from the proposed Rockaway lateral pipeline. The recently released draft EIS for the project (FERC 2013) indicates particulates, SOx, NOx and VOCs would all increase during construction, but that because they would be lower than "de minimus" standards for conformity determinations would not be significant. In addition, the construction of the line is expected to result in 20,000 tons of CO2 equivalents in greenhouse gases; because this is lower than the Council on Environmental Quality standards for required detailed analysis of 25,000 tons per year, no quantitative analysis or mitigation was offered. The impacts from the no-action alternative would primarily be short term or localized or both and would add an imperceptible adverse impact to these overall adverse cumulative impacts. Planting trees could improve air quality by reducing CO2, an unknown but likely imperceptible beneficial offset of the adverse cumulative impacts.

Conclusion

The no-action alternative would result in no change to current emissions from mobile sources, and short-term localized increases in emissions from construction-related activities, an adverse impact on air quality. The emissions of NOx and CO from mobile sources at the park would be high under alternative A. CO disperses quickly and modeling shows that it would decrease as increasingly strict regulations are put in place. Although NOx levels would be higher than advised by the NPS ARD, the region is in compliance for all NOx standards



and that contributed by park visitors is a small portion of the overall NOx in the air basin. Park operations also result is a very small amount of criteria pollutants and greenhouse gas emissions. For these reasons and because air quality is not identified as a fundamental resource at the park, the impacts of alternative A on air quality would not be considered significant. Although cumulative impacts on air quality are substantial and adverse, the contribution from either mobile or construction sources under this alternative would not add more than an imperceptible adverse increment, and planting trees would add an imperceptible beneficial increment.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Emissions from Facilities Construction

Both action alternatives envision the JBSRI, which would support protection projects and similar urban ecology projects, being established somewhere near Jamaica Bay and likely on park lands. The location is yet unknown, but it could be at Floyd Bennett Field. If so, preliminary work envisions it located on an approximately 20-acre site on the east side of Floyd Bennett Field, allowing it to take advantage of existing buildings for reuse, renovation, or potentially for expansion (Happold Consulting 2012). The institute would be a campus-like collection of buildings, with possible temporary housing or food service for visiting researchers, research and lab facilities, and docks and related infrastructure for a small boat fleet. Should the wetlands center also be approved (as proposed in alternatives B and C), it and the JBSRI would potentially be co-located to share resources, dock facilities, parking, and road access. Some construction of access, parking, and dock facilities or renovating or expanding buildings could occur at Floyd Bennett Field, with associated emissions (including HC, particulates [particularly from diesel engines], and CO) from heavy equipment. These emissions would be localized and temporary, lasting only until construction is complete.

Other Emissions

Both alternatives would implement measures to reduce greenhouse gases such as modernizing the NPS fleet of vehicles, purchasing renewable energy, reducing miles traveled and other changes listed on page ~~56~~ 57. These measures would reduce the parks emissions of CO2, a beneficial impact.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Mobile Source Emissions

Alternative B would include additional public transportation and options for bikes, water access, pedestrian walkways, and shuttles. These changes are described in more detail in the "Transportation" section in this chapter of the GMP/EIS, but would include, for example, a multimodal transportation hub at Floyd Bennett Field. In part, the purpose of this hub would

be to facilitate the development of the wetlands center at Floyd Bennett Field, because this new center would be the focus of outdoor classrooms, educational exhibits, and interpretive media, and would be the starting point for many visitors to experience the Jamaica Bay Unit. Camping, ~~a proposed hotel,~~ lodging, multiple community and visitor activity areas, water-based recreation, and other attractions would be particular draws for this area.

These additions would be likely to increase visitor numbers at Floyd Bennett Field. Some of these visitors would arrive by car and add to the emissions totals identified in alternative A. However, alternative B is particularly focused on creating public transportation or alternative transportation options and maintaining a series of links across park sites. These would include the presence of alternative transportation hubs at Floyd Bennett Field, Jamaica Bay Wildlife Refuge, and Canarsie Pier as well as newly created bike or pedestrian connections between Floyd Bennett Field and Plumb Beach or Bergen Beach, between Canarsie Pier and adjacent communities, between neighborhoods and the Spring Creek park site, and between Jacob Riis park and other NPS and city park sites. Water transportation would be improved by designating canoe and kayak routes around Jamaica Bay, rebuilding Great Kills Marina for private boat use, and offering or linking to ferries from Manhattan to Staten Island or to Jacob Riis, Sandy Hook, or Great Kills, or between the Jamaica Bay Wildlife Refuge and the wetlands center at Floyd Bennett Field. Public transportation by shuttle may be offered between some park sites, such as from Fort Tilden to Breezy Point Tip, and would continue to link visitors to Sandy Hook when parking lots are full. The Sandy Hook shuttle would be expanded to carry visitors between Sandy Hook sites. Each of these options could result in the decrease of car-related emissions, because visitors would be much more likely either to not use a car at all or to park at Floyd Bennett Field or other large lots and travel around park sites on foot or by bike, boat, or shuttle. This could result in substantial and widespread reductions in park visitor–related emissions from cars.

As noted in the "Methods" section in this chapter, air quality is not named as a fundamental resource at the park, but is important in providing crisp, clear views for natural observation, for example. Current air quality conditions at the park are poor for several indicators, including all three monitored and evaluated by the NPS: ozone, wet deposition, and visibility. However, the air basin is a shared resource and impacts on it come from regional sources. As noted in the alternative A cumulative impacts discussion, cars driving in the park add only an imperceptible amount. Therefore, although the park would be making major changes to its input to the regional air quality scenario from mobile sources, the air quality itself would not change perceptibly as a result. Reductions in mobile source emissions at the park would be beneficial and widespread across the park compared to current park emissions.

Emissions from Facilities Construction

Alternatives B and C would both include the creation of a wetlands center at Floyd Bennett Field, but this alternative proposes additional visitor facilities, such as an education center, trails and boardwalks, outdoor classrooms, observation facilities, and a wide range of accommodations not part of alternative C. Some of these facilities may be located inside existing buildings, which would require rehabilitation before they are reused. The Jamaica Bay Vision Report (Happold Consulting 2012) proposes that the wetlands center be located on a 100-acre portion of the North Forty area of Floyd Bennett Field, although further

studies would be conducted to determine the final acreage. The center would include paths, outdoor educational opportunities, and a visitor center. The report also describes the creation of connections between Floyd Bennett Field and Jamaica Bay to facilitate a restored and self-sustaining saltwater wetlands area, as well as a freshwater wetland constructed farther inland. These would each require the use of heavy equipment for excavating, grading, and construction. Even very intense construction, such as of a water treatment facility, that would require 30 to 50 trips by heavy-duty trucks every day, would result in between 0.25 and 0.5 ton of HC, 1.3 and 2.3 tons of CO, and 6 and 10 tons of NOx for the entire six-month construction period (NPS 2004h). These are considered small amounts by the NPS ARD, and are temporary and localized adverse impacts.

A similar but slightly lesser level of effort may be required for other actions in alternative B; for example, the proposed construction of a community gathering space at one of the two former landfill sites on Jamaica Bay that the park would develop for visitor uses, or rebuilding beach centers at Sandy Hook. The size and complexity of these projects would define the time each would take to build and the associated construction-related air impacts. Alternative B would use portable facilities and other sustainable design techniques that would minimize the need for permanent construction and related air quality impacts. Overall, impacts on air quality from emissions from heavy equipment would not be likely to exceed those noted previously for an intense, six-month construction effort and would be temporary and local.

Building transportation hubs or physical connections between park sites, or between park sites and local communities, would also require some construction effort, with resulting short-term localized impacts on air quality. Similarly, alternative B calls for new visitor facilities, including camping at Floyd Bennett Field, and Fort Tilden~~, and Canarsie Pol~~; amenities like bathrooms, food trucks, launching areas, and/or nature trails at Plumb Beach; and the new landfill park sites, as well as similar physical connections between other park sites. Each of these would potentially require grading, excavating, and construction using heavy equipment, with associated short-term localized impacts on air quality from emissions.

Cumulative Impacts

Impacts of the other actions that contribute to cumulative impacts (i.e., those not related to alternative B) to air quality are the same as described under alternative A. The park would potentially greatly diminish its contribution to greenhouse gases by planting trees and would provide benefits from reduced mobile emissions in alternative B, thereby offsetting the cumulative degradation of air quality from regional sources; however, the change would be imperceptible because impacts from those sources would be much larger than could be compensated for by the potential benefits from alternative B. The temporary and localized impacts from construction would add a short-term imperceptible adverse increment to cumulative impacts on regional air quality.

Conclusion

Reductions in mobile sources from cars at the park would occur as visitors increasingly use alternative transportation and physical connections between park sites for bikes,

boats, and pedestrian travel. This would be a substantial, widespread benefit compared to existing mobile source emissions from the park, but would be an imperceptible contributing benefit to current air quality in the park and region and would therefore not be considered significant. Actions taken by the park to reduce greenhouse gas emissions would also be beneficial but not significant for the same reasons. Increased short-term adverse impacts from construction compared to alternative A would occur, including those from any expansion of buildings or new buildings for the JBSRI, but these would be localized and imperceptible compared to current conditions and would not be considered significant.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Mobile Sources

This alternative would include most of the same hubs, connections between park sites, and alternative transportation paths and opportunities as alternative B. However, some actions under this alternative would differ from those under alternative B. For example, at Floyd Bennett Field, camping would be more concentrated and require less space and less transportation, and would also have fewer visitors. Facilities would be less oriented toward a wide range of accommodations and more toward carrying capacity, green design, and a secluded visitor experience. Visitor facilities would be located in pockets surrounded by larger undeveloped or restored areas. In addition, the entrance and circulation at Floyd Bennett Field would be changed to better accommodate flow. Equestrian facilities would be relocated away from Bergen Beach and moved to either Floyd Bennett Field or Fort Tilden, with an accompanying change in vehicular patterns. The location of an anaerobic digester at Floyd Bennett Field (see "Facility Emissions") and a potential natural gas power generation plant or similar facility at one of the landfills along Jamaica Bay would likewise change traffic patterns. Substantially fewer facilities at Fort Tilden would mean that increases in traffic there would be less likely than under alternative B. Concentrating maintenance functions at Fort Tilden for the Rockaway Peninsula park sites and at a central location (or locations) for Sandy Hook would also cause small-scale changes in staff traffic patterns. Each of these differences would result in very small localized changes in air emissions compared to alternative B. Given the same alternative transportation and connection options as in that alternative, the beneficial impacts of alternative C compared to no action for emissions related to mobile sources in the park would be nearly the same as for alternative B compared to no action: widespread and beneficial.

Facility Emissions

A notable difference between alternatives B and C is the proposed use of an anaerobic digester to reduce compostable wastes and generate biofuels under this alternative. Building this kind of facility would require additional environmental review and permitting, with a much better idea of size, feed material, location and therefore of air quality emissions and impact. For the GMP/EIS, description of impacts is programmatic and qualitative.

Reductions in mobile sources from cars at the park would occur as visitors increasingly use alternative transportation and physical connections between park sites for bikes, boats, and pedestrian travel.

An anaerobic digester is most commonly used to reduce solid waste and create burnable biogas from animal manure. However, it can also use vegetation (yard waste) and food waste. The air emissions from a digester are typically primarily a combination of methane and CO2, with other gases such as nitrogen, hydrogen, hydrogen sulfide, and oxygen in far lesser amounts (SENES Consultants Limited 2009). Hydrogen sulfide, which has a "rotten egg" smell, is primarily emitted during startup periods with a digester. It is associated in higher concentrations with a feedstock of agricultural materials, including animal waste, which would not be used at the park. CO2 is also a greenhouse gas, but the facility could be designed to burn off CO2 before it is released (SENES Consultants Limited 2009). Methane, which is naturally produced from the decomposition of organic matter, could be used as a cooking fuel as is or upgraded to the same natural gas that is used to heat homes. A portion of the methane would be burned as fuel to run the digester. However, methane is also a powerful greenhouse gas, considered 23 times more potent in its contribution to global warming than CO2. Facilities can be designed to capture emissions; for example, housing the digester in a building provides a second roof to help keep odors or other pollutants from leaking into the surrounding area.

This alternative also proposes examining the option of drawing methane from one of the two former landfills along Jamaica Bay to create fuels or burn for a renewable energy source, or building a field of solar panels to generate power. Similar to the digester, additional environmental review and permitting would be required with site specific air quality information before this kind of facility could be built. Methane is produced along with other gases (landfill gas) from landfills, and landfills are considered the third-largest source of methane emissions in the country (EPA 2013). The gas can be flared, used directly in thermal applications, or used in a boiler for power generation. The EPA has indicated an interest in landfill gas energy to help use rather than emit methane (because it is a greenhouse gas), to generate renewable energy, and to reduce local air pollution. Developing a landfill gas facility to use methane at the landfill would have a localized beneficial impact on air quality. Solar panels would also have a beneficial impact by reducing emissions from a fossil-fuel burning facility somewhere in the region. Depending on the current source of energy and the location where solar-generated power would be used, benefits could be part of the air basin in which the park is located or farther away.

Visitor-related facilities would be slightly reduced in scale compared to alternative B. For example, camping at Floyd Bennett Field and Fort Tilden would be downsized and concentrated. Beach centers at Sandy Hook would make the maximum use of portable facilities and have the fewest amenities of any alternative. Construction-related air emissions would still occur, but would be lower than under alternative B.

Cumulative Impacts

Impacts of the other actions that contribute to cumulative impacts (i.e., those not related to alternative C) on air quality are the same as described under alternative A. Although the park would potentially greatly diminish its contribution and provide benefits to offset the cumulative degradation of air quality from regional sources, the change would be imperceptible because impacts from those sources would be much larger than could be compensated for by the potential benefits from alternative C. Benefits from alternative

C would include removing methane and CO2 with an anaerobic digester and methane recovery plant and so would be greater than benefits under alternative B; however, they would still be imperceptible compared to the substantial adverse cumulative impacts on the air basin. The temporary and localized impacts from construction would add a short-term imperceptible adverse increment to impacts on regional air quality.

Conclusion

Reductions in mobile sources from cars at the park would occur as visitors increasingly use alternative transportation and physical connections between park sites for bikes, boats, and pedestrian travel. This would be a substantial, widespread benefit compared to existing mobile source emissions from the park, but would be an imperceptible benefit to regional air quality conditions. Additional reductions to greenhouse gases from actions taken to reduce direct and indirect combustion under either alternative would also occur. Additional substantial localized benefits from proposed methane recovery projects (including the anaerobic digester and landfill methane recovery project) or solar panels offsetting the park's greenhouse gas emissions would also be likely. Increased short-term adverse impacts from construction compared to alternative A would occur, but emissions from this source would be slightly lower under this alternative than under alternative B. Impacts from construction would be localized and imperceptible compared to current conditions. Although some of these adverse or beneficial effects would be important, they would not be considered significant because air quality is not an identified fundamental resource and changes to air quality would not noticeably improve or degrade air quality conditions in the park because of cumulative impacts from other sources.

Water Resources

Water resources include groundwater aquifers and surface waters such as bays, ponds, streams, and wetlands (see the "Water Resources" section in chapter 3). Dredging, shoreline development, urbanized watersheds, and pollution from sewer and wastewater treatment outflows have adversely impacted the hydrology, bathymetry, water quality, and sediment quality of water resources at Gateway. Pollution can degrade water quality and diminish the opportunities for fishing, water-based recreation, and visitor enjoyment. Gateway's wetlands ameliorate some of these effects through functions such as floodwater attenuation, trapping sediments and pollutants, and recycling nutrients.

Dredging, shoreline development, urbanized watersheds, and pollution from sewer and wastewater treatment outflows have adversely impacted the hydrology, bathymetry, water quality, and sediment quality of water resources at Gateway.

Laws and Policies

Surface water and groundwater are managed by the NPS as integral components of park aquatic and terrestrial ecosystems. Water resources are legally regulated and protected under provisions of the Clean Water Act, including sections 305(b) and 303(d), which establish state water quality monitoring and reporting standards; section 402, which regulates pollution and sediment in runoff; and section 404, which regulates dredge and fill activities that affect wetlands. The NPS has several guiding principles with respect to water resources, as outlined in the "Water Resource" section of the NPS *Management Policies* 2006 (NPS 2006a). These include considering a watershed approach to managing water resources, minimizing human disturbances that adversely affect surface waters and

groundwater, and working with appropriate agencies to obtain the highest possible standards available under the Clean Water Act. NPS policy also encourages developing cooperative agreements with other agencies as appropriate to help maintain or restore the quality of park water resources.

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on water resources. Sources of information used to assess impacts on water resources under the proposed alternatives include state water quality monitoring reports and regional watershed planning documents, including the Hudson–Raritan Estuary Comprehensive Restoration Plan (USACE and PA 2009) and the Jamaica Bay Watershed Protection Plan (NYCDEP 2012).

Resource-specific context factors for assessing the impacts of the alternatives on water resources include the following:

- Jamaica Bay waters, including inlets, submerged lands, and Dead Horse Bay, are named as a fundamental resource at Gateway.

- The quality of water resources is related to the condition of wetlands, particularly saltmarshes, which are an important component of the natural areas at Breezy Point Tip, Floyd Bennett Field, Great Kills, Jamaica Bay Wildlife Refuge, and Sandy Hook. These natural areas are named fundamental resources at Gateway.

- Water resources affect the quality and availability of water-based recreation (e.g., swimming, fishing, and self-propelled watercraft), a named fundamental park value.

Alternative A: No Action

Impacts of Alternative A

Under the no-action alternative, Gateway would continue providing data on water quality and subaqueous sediments to regulatory authorities under existing water resources monitoring programs. The desired future conditions identified by the park for water quality in Jamaica Bay include eliminating and/or controlling pollutant sources, attaining water quality levels that support visitor contact recreation and aquatic ecosystem restoration and controlling invasive exotic aquatic species (NPS 2010b). Gateway would continue to collaborate with local, state, and federal officials as needed to address these and other common management goals concerning water quality and surface waters, including for wetlands. Current projects in Jamaica Bay include those to restore saltmarshes and protect fringe wetlands, coastal flooding and shoreline stabilization projects, and ongoing programs to conduct scientific research and collect water quality monitoring data. Inter-agency planning and coordination for restoring Jamaica Bay with agencies including the USACE and EPA has been ongoing for decades. The results of collaborative partnerships and programs would be expected to have widespread and long-term beneficial impacts on Gateway water resources by addressing the underlying causes of adverse impacts.

Protection and restoration of wetlands throughout the park is expected to provide widespread beneficial impacts because of the water quality functions wetlands perform, including trapping sediment and pollutants and recycling excess nutrients. A more detailed discussion of these impacts is provided in the "Wetlands and Floodplains" section of this chapter.

Continued visitor use could result in erosion of soils, with localized and usually inconsequential impacts on water quality. Specific areas in the Jamaica Bay Unit that would experience such impacts include Plumb Beach, where the dune system is impacted by foot traffic, and Bergen Beach, which would have continuing equestrian use under the no-action alternative. At the Staten Island Unit, access to beaches and dunes at Fort Wadsworth and Miller Field would continue to be unmanaged. Elsewhere in the park, fewer or no adverse impacts would be expected to occur in areas currently managed as designated trails, boardwalks, or restricted access areas.

Cumulative Impacts

Collaborative projects and programs, including water quality monitoring and improvement, shoreline stabilization projects, and wetland restoration, are examples of actions with potential cumulative benefits to water resources.

The water resources at Gateway are connected to the larger Hudson–Raritan Estuary system, which includes Jamaica, Sandy Hook, Raritan, and Upper and Lower New York Bays; the Atlantic Ocean; and freshwater rivers and streams including the Hudson and Raritan Rivers and their tributaries. As such, the analysis of cumulative impacts takes into account the geographic area of the Hudson–Raritan Estuary system, including inputs contributed by the surrounding urbanized watersheds. Cumulative impacts also consider the effects of historical and ongoing land uses in the area surrounding Gateway, as well as the policies and actions of other managing stakeholders in the area, including New York City, the U.S. Army Corps of Engineers (USACE), and the states of New York and New Jersey.

The New Jersey Coastal Plain aquifer system lies beneath the Sandy Hook and Staten Island Units, and the Brooklyn–Queens aquifer system underlies the Jamaica Bay Unit. Gateway provides opportunities for groundwater recharge because of its open spaces, natural habitats, and soils with coarse particles that allow for rapid movement of water into the soil (NRCS et al. 2001), an imperceptible beneficial impact on the region's groundwater resources given the geographic scope of the aquifers and their contributing watersheds.

Adverse impacts on surface waters (including wetlands; see the impacts section for wetlands and floodplains), subaqueous sediments, and water quality in Gateway are the result of numerous regional factors (see the "Wetlands and Floodplains" section in this chapter). Urban development is associated with hardened shorelines, impervious surfaces, and channelized runoff (USACE and PA 2009; NYCDEP 2007). Most natural tributaries, especially at Jamaica Bay and Staten Island, have been filled and diverted for urban development. Most runoff now consists of outflows from water treatment plants, CSOs, and stormwater runoff (USACE and PA 2009).

Dredging of bay sediments to maintain channels for shipping and commerce creates deep pits or channels that act as a sediment sink and alter water flows, including amplifying tidal ranges and decreasing natural flushing rates (USACE and PA 2009; Swanson and Wilson 2008). The average depth of Jamaica Bay has increased from 11 feet (historical) to 16 feet and water volume increased 350 percent from dredging (NYCDEP 1994, as cited in NYCDEP 2007). High tides in Jamaica have risen by 1 to 1.6 feet over the past century, resulting in water levels over saltmarshes that are 56–78 percent greater than the regional sea-level rise (Swanson and Wilson 2008). The hydrological changes in Jamaica Bay from urban development and dredging have resulted in altered sediment transport dynamics and contributed to decreased water quality (USACE and PA 2009). Increased sediment loads and channelized urban runoff result in increased scouring that erodes dunes, saltmarshes, and other coastal habitats (USACE and PA 2009).

Pollution of surface waters can degrade the natural functioning of aquatic and terrestrial ecosystems and diminish the utility of park waters for visitor use and enjoyment (NPS 2006a). Landfill leaching, stormwater runoff, and outflows from wastewater treatment plants and CSOs, including the 240–340 million gallons per day of treated sewage effluent that flow into Jamaica Bay alone, carry chlorine, heavy metals, nutrients, silica, pharmaceuticals, soaps, floating debris, chemicals, pathogens, personal care products, pharmaceuticals, detergents, pesticides, trace organics that have endocrine-disrupting properties, and other contaminants into Gateway's surface waters, especially Jamaica Bay (NPCA 2007a; USACE and PA 2009; NYCDEP 2007; JBWPPAC 2007; Furlong et al. 2010). Contaminants dissolved or suspended in water adhere to organic compounds and settle into sediments, where they persist and are difficult to remove. Many chemicals that taint sediments are readily absorbed into animal fat cells, accumulating to dangerous levels and prompting consumption advisories for some of the region's fish and shellfish species (USACE and PA 2009).

An estimated 36,600 pounds per day of nitrogen are discharged into Jamaica Bay from water pollution control plant (WPCP) outflows, accounting for 95 percent of the nitrogen load (NYCDEP 2007). Excess nutrient loading, a condition known as eutrophication, stimulates the growth of invasive plants, causes phytoplankton and algae blooms (NYCDEP 2007), and is linked to saltmarsh loss through decreased root production and sediment accretion rates and increased soil organic matter decomposition (Rafferty, Castagna, and Adamo 2011). High nutrient loads also contribute to low dissolved oxygen (DO) levels in Jamaica Bay, which occasionally fall below the 5.0 milligrams per liter (mg/L), the threshold specified by state water quality standards for waters suitable for recreation and fishing. The current trend in DO levels is increasing overall (NYCDEP 2007).

The draft EIS for the Rockaway lateral Pipeline (FERC 2013) indicates construction of the pipeline could result in leaks of hazardous materials including fuel or oil as well as temporary large scale increases in turbidity. Some of these effects would occur in the Atlantic, but Jamaica Bay water quality would also be temporarily adversely affected as a section between Riis Park and Floyd Bennett Field would be completed.

Climate change can add to the adverse impacts on water resources at Gateway through mean sea-level rise and possibly from increased duration, intensity, and frequency of storms.

Extreme precipitation events linked to climate change will likely exacerbate the problem of overflowing wastewater and sewage systems, which carry most of the pollution to Jamaica Bay and other Gateway surface waters. Poor water quality reduces ecosystem resilience to climate change (Columbia University 2011).

Adverse cumulative impacts are partially offset by collaborative projects and local and regional environmental policy initiatives in which Gateway plays a role. New York City's 10-year economic development plan, called Vision 2020, is accompanied by the New York City Waterfront Action Agenda, which outlines 130 key projects, including several projects in Jamaica Bay to improve water quality and restore degraded wetlands. One project in Jamaica Bay involves the installation of nitrogen-control technologies at wastewater treatment plants, which is expected to reduce the nitrogen load by 50 percent over 10 years. Considering that treatment plant outflows contribute 95 percent of the nitrogen to Jamaica Bay, this project would provide an appreciable benefit to reduce the specific problem of eutrophication in Jamaica Bay. Another project to build combined sewer outflow (CSO) storage facilities will, once completed, retain CSOs until they can be treated instead of allowing them to flow into Jamaica Bay when outflow volume exceeds the capacity of existing treatment plants.



The Jamaica Bay Watershed Protection Plan aims to create and restore saltmarshes in Jamaica Bay, establish natural areas as watershed buffers, upgrade technologies at wastewater treatment plants, and manage runoff from impervious surfaces (NYCDEP 2012). Other opportunities to address pervasive water quality issues are proposed in the Hudson–Raritan Estuary Comprehensive Restoration Plan (USACE and PA 2009). The implementation of these plans could provide widespread beneficial cumulative impacts for Jamaica Bay water quality. To the extent that the NPS is involved as a partner, beneficial impacts from these efforts could be considered part of the no-action alternative.

Conclusion

The no-action alternative would result in substantial widespread beneficial impacts on water quality throughout the park from continued collaboration and input to coordinated research, restoration of wetlands, and minimizing input of pollutants. Because these improvements would affect Jamaica Bay waters and the quality of water important to many of the park natural areas and recreational experiences, all of which are named as fundamental resources of the park, benefits would be significant. An imperceptible benefit to groundwater resources would occur from maintaining open spaces and natural areas that facilitate groundwater recharge to underlying aquifers. Cumulative impacts on water resources are significant and adverse and would include those from channelized runoff and impervious surfaces from the urbanized watershed, degraded water quality from pollution and nutrient loading, dredging and shoreline hardening that contribute to hydrological changes in the bays, and the effects of sea-level rise and possibly increasingly intense storms related to climate change. Collaborative efforts by the park with other agencies to improve water quality in the region, including improved wastewater treatment technologies, more effective stormwater management strategies, and mitigation of coastal erosion, would noticeably offset these adverse impacts.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Under both action alternatives, Gateway would work with partners to increasingly support a cooperative stewardship approach to promote holistic management of federal, state, and city wetland and water resources. In support of this approach, a research institute would be established, tentatively called the JBSRI, which may be located in Gateway. The JBSRI would coordinate and implement specific studies and monitoring programs to improve understanding of the important ecosystem processes in and around Jamaica Bay and presumably work to jointly achieve restoration and rehabilitation goals. The resulting beneficial impacts of more effective public policy and increased scientific understanding would be substantial.

Under the new cooperative stewardship approach, Gateway would work with its partners to develop and fund projects that would enable the park to achieve objectives for water quality and sediment resources in Jamaica Bay as defined in the park's in-depth assessment of current conditions (NPS 2010b). These objectives include improving water quality to support desired wildlife habitat conditions and visitor recreational opportunities, as well as reducing chemical contamination (in water and sediments) such that less than 1 percent of the aquatic animal species will experience adverse biological effects in response to exposure. Under both action alternatives, protection of natural habitats and wetlands would be improved through restoration projects, invasive species management, and other unspecified measures. Wetlands provide water quality improvement functions by retaining nutrients and pollutants that can be recycled or attenuated by biogeochemical processes through their residence time in the wetland system.

Projects that would help meet these objectives include the following:

- Improving water quality by reducing or eliminating pollution from wastewater treatment plants and CSOs by implementing technologies that remove excess nutrients (especially nitrogen), pharmaceutically active compounds, pathogens, and other contaminants (this would also help reduce long-term accumulation of contaminants in sediments)

- Filling borrow pits to a depth that would improve estuary-wide DO levels, especially where anoxic or hypoxic conditions exist

- Using clean dredged materials to cover and contain contaminated sediments, and removing and treating (remediating) sediments from contamination "hotspots"

The implementation of these projects and others by the JBSRI and its partner agencies could result in substantial improvements in water quality in Jamaica Bay, which could then benefit saltmarsh and other habitats. These wetlands could continue the cycle by providing additional water quality benefits by removing silt, bacteria, or pollutants. As noted previously, a coordinated approach to research and applied restoration has offered substantial beneficial impacts across Jamaica Bay; adding partners and improving joint research and application to restoring water quality in the bay would increase these benefits.

At Floyd Bennett Field, both alternatives would result in the creation of more than 100 acres of wetland, marine, and estuarine habitat. Alternative C calls for more restored wetland area at Floyd Bennett Field and increased protection of natural areas compared to alternative B. Under both alternatives, the new wetlands could offer localized benefits for water quality.

Alternatives B and C would provide more visitor facilities and amenities at Floyd Bennett Field and the Pennsylvania Avenue and Fountain Avenue Parks, as well as at other park sites. The construction of new facilities would involve repurposing existing buildings to the extent possible, or using sites with previously disturbed or artificial soils, including historical dredged fill material and landfill cap material. Localized impacts from construction activities would likely include some stockpiling of soils and runoff during precipitation events, with increases in turbidity and localized short-term adverse impacts on bay water quality. These could be minimized by implementing standard construction best management practices. Dredging sediments to create a complex of freshwater wetlands and saltmarshes associated with the wetlands center and the proposed marina associated with the JBSRI at Floyd Bennett Field would cause short-term localized adverse impacts by increasing suspended sediments during construction.

Visitor use would be expected to increase under both alternatives and could cause localized adverse impacts on water quality from increased turbidity from erosion and increased pollution (e.g., from improperly discarded trash). Localized adverse impacts from increased erosion and pollution could occur where increased camping opportunities are provided at Floyd Bennett Field, Fort Tilden, Fort Wadsworth, Great Kills, ~~and Horseshoe Cove (alternatives B and C)~~, ~~and at Canarsie Pol~~ and Sandy Hook ~~oceanside beach areas (alternative B only).~~ Localized adverse impacts from erosion could also occur where new trails and boardwalks would be established throughout all three units of the park. In areas where visitor use is not currently managed or controlled, such as the dune system at Plumb Beach and the swamp white oak forest at Miller Field, establishing designated trails and restricting access to sensitive environmental areas would reduce erosion caused by visitors, a localized beneficial impact on water resources from reducing a source of turbidity.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

The degree of development in the coastal flood zone under this alternative would be greater than that under alternative C, and facilities would be more likely to be permanent at park sites like Fort Tilden, Jacob Riis Park, and Sandy Hook. Development is associated with impervious surfaces that accelerate erosion and channel pollutants through runoff, an adverse impact on water resources. Under alternative B, equestrian use at Bergen Beach would be restricted to designated trails to protect natural areas, including wetlands, a localized beneficial impact on water quality from reducing erosion and protecting wetland functions. Camping could ~~would~~ be increased at ~~Canarsie Pol and~~ Sandy Hook ~~oceanside beach areas,~~ possibly resulting in localized adverse impacts on water quality from increased erosion and pollution. Other impacts would be as described under "Common to Both Action Alternatives."

Cumulative Impacts

The sources of other impacts (i.e., not part of alternative B) would remain the same as those described under the no-action alternative.

Under alternative B, cooperative stewardship and the establishment of the JBSRI would add appreciably to existing benefits by generating more effective public policy approaches and increased scientific understanding, setting a precedent for future management of natural resources (including water resources) at Gateway and throughout the region. Additional benefits under alternative B from increased creation and restoration of wetlands would add imperceptible benefits to water quality.

Conclusion

Under both action alternatives, Gateway would work with partners to support a cooperative stewardship approach to promote holistic management of federal, state, and city wetland and water resources, protection of natural habitats and wetlands, and shoreline protection and erosion control projects that would provide widespread beneficial impacts. Because the waters of Jamaica Bay are fundamental resources and this holistic approach would potentially be precedent setting, benefits for the waters of Jamaica Bay would be considered significant. Such benefits would include increased water quality and clarity, improved coastal resiliency, and more natural sediment transport dynamics. These potentially significant benefits would be further enhanced by the creation of 100+ acres of wetlands at Floyd Bennett Field and actions that would be taken under alternative B to control visitor use in unmanaged areas, which would result in widespread improvements in resource conditions. Alternative B would also result in some adverse impacts on water resources from the development of additional visitor facilities and amenities; increased visitor use, including camping and a wider network of trails; and construction activities needed to create wetlands at Floyd Bennett Field. These adverse impacts would be localized, limited in extent, and minimized through site planning and design and the implementation of erosion control measures. Some activities, such as camping, would require additional more site specific analysis and consultation before they are approved. Adverse cumulative impacts on water resources from actions outside the park include channelized runoff and impervious surfaces from the urbanized watershed, degraded water quality from pollution and nutrient loading, dredging and shoreline hardening that contribute to hydrological changes in the bays, and the effects of sea-level rise and possibly increasingly intense storms related to climate change. The combination of these cumulative adverse impacts on water resources at the park would be considered significant. Collaborative efforts to improve water quality, restore saltmarshes, control runoff, and mitigate coastal erosion under the JBSRI would contribute scientific understanding to inform effective public policy and natural resource management practices, adding an appreciable beneficial increment to the cumulative adverse impacts. Additional imperceptible benefits under alternatives B and C from increased protection of natural habitats, creation and restoration of wetlands, and implementation of erosion control and shoreline stabilization projects would also occur.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

A slightly greater degree of natural area protection, a slightly larger area of created and restored wetlands, more removal of impervious surfaces from coastal resiliency projects, and fewer permanent visitor facilities distinguishes alternative C from alternative B. In addition, equestrian use at Bergen Beach would be eliminated or relocated to another area of the park and the existing trails would be removed. These differences between alternatives would not be great enough to alter the outcome of the impacts analysis. Therefore, beneficial and adverse impacts under alternative C would be the same as described under alternative B.

Cumulative Impacts

Cumulative impacts under alternative C would be the same as described under alternative B because the slight differences between alternatives with respect to water resources (i.e., impacts on water quality and sediment contamination) would not be great enough to influence the impacts analysis.

Conclusion

Impact analysis conclusions would be the same as described under alternative B.

Wetlands, Floodplains and Flooding

Wetlands and floodplains are both located in low-lying areas of the park. Floodplains are only periodically covered with water, but wetlands can be submerged most or all of the time. Some wetland habitats in the park (high saltmarsh for example) are only covered at high tide or spring tide.

Although both floodplains and wetlands can provide important habitat, floodplains at the park are primarily coastal habitats whose values are described in the other natural resources sections (such as "Vegetation," "Marine Resources," and "Wildlife") of this GMP/EIS. This analysis focuses on the hazards associated with development in the floodplain and on adverse or beneficial impacts on wetlands as an ecosystem.

Wetlands at Gateway provide open spaces for recreation and opportunities for science education, contribute to outstanding natural beauty and scenic views, and perform a variety of ecosystem services. Wetlands are habitat for fish, wildlife, and unique plants, they protect coastlines by reducing erosion and storing floodwaters, and they improve water quality by removing sediments and contaminants (NRCS et al. 2001). Because up to 95 percent of the region's freshwater and estuarine wetlands have been lost since colonial times, protection of wetland resources at Gateway is a top priority for federal, state, and local stakeholders.

Because up to 95 percent of the region's freshwater and estuarine wetlands have been lost since colonial times, protection of wetland resources at Gateway is a top priority for federal, state, and local stakeholders.

Laws and Policies

NPS *Management Policies* 2006 (NPS 2006a) section 4.6.4 directs parks to manage for the preservation of floodplain values and minimize potentially hazardous conditions associated with flooding. The NPS and all federal agencies are also required to comply with Executive Order 11988, "Floodplain Management," which is geared toward these same floodplain values and increased flood risk. Agencies are to avoid locating facilities in floodplains and the NPS must prepare a statement of findings that documents when it is not practicable to relocate a proposed facility. Non-structural measures to reduce hazards are encouraged.

The "Wetlands" section of the NPS *Management Policies* 2006 (NPS 2006a) includes the following: (1) provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands. Other legislation and NPS mandates include requirements of Executive Order 11990, "Protection of Wetlands"; the Clean Water Act; the Rivers and Harbors Appropriation Act of 1899; and the procedures described in Director's Order 77-1: *Wetland Protection* (NPS 2002). Specific provisions of the Clean Water Act applicable to wetlands include section 404, which regulates the discharge of dredge or fill material into wetlands, and section 319, which protects wetlands through the establishment of state and federal programs to identify and mitigate non-point source pollution that impairs the water quality functions of wetlands. Management goals include implementing a "no net loss of wetlands" policy, restoring natural wetland characteristics and functions to the extent practicable, and enhancing natural wetland values through educational, recreational, or scientific purposes (NPS 2006a).

Methods

Impacts on floodplains and wetlands are described qualitatively in this analysis for the most part, although information on the extent of coastal flooding associated with storms and potentially occurring from stronger storms in the face of Hurricane Sandy and climate change is taken from published literature (when available), NPS and National Oceanic and Atmospheric Administration (NOAA) websites, NPS Incident Management Team reports, and in the absence of these sources, from newspapers and magazines. The latter are used primarily to evaluate effects from Hurricane Sandy, because the impacts of this storm have not yet been assessed in the peer-reviewed scientific literature.

Sources of information used to assess impacts on wetlands include Gateway natural resource inventories and assessments and regional watershed planning documents, including the Hudson–Raritan Estuary Comprehensive Restoration Plan (USACE and PA 2009) and the Jamaica Bay Watershed Protection Plan (NYCDEP 2007).

Resource-specific context factors for assessing the impacts of the alternatives on wetlands and floodplains include the following:

- Floodplains are not identified as a fundamental resource or value.

- The vast majority of floodplains at the park are coastal in nature.

- Wetlands are an important component of the natural areas at Breezy Point Tip, Floyd Bennett Field, Great Kills, Jamaica Bay Wildlife Refuge, and Sandy Hook; these natural areas are fundamental Gateway resources.

- Wetlands provide functions and values that protect the quality of other fundamental park resources (e.g., the waters of Jamaica Bay) and values (e.g., nature observation, water-based activities, and direct sensory experience with natural elements).

- Policies and management actions of other local and regional stakeholders (e.g., USACE and New York City) engaged in watershed protection and wetland restoration affect Gateway wetland resources.

- Wetland conditions inside the park are substantially affected by development and alterations outside the park.

Alternative A: No Action

Impacts of Alternative A

Floodplains

Much of the park is low in elevation and coastal, which in combination with the area's complex coastal geometry and bathymetry, shallow continental shelf, and funneling effects of Long Island and the coast of New Jersey for wind and water, means the park is at risk from flooding from strong storm surge. Although coastal flooding from strong storms is most likely and potentially most damaging, flooding and overflow of the marsh and back-bay areas of the park and rivers in the region can add to flooding risk (Colle, Rojowsky, and Buonaiuto 2010).

As demonstrated by Hurricane Sandy (technically a cyclone) in October 2012, storm surge, which is a combination of waves, tides, and the effect of intense wind blowing water such that it piles up along the shore, can result in water that reaches much further inland than under normal tidal conditions. At the park, storm surge was measured at 13 feet at Sandy Hook. The New York City Office of Emergency Management has predicted that hurricane storm surge could be much higher, on the order of 30 feet in some parts of the city (NYCOEM 2013).

Although the frequency of intense storms may be increasing due to climate change (see cumulative impacts), no trend in "regular" storms has been noted in the New York City area (Zhang et al. 2000, as cited in Colle, Rojowsky, and Buonaiuto 2010). Storm surge in the area usually varies from 0.5 to 1 meter, although more severe storms that occur periodically can result in storm surges greater than 1.5 meters. In the no-action alternative, current

In the Jamaica Bay Wildlife Refuge, a collaborative NPS and New York Department of Environmental Conservation pilot restoration project at Big Egg Marsh and subsequent monitoring from 2003 to 2008 have provided valuable information to ensure success for subsequent restoration efforts at Gateway.

levels of protection from coastal flooding would continue, and approved projects such as stabilization efforts at Plumb Beach or repair and strengthening of coastal areas using funds to repair damage from Hurricane Sandy would be implemented. These efforts include beach nourishment at several sites along Sandy Hook, at Great Kills Park, and at sites on the Rockaway Peninsula, as well as a sand slurry transfer system from North to South Sandy Hook and from offshore to Plumb Beach. The park also has offshore groins at Fort Tilden and other park sites, a reef of tires offshore of Plumb Beach to slow waves, and a sand dike stabilizing Miller Field. The Plumb Beach project, which would be implemented regardless of which GMP alternative is selected, includes installing groins and a new rock reef to reduce wave speed and energy striking the coast. These actions help in providing sand to park sites or in stabilizing it, which diminishes the effect of strong waves, storm surge, and wind during storms and reduces coastal flooding, particularly if sand develops into foredunes. Continuing these efforts would help in minimizing the flooding damage of most storms, a long-term beneficial effect.

Wetlands

Under the no-action alternative, Gateway would continue managing wetland resources under existing guidance provided by the park's enabling legislation, the existing GMP (NPS 1979d), and other implementation plans. Current fully funded and approved programs to protect and restore wetlands would continue, many under existing partnerships and collaborations. Other wetland management activities would take place as funding allows to meet regulatory requirements or NPS policy goals.

Gateway would continue to collaborate with local, state, and federal officials as needed and work with New York Department of Environmental Conservation to address common management goals concerning wetlands, including saltmarsh restoration projects in Jamaica Bay and the protection of fringe wetlands to improve coastal resiliency.

In the Jamaica Bay Wildlife Refuge, a collaborative NPS and New York Department of Environmental Conservation pilot restoration project at Big Egg Marsh and subsequent monitoring from 2003 to 2008 have provided valuable information to ensure success for subsequent restoration efforts at Gateway (Rafferty, Castagna, and Adamo 2011; NPCA 2007a). Subsequent projects completed under the Hudson–Raritan Estuary Comprehensive Restoration Plan include 125 acres of saltmarsh island restoration at Yellow Bar Hassock, Elders West Marsh Island, and Elders East Marsh Island. Current projects to restore Black Wall and Rulers Bar Islands began in August 2012 (USACE 2012b). The completed restoration projects in Jamaica Bay demonstrated that saltmarsh vegetation can be successfully restored and set a precedent for continued collaborative partnerships for improving environmental conditions in the vicinity of Gateway; however, decades of research and monitoring may be necessary to determine whether functions such as food web support and carbon sequestration will fully develop in the created saltmarshes (Rafferty, Castagna, and Adamo 2011). Research and monitoring may also reveal whether Jamaica Bay saltmarshes will be able to withstand the additional impacts of sea-level rise associated with climate change (Rafferty, Castagna, and Adamo 2011).

The results of the current collaboration with New York City have had and would be expected to continue to have widespread and long-term beneficial impacts on Gateway wetland resources. Other direct beneficial impacts of continuing park management would be localized and include limiting visitor access to protected areas and removing invasive vegetation as availability of staff and funding allow.

Cumulative Impacts

Floodplains

Because of the development in the urban core and surrounding area, the effect of storms is greater than it would be given the topography and natural winds and currents. This exposes more people and property to damage, but also hardens shorelines and prevents the deposition of sand and other sediment, which could build protective foredunes and positively affect the shoreline position and the impact of storm surge.

Climate change, including sea-level rise, will also result in increased coastal flooding. The rate of sea-level rise was around 0.3–0.4 inch per decade before the Industrial Revolution, but in the 20th century averaged 1.2 inches per decade (Horton, Gornitz, and Bowman 2010). From 1932 until 2011, sea-level rise at Sandy Hook averaged 1.54 inches per decade. The 20th century average is predicted to double in the 21st century, with projections of an increase of 2–5 inches during the GMP's 15- to 20-year timeframe (Columbia University 2011). In addition to sea level rise, which the New York City panel on climate change as characterized sea-level rise as "extremely" likely, more frequent and damaging coastal storms are considered "very" likely, and brief, intense rainstorms alternating with droughts as "more likely than not" (New York Academy of Sciences 2010). The combination is expected to result in increases in storm surge and coastal flooding.

For example, the former 10-year flood is expected to occur every 8 years by the 2020s and as often as once every 3 years by the 2050s. The former 100-year flood is expected to occur every 65–80 years in the 2020s, with flood height increasing from its current predicted 8.6 feet to 9 feet. The 500-year flood is expected to occur every 382–450 years by the 2020s and flood heights are expected to increase from 10.7 feet to up to 11.2 feet (Horton, Gornitz, and Bowman 2010). The damage from these flood heights depends on the elevation of the land where they strike and other factors such as the tidal conditions and tidal range.



Although efforts by the park to protect its resources and assets from the effects of coastal flooding would continue to provide noticeable benefits at many park sites under this alternative, the "very likely" increasing strength of storms and sea-level rise are likely to make these benefits imperceptible later in the 21st century.

Wetlands

The wetlands and water resources at Gateway are connected to the larger Hudson–Raritan Estuary system, which includes Jamaica, Sandy Hook, Raritan, and Upper and Lower New York Bays; the Atlantic Ocean; and freshwater rivers and streams, including the Hudson and Raritan Rivers and their tributaries. Because of the connection, the analysis area

for cumulative impacts to Gateway wetlands covers this entire system, including inputs contributed by the surrounding watersheds. Cumulative impacts also consider the effects of historic and ongoing land uses in the area surrounding Gateway, as well as the policies and actions of other managing stakeholders in the area including New York City, USACE, and the states of New York and New Jersey.

Adverse impacts on wetlands in this larger area are largely due to the same factors as discussed in detail in the "Water Resources" section of this chapter. Urban development is associated with hardened shorelines, impervious surfaces, and channelized runoff. Dredging of bay sediments to maintain channels for shipping and commerce created deep pits or channels that act as a sediment sink and alter water flows, including amplified tidal ranges and decreased natural flushing rates. In Jamaica Bay, historic dredging or filling and other unknown causes have resulted in the loss of land area in the form of marsh islands at an alarming rate. Even excluding acreage directly affected by dredge and fill, only 876 acres of an original land mass of 2,347 acres of marsh islands in Jamaica Bay remained as of 2003 (NPS 2010b). Filling of saltmarshes and creeks to create Floyd Bennett Field cut off the west end of the bay. Over the years, more of the adjacent saltmarsh was filled by major trash dumps, the John F. Kennedy International Airport, housing, and the artificial upland that became the Jamaica Bay Wildlife Refuge. A conservative estimate of the quantity of sediments dredged from Jamaica Bay is 93 million cubic yards (NPS 2010b). The hydrological changes in Jamaica Bay from urban development and dredging have resulted in altered water volume, flushing time, and sediment transport dynamics and contributed to decreased water quality.

Increased sediment loads and channelized urban runoff result in increased scouring that erodes saltmarsh sediments. Saltmarsh sediment accretion rates are linked to the amount of root biomass in saltmarsh plants, particularly cordgrass species. Excess nitrogen, 95 percent of which comes from wastewater treatment plant outflows to Jamaica Bay, decreases root production in cordgrass, resulting in reduced sediment accretion rates. Increased nitrogen also increases soil decomposition, further diminishing the capacity of saltmarshes to develop soil and accumulate peat (undecomposed organic matter).

Excess nitrogen and other nutrients fuel algae blooms, which results in increased production of labile carbon. Labile carbon contributed by algae blooms and direct inputs from water treatment plant outflows causes increased sulfate reduction in marsh sediments. Sulfate reduction produces sulfide as a byproduct, which is toxic to cordgrass at high concentrations and can cause stunted growth or mortality. Another threat to native saltmarsh vegetation is nonnative species invasion. *Phragmites* and Japanese knotweed, for example, form dense monocultures in disturbed wetlands, outcompeting the native cordgrass species that are crucial for maintaining saltmarsh ecological functions (JBWPPAC 2007).

As a result of the combination of factors above and as yet unknown reasons scientists are researching now, 526 acres of saltmarsh disappeared from Jamaica Bay over a 20-year period between 1974 and 1994, averaging 26 acres per year. Over the next 5 years (1994 to 1999), marsh loss accelerated to a rate of 44 acres per year, totaling 220 acres (NYDEC n.d.d). Calculations over a broader period estimate an average loss rate of 33 acres per year from

1989 to 2003 (Gateway and JBWPPAC 2007). Although a gas pipeline is proposed across the Rockaway Inlet connecting Floyd Bennett field and Riis Park, the EIS prepared for this pipeline (FERC 2103) indicates no wetlands would be affected in Gateway.

Uncertainty remains as to the degree to which climate change factors such as sea-level rise and extreme weather events will contribute to saltmarsh loss (Columbia University 2011). Sediment accretion, a process important to the development and maintenance of saltmarshes, can be reduced by higher sea levels and more intense storms that accelerate erosion. Sea-level rise and changing tidal cycles also cause changes in water levels and salinity that influence vegetation composition, reducing the sediment accretion rate in such altered ecosystems (Columbia University 2011).

Sea-level rise adds to the effect of amplified tidal cycles in Jamaica Bay, which has been linked to dredging, shoreline development, and other engineering modifications of the bay. The resulting excess inundation has degraded or destroyed saltmarshes and other low-elevation coastal habitats (Swanson and Wilson 2008). However, saltmarsh loss rates are much lower in areas adjacent to Jamaica Bay (i.e., Hempstead Bay, Great South Bay, and Moriches Bay) where the magnitude of sea-level rise is similar, but tidal cycles have not been affected to the same degree and there is less urban development (Swanson and Wilson 2008). This suggests that the cumulative effects of human alterations to the bay and surrounding watershed are more important factors in saltmarsh loss than the relative contribution of mean sea-level rise.

These substantial adverse cumulative impacts are partially offset by the collaborative restoration projects between NPS and other agencies, primarily New York City, described as part of the no-action alternative. Additional partnerships and collaborative approaches include the following:

- New York City's 10-year economic development plan, called Vision 2020, accompanied by the New York City Waterfront Action Agenda, which outlines 130 key projects, including several projects in Jamaica Bay to improve water quality and restore degraded wetlands

- Funding for the Hudson–Raritan Estuary Comprehensive Restoration Plan, which identifies opportunities to restore saltmarshes in and around Jamaica and Sandy Hook Bays as well as projects to address pervasive water quality issues that threaten wetlands in the region (USACE and PA 2009)

- The Jamaica Bay Watershed Protection Plan, which aims to create and restore saltmarshes in Jamaica Bay and establish natural areas as buffer areas around the periphery of the bay and watershed (NYCDEP 2012)

Gateway's role in these wider efforts includes making park land available for wetland restoration and research and providing resources for monitoring, actions that are also part of alternatives B and C.

The current management direction and programs implemented as the result of collaborative partnerships are having a noticeable beneficial impact on wetlands. The current rate of saltmarsh loss has slowed to 19 acres per year (Rafferty, Castagna, and Adamo 2011) from its peak of 44 acres per year from 1994 through 1999 (NYDEC 2013b). The contribution of the park actions in restoring saltmarsh through demonstration projects has had a noticeable or even an appreciable beneficial contributing impact to the slowing rate of loss. However, saltmarsh continues to disappear and the current level of effort will not be wholly adequate for maintaining the resource condition of wetlands in Jamaica Bay at Gateway over the long term because of the regional scope and magnitude of adverse effects.

Conclusion

The benefits in reducing the risk of damage from coastal flooding resulting from beach nourishment and other sand stabilizing efforts would continue, particularly if they result in the formation of protective and stable foredunes. These actions would provide localized benefits at many park sites. To the extent that adding sediment offsets impacts on both natural and cultural resources considered fundamental to the park, the benefits could be considered significant. Although these benefits would be noticeable in offsetting the adverse effects of climate change at many park sites, the possibly increasing strength of storms and sea-level rise would likely make these benefits imperceptible later in the 21st century.

The no-action alternative would result in short-term widespread beneficial improvements in wetland resource conditions throughout the park primarily from coordinated efforts by the park with New York Department of Environmental Conservation to restore marsh habitat in Jamaica Bay. Although wetlands are not called out as a unique or fundamental resource, they are an important component of the Jamaica Bay ecosystem and habitat at Sandy Hook, both of which are named as fundamental resources as natural areas of the park. The impacts of continuing this coordinated effort to help restore saltmarsh and water quality of the bay would therefore likely be considered significant. Actions in alternative A would have a noticeable or even appreciable beneficial effect in offsetting the significant adverse cumulative impacts of regional and global factors (e.g., poor water quality, pollution, altered hydrology and sediment transport dynamics, sea-level rise).

Common to Both Action Alternatives

Impacts of Alternatives B and C

Floodplains

Alternatives B and C both propose to increase visitor and recreational facilities and amenities in the coastal zone, particularly at Floyd Bennett Field, Fort Tilden, and Jacob Riis Park. Both also propose rebuilding facilities in the coastal zone at Sandy Hook and Great Kills Park. Regular storms may not result in flooding of these facilities, but storms of the intensity and strength of Hurricane Sandy would. However, before a final decision is made as to the type and extent of renovating existing facilities or building new amenities, the park would conduct a risk assessment and cost/benefit analysis to determine whether the sites are in the

coastal floodplain and therefore subject to damage from flooding. The park would avoid making major investments where hurricane or strong storms could affect those investments. Hurricane Sandy resulted in extensive flooding and damage at Fort Tilden and Jacob Riis Park, and overwashed and eroded protective dunes. Although future storms may differ from Hurricane Sandy, e.g., not come from the same direction, proceed along the same route, or be combined with a high tide, the effects of Hurricane Sandy illustrate the kind of damage a major storm can cause. Besides flooding of facilities, dunes at other park sites where less development is proposed in alternatives B or C, such as at Sandy Hook or Great Kills Park, were also overwashed and eroded. Facilities and infrastructure for beach centers at Sandy Hook were heavily damaged and both alternatives B and C proposed rebuilding these centers to some degree. The marina at Great Kills Park was damaged by Hurricane Sandy, and both alternatives also propose rebuilding it and even increasing recreation options here. Placing or rebuilding these facilities in the coastal zone exposes them to greater risk of damage from coastal flooding, a localized but potentially substantial adverse impact. The site specific cost benefit analysis before implementing either alternative in the coastal zone would reduce this impact.

Both alternatives B and C also propose a suite of dune protection and beach erosion or restoration measures. For example, although risk of erosion and associated increases in damage to the Belt Parkway from flooding threaten Plumb Beach, all alternatives would stabilize this erosion with added groins and an offshore reef. Creating a connection to Jamaica Bay at Floyd Bennett Field and softening the shoreline to help restore saltmarsh vegetation could absorb some bay flooding during a storm, with localized benefits at this park site. Both alternatives include provisions to work with neighboring landowners at Jacob Riis Park and at Great Kills Park to restore sediment transport processes, actions that could result in net positive sediment budgets and benefits in reducing flooding associated with storms. Both alternatives propose protecting dunes in some park sites, such as at Fort Tilden, until monitoring indicates they are fully able to withstand human use impacts. Both alternatives propose the control of beach erosion and maintenance of natural beach and dune habitats at a number of park sites, including Plumb Beach, Bergen Beach, Fort Wadsworth, and Sandy Hook. Both work with partners to restore natural resources along the shoreline and to restore and maintain beach and dune habitat at Miller Field. Each of these could result in substantial localized benefits by lowering the risk of damage from coastal storms through building or maintaining protective foredunes or sand supplies at beaches.

Wetlands

Under both action alternatives, Gateway would work with a wider range of agency, private, non-governmental organization (NGO), and academic partners to support a cooperative stewardship approach to promote holistic management of federal, state, and city wetland and water resources at Jamaica Bay. In support of this approach, a research institute would be established—tentatively called the JBSRI—that could be located in Gateway. The institute would coordinate and implement specific studies and monitoring programs to improve understanding of the important ecosystem processes in and around Jamaica Bay and ensure achievement of restoration goals. The resulting indirect beneficial impacts of more effective public policy and increased scientific understanding establish could be widespread and regionally important for wetlands.

Following the concept of management zoning for park planning, most wetlands would be located in the Natural Zone in both alternative B and C, which prioritizes the preservation of natural resources in Gateway's open, undeveloped areas. Public access would be restricted to the Sensitive Resources Subzone, which includes vulnerable wetlands requiring the highest level of protection, as well as candidate sites for restoration projects and scientific investigations. Some wetlands may be located in other zones, such as the Recreation Zone, but would still be managed in accordance with the park's natural resources protection mandate. Management zoning would provide an indirect beneficial impact by allowing resource managers to prioritize goals and allocate funding to maximize the potential for Gateway wetlands to provide natural, educational, and recreational benefits.

Projects to restore natural sediment transport dynamics or create a positive sediment budget would also assist wetlands because erosion and sediment loss are two additional factors that contribute to saltmarsh loss and degraded wetland conditions.

Both action alternatives also include the construction of a wetlands center in the North Forty section of Floyd Bennett Field that would include new visitor facilities and a complex of constructed and restored habitats, including an estimated 14 acres of freshwater marsh and 34 acres of saltmarsh, as well as open marine, estuarine, and freshwater environments to total over 100 acres (WWT Consulting 2012). The wetlands center would provide an important opportunity for students and visitors to learn about problems facing wetlands as well as stewardship opportunities. This would increase environmental awareness and public support for initiatives to protect wetland habitats and may result in enhancements for them and the ecological functions and values they provide, a potential widespread beneficial impact. The associated wetland creation and restoration projects would provide direct localized benefits to the wetland complex at Floyd Bennett Field. Increasing the quantity of freshwater wetlands would improve habitat diversity. Saltmarsh restoration would improve the fragmented condition of the existing saltmarsh complex and restore degraded functions, improving the resiliency of the tidal wetland ecosystem in the face of climate change and the continued effects of ongoing adverse impacts.

Both alternatives include unspecified actions that would help to protect fringe wetlands at Bergen Beach and the shorelines around Canarsie Pier and Frank Charles Memorial and Hamilton Beach Parks, with potential substantial localized benefits to wetlands at these small park sites. It is also possible that improvements to these and other park sites where wetlands exist now would bring trampling of vegetation by increased visitors, an adverse impact.

At the Jamaica Bay Wildlife Refuge, West Pond would remain breached and the effects would be monitored. The West Pond breach represents a localized change in conditions with respect to wetlands and surface waters. Instead of retaining a brackish pond, the West Pond site currently mixes freely with the waters of Jamaica Bay. Although rare vegetative communities grow on the edge of East Pond, the primary wetland value of West Pond is for wildlife and is evaluated in that section. Localized benefits from open mixing with the waters of Jamaica Bay likely are currently occurring for saltmarsh vegetation. Because freshwater wetlands are rarer, however, it is likely that more substantial benefits to wetlands would result from studying how to recreate and then restore those supplied by West Pond before the breach, particularly if this is done in a more holistic, baywide approach.

In each alternative, management would also increase efforts to control invasive vegetation in park sites (including Spring Creek, Great Kills Park) where they are an issue. *Phragmites* and Japanese knotweed are of particular concern because of their ability to form dense monocultures in disturbed wetlands, outcompeting the native cordgrass species that are crucial for maintaining and restoring Gateway's disappearing saltmarshes (JBWPPAC 2007). Beneficial impacts would be localized. Addressing invasive species issues would improve the success of protection and restoration efforts by eliminating one of the factors that contributes to degraded wetland resource conditions in the park.

Projects to restore natural sediment transport dynamics or create a positive sediment budget would also assist wetlands because erosion and sediment loss are two additional factors that contribute to saltmarsh loss and degraded wetland conditions. Such projects would be expected to have a widespread beneficial impact on wetlands over the long term as hydrological conditions and sediment accretion improve over time.

The management direction under alternative B would result in numerous projects that would provide local direct beneficial impacts on wetlands by removing or mitigating factors such as erosion and invasive species that degrade wetland functions.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

The degree of development in the coastal flood zone under this alternative would be greater than under alternative C and facilities would be more likely to be permanent at park sites like Fort Tilden, Jacob Riis Park, and Sandy Hook. This means they would be more susceptible to flooding from coastal storms, an adverse localized impact as described in the "Impacts of the Action Alternatives" section. Because facilities would be less movable than under alternative C, impacts from the risk of damage in the coastal zone would potentially be worse under alternative B. In addition, the application of findings from a cost/benefit analysis before making investments in facilities or amenities in the coastal flood plain would help in avoid storm or flood-related damage under either alternative.

Both action alternatives would attempt to control beach erosion and maintain natural beach habitats at several park sites. Although the method of protection is not specified, it could include beach nourishment, creating berms, planting dunes, or even the use of groins, sand fences, or other sand capturing methods. The methods may vary between action alternatives, but the specifics are unknown at this time and benefits are assumed to be equal under alternatives B and C.

At the Staten Island and Sandy Hook Units, the current management direction would be followed to maintain wetland resource conditions. In the Jamaica Bay Unit, improving water quality and protecting and restoring natural habitats would be prioritized, and the wetlands center facilities would be developed to maximize visitor experience. Unspecified protection measures with localized beneficial impacts could include invasive species removal, planting native species, and controlling erosion.

The management direction under alternative B would result in numerous projects that would provide local direct beneficial impacts on wetlands by removing or mitigating factors such as erosion and invasive species that degrade wetland functions. At Plumb Beach, access to natural areas would be controlled to protect wetlands and other habitats. Equestrian use

at Bergen Beach would be restricted to designated trails to protect natural areas including wetlands. Actions such as removing invasive species and planting native species would have an immediate benefit by restoring natural wetland functions and values. Other benefits would be seen over time, for example, after visitor access and use is controlled at Bergen Beach and the Plumb Beach wetlands naturally recover from the impacts of trampling.

Cumulative Impacts

Floodplains

The cumulative impacts of outside forces such as urban development and sea-level rise would be the same for alternative B as for the no-action alternative. Development or repair of facilities in the park's coastal zone would add imperceptibly to the cumulative risk of flooding, and efforts to increase sediment budget, build or stabilize dunes, or control erosion and loss along park shorelines could noticeably offset this risk, particularly during the lifetime of the GMP. The potential increasing strength of storms and sea-level rise would likely make these benefits imperceptible later in the 21st century.

Wetlands

The adverse cumulative impacts of regional and global factors (e.g., poor water quality, pollution, altered hydrology and sediment transport dynamics, and sea-level rise) under alternative B would be the same as described under the no-action alternative. At a localized scale, actions under alternative B would noticeably offset cumulative adverse impacts on wetland resources by maintaining, improving, and creating wetlands. Over the long term, the combination of collaborative stewardship, increased scientific understanding to inform management actions and public policy provided by the JBSRI, and increased opportunity for environmental education and awareness provided by the wetlands center have the potential for appreciable beneficial impacts on wetlands throughout the region. Expected benefits include reduced rate of saltmarsh loss, increased area of created and restored wetlands, improved scientific understanding, and evolving environmental policies that would ameliorate and potentially eliminate the factors contributing to current wetland degradation.

Conclusion

Adding or repairing facilities in the coastal zone at several park sites in both alternatives B and C would expose them to continued risk of damage and loss from coastal flooding. To the extent that these efforts maintain fundamental or otherwise important park assets in an area where they are subject to repeated damage and loss from coastal flooding, they could be considered significant and adverse. Dune protection, beach erosion control, and efforts to create a positive sediment budget at several coastal park sites, particularly to restore natural sand transport processes and build protective foredunes, could have substantial beneficial localized impacts by lowering the risk of damage from coastal flooding. If the buildings or resources that these efforts protect are fundamental or otherwise important to the park, benefits could be considered significant. Conducting a site specific cost-benefit analysis before moving forward with restoring or building new facilities or amenities in a coastal zone and applying the findings could also avoid significant adverse impacts from flooding.

Building partnerships to manage area wetlands holistically could result in significant widespread benefits for wetlands in either action alternative, in part because wetlands are rare and important in the functioning of entire ecosystems like Jamaica Bay, but also because of the precedent-setting nature of a holistic management approach. Zoning areas with wetlands to allow managers to allocate funds and staff to protect or restore them, creating educational and stewardship opportunities at a new wetlands center, and creating both saltmarsh and freshwater wetlands at Floyd Bennett Field could each have substantial and potentially significant localized beneficial impacts on wetlands at the park. Protecting fringe wetlands or removing invasive vegetation from marshes at several smaller park sites could have localized substantial benefits. Because invasive plant species substantially alter hydrology and available habitat, particularly for rare freshwater wetlands, efforts to remove them could have localized significant benefits.

The cumulative impacts on flooding or wetlands from outside forces such as urban development and sea-level rise would be the same under alternative B as under the no-action alternative. Development or repair of facilities in the park's coastal zone would add imperceptibly to the cumulative risk of flooding, and efforts to increase sediment budget, build or stabilize dunes, or control erosion and loss along park shorelines could noticeably offset this risk, particularly during the lifetime of the GMP. The potential increasing strength of storms and sea-level rise would likely make these benefits imperceptible later in the 21st century. Over time, a noticeable beneficial impact on wetland resources at Gateway would be realized through concurrent restoration, collaborative stewardship, and increased scientific understanding of wetlands.

In sum, alternative B would have significant beneficial impacts to wetlands and both significant benefits from reducing flood risk and significant adverse impacts from continuing to build or restore structures in the floodplain, which could be reduced by applying findings of cost benefit analysis. The relative contribution to adverse cumulative impacts would be imperceptible; the contribution to beneficial cumulative impacts would be noticeable in the short term but less perceptible as the effects of climate change increase later in the 21st century.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Floodplains

Alternative C proposes less development in the coastal areas of park sites than alternative B, and at Jacob Riis Park, Fort Tilden, and Sandy Hook, would require facilities and support infrastructure to be portable. This change could result in a substantially lower risk of damage from localized coastal flooding than under alternative B; however, locating or relocating any visitor-related facilities in the coastal zone could result in substantial adverse impacts from flooding. Applying the findings of cost/benefit analysis before deciding on the type and extent of these amenities could reduce the impact. This alternative would also increase efforts to restore coastal habitat at Sandy Hook, including dune habitat, and would seek to provide more intensive coastal habitat enhancements at Plumb Beach and Bergen

Beach. To the extent that these efforts increase foredune stability or sediment supply, they would have localized benefits compared to other alternatives.

Wetlands

Alternative C would provide the highest levels of preservation and restoration of natural habitats, including wetlands. Beneficial impacts on wetland resources at Gateway would be similar to those under alternative B but greater in magnitude and more widespread because zoning under alternative C would call for the greatest proportion of wetlands in the Sensitive Resources Subzone. Management prescriptions in this subzone include restricting public access to restoration sites, research areas, and protected areas.

In the Jamaica Bay Unit, additional localized beneficial impacts from creating a larger saltmarsh and freshwater wetland area at Floyd Bennett Field, as well as more intense restoration efforts at Plumb Beach and Bergen Beach, would occur under alternative C. Equestrian use would be discontinued at Bergen Beach and trails restored, eliminating a source of unwanted nutrients to Jamaica Bay from this park site. These nutrients can contribute to algae blooms and anoxic water conditions. Leaving West Pond breached could improve opportunities for increasing saltmarsh habitat through natural development or restoration projects, a beneficial impact.

Instead of following the current management direction at the Sandy Hook Unit, Gateway would pursue more opportunities to restore wetlands, conduct research and monitoring, control or restrict access to sensitive habitat areas, aggressively control invasive vegetation, and address specific erosion concerns, a potentially substantial benefit for wetlands at this park unit.

Cumulative Impacts

Floodplains

The cumulative impacts of outside forces such as urban development and sea-level rise would be the same under alternative C as under the no-action alternative. The development or repair of facilities in the park's coastal zone would add imperceptibly to the cumulative risk of flooding, and efforts to increase sediment budget, build or stabilize dunes, or control erosion and loss along park shorelines could noticeably offset this risk, particularly during the lifetime of the GMP. The potential increasing strength of storms and sea-level rise would likely make these benefits imperceptible later in the 21st century.

Wetlands

Cumulative impacts of outside forces would be the same as described under alternative B. Local beneficial impacts on wetlands under alternative C would be more widespread throughout the park because of the increased area designated for wetland creation, restoration, and protection throughout all three park units as compared to alternative B. The long-term appreciable offsetting beneficial contribution to cumulative impacts on wetlands from collaborative stewardship, JBSRI, and the wetlands center would be the same as under alternative B.

Conclusion



Adding or repairing facilities in the coastal zone at several park sites in both alternatives B and C would expose them to continued risk of damage and loss from coastal flooding. To the extent that these efforts maintain fundamental or otherwise important park assets in an area where they are subject to repeated damage and loss from coastal flooding, they could be considered significant and adverse. Increasing protection efforts under alternative C and reducing the permanence of developed facilities would lower the risk of damage from flooding, but impacts would still be accurately characterized as adverse and localized, although less likely to be considered significant. Applying findings of a site specific cost benefit analysis before deciding how to move forward would also reduce the impact of flooding on park investments. Dune protection, beach erosion control, and efforts to create a positive sediment budget at several coastal park sites, particularly to restore natural sand transport processes and build protective foredunes, could have substantial beneficial localized impacts by lowering the risk of damage from coastal flooding. Similarly, if the buildings or resources these efforts protect are fundamental or otherwise important to the park, benefits could be considered significant.

Building partnerships to manage area wetlands holistically could result in significant widespread benefits. Zoning areas with wetlands to allow managers to allocate funds and staff to protect or restore them, creating educational and stewardship opportunities at a new wetlands center, and creating both saltmarsh and freshwater wetlands at Floyd Bennett Field could each have substantial and potentially significant beneficial impacts on wetlands at the park. The benefits from creating these wetlands would be greater under alternative C than under alternative B because of the proposed additional area. Protecting fringe wetlands or removing invasive vegetation from marshes at several smaller park sites could have localized substantial benefits. Adding sand or otherwise creating a positive sediment budget could reduce shoreline erosion and sediment loss from saltmarsh habitats, a beneficial impact. Beneficial impacts on wetlands under alternative C would be more widespread throughout the park than under alternative B because of the increased area designated for wetland creation, restoration, and protection throughout all three park units. Over time, a noticeable beneficial contribution to cumulative impacts on wetland resources at Gateway would be realized through concurrent restoration, collaborative stewardship, and increased scientific understanding of wetlands.

In sum, alternative C would have significant beneficial impacts to wetlands and both significant benefits from reducing flood risk and localized adverse impacts from continuing to place or restore structures in the floodplain. The relative contribution to adverse cumulative impacts would be imperceptible; the contribution to beneficial cumulative impacts would be noticeable in the short term but less perceptible as the effects of climate change increase later in the 21st century.

Marine Resources

For the purposes of this GMP/EIS, marine resources at the park are defined as those in the oceans, onshore in beaches and other intertidal areas, and in foredunes. This section assesses impacts on these systems as a whole, rather than assessing impacts on individual

components, which are addressed in other sections of the GMP/EIS such as the "Coastal Processes" section of "Soils and Geology," "Vegetation," "Wetlands and Floodplains," "Wildlife," "Water Resources," and "Species of Special Concern." Water quality of marine resources, particularly of Jamaica Bay, is addressed in the "Water Resources" section of this GMP/EIS. While actions in the GMP/EIS alternatives may affect one of these components in a substantial way, they must affect the entire system of marine resources to be considered significant in this section.

Laws and Policies

Laws that govern resources in the marine environment include the Marine Mammals Protection Act. This law was enacted in 1972, and prohibits the taking of marine mammals or the import, export, or sale of any marine mammal, part, or product in the United States.

The Migratory Bird Treaty Act of 1918 prohibits killing, capturing, buying or selling, or importing or exporting migratory birds, eggs, feathers, or other parts. Harassment or habitat modification resulting in the direct loss of birds, eggs, or nests is also prohibited.

The NOAA–Fisheries is responsible for implementing the U.S. Endangered Species Act for listed marine species. The NPS is required to consult with NOAA–Fisheries if an action it proposes would "take" an individual of a listed marine species. "Take" includes harming, harassing, hunting, trapping, or capturing an individual or even significantly modifying a species' habitat.

The park's enabling legislation allows fishing and shellfishing (460 cc-2(f)), although the current superintendent's compendium closes much of the park managed waters to shellfishing because of concerns over health and safety. As noted above, consumption advisories for some fish and shellfish taken in the New York Bay and adjacent areas are in effect.

Other laws and policies regulate how the NPS manages its vegetation and wildlife, and are discussed in the corresponding sections of the GMP/EIS.

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on marine resources using NPS and other agency reports and the scientific literature for information. Resource-specific contexts for assessing the impacts of the alternatives on marine resources include the following:

- Beach and dune systems at Bergen Beach, Breezy Point Tip, Great Kills Park, Jacob Riis Park, Fort Tilden, Plumb Beach, and Sandy Hook are considered fundamental resources.

- The region in which the park is located is situated such that it funnels migratory species from both the east to the west and from the south to the north into the New York Bight and New York Bay.

Alternative A: No Action

Impacts of Alternative A

Zoning maps of park sites show the Marine Zone is applied to the waters of Jamaica Bay and to 0.25 mile offshore of most coastal park sites (Miller Field is an exception). The management prescription in this zone is as follows:

- Protect and enhance the ocean and bay environments.
- Provide opportunities for water-based visitor use and recreation.
- Regulate activities to protect elements of the natural environment, prevent visitor conflicts, and enhance public safety.

The degree of visitor use, and the corresponding need for management, is expected to vary seasonally in the marine zone.

Current park management of this zone off ocean coasts is minimal, although interest in the offshore and nearshore environment has recently increased and the park is inventorying benthic (submerged and/or bottom-dwelling) and nektonic (free-swimming) marine life off its shores. This means impacts of current management on these resources are largely unknown, although some shoreline erosion from passing boats, disturbance of coastal wildlife from visitors, and crushing of intertidal vegetation and invertebrates likely does take place at park sites. Because of consumption advisories, shellfishing is not allowed. Fishing is permitted at the park, but data on the impact of recreational fishing to the population is unavailable.

Management of Jamaica Bay is aimed at protection and enhancement of the bay, including restoration of saltmarsh islands and improving water quality. Although a wealth of information exists about Jamaica Bay, new scientific insights are needed to clarify important ecosystem processes and achieve restoration goals. For example, the rate of loss of marsh island habitat is substantially higher than can be attributed to the urban development, water quality degradation, and dredge and fill of the marsh that has historically taken place (see "Wetlands and Floodplains" and "Water Resources" sections for more information). The causes for this disproportionately rapid rate of loss are largely unknown. Currently, the NPS works with other agencies, including the USACE and New York City, to experiment with building the height of some select marsh islands to restore saltmarsh habitat. The park also conducts coordinated research to some extent with its agency, academic, and NGO partners.

In 2010, the park completed an in-depth assessment of current conditions in Jamaica Bay and defined its objectives for each resource (NPS 2010b). These objectives include eliminating or controlling pollution sources, monitoring aquatic and saltmarsh wildlife to determine success of these efforts, softening the shoreline, restoring island saltmarsh habitat, reestablishing aquatic species such as eelgrass, oysters, Atlantic bay scallops and diverse finfish populations. The study was clear that each of these goals was only possible to reach if the park was able to conduct collaborative research, obtain funding, and ensure problem solving between all agency, private business, NGO, and academic partners. This kind of effort is part of both alternatives B and C.



The park historically conducted or currently conducts beach nourishment efforts at several park sites, including at Jacob Riis Park, Great Kills Park, Plumb Beach, and parts of Sandy Hook. It also requires a clean source of sediment to conduct marsh island restoration in Jamaica Bay. The source of sand for some of these efforts is the Ambrose Channel, the main shipping channel from the New York Bight that leads into New York Harbor. An environmental assessment prepared by the USACE (2012a) to evaluate impacts from dredging in this area found the following impacts on marine resources:

- Short-term direct impacts on immobile wildlife and some slower-moving invertebrates, such as shellfish and crustaceans, from crushing and covering with dredged material

- Short-term impacts on fish and mobile wildlife from increased suspension of solids and turbidity, noise, and disturbance

- Possible harm through inadvertent capture of feeding or swimming sea turtles in dredges; short-term loss of food resources for turtles

- Direct loss of eggs or larvae from essential fish habitat fish species or temporary changes in habitat from turbidity, noise, and vibrations

- Possible long-term changes in the bathymetry and hydrodynamics of the seafloor in the dredge area

Each of these impacts was assessed as negligible or minor, and most were short term. In addition to impacts at the borrow site, the deposition of sand at beach sites in the park could have adverse localized impacts to intertidal plants and animals through burial and suffocation. These impacts could be substantial at a specific location.

All alternatives, including the no-action alternative, also include the implementation of an approved project to stabilize erosion at Plumb Beach. An environmental assessment to evaluate the project (USACE 2010) described the proposed action as including beach fill to create a dune and berm. Two groins would be built on the east and west limits of the beach fill to continue renourishment of the beach. A 200-foot rubble mound offshore would act as a reef to slow waves and reduce the speed of longshore transport of sediment placed at the site. Although the source of initial nourishment was not identified, impacts such as those described above for marine resources at the borrow site are likely. Impacts on marine resources under NPS management at the Plumb Beach site were evaluated, and are summarized as follows:

- Benefits to topography by creating a more uniform and less steep slope offshore of Plumb Beach

- Temporary and localized increases in turbidity during construction

- Direct impacts from dredging for slow-moving or immobile marine organisms in the vicinity of the groins or rock reef; long-term benefits from increased habitat stability

- Temporary impacts from turbidity and noise on mobile marine species, including essential fish habitat species; long-term benefits from increasing benthic food supply

- Possible loss of individual horseshoe crabs or habitat during construction, but beneficial impacts from increasing habitat

- Temporary disturbance and possible displacement of birds and small mammals

In addition to the factors identified above, extensive recreational use of Gateway beaches has resulted in disturbance of coastal wildlife, such as nesting birds, and has increased demand for parking, access, and other facilities that could further disturb wildlife or eliminate habitat (USFWS 1997a). Invasive species, including Japanese sand sedge, are rapidly colonizing beaches and dunes, outcompeting and resulting in the loss of native species.

Marine, Beach, and Foredune Habitat at Park Sites

The saltmarsh habitats of Jamaica Bay are also intertidal, but as noted above are discussed in other sections of this GMP/EIS, including "Wetlands and Floodplains."

Description and analysis of impacts, both beneficial and adverse, on coastal sediment budgets under current management are part of the "Soils and Geology" section of the GMP/EIS; description and analysis of the impacts on existing facilities in the coastal zone from storms are contained in the "Wetlands and Floodplains" section.

Intertidal mudflat habitat occurs on islands in Jamaica Bay, at the Jamaica Bay Wildlife Refuge, and to a much lesser degree at Floyd Bennett Field and Great Kills Park. This habitat is important as a feeding ground for shorebirds and for horseshoe crab spawning and feeding. Atlantic ribbed mussels and other shellfish also use intertidal mudflats. Northern Atlantic upper ocean beach is a beach or foredune association sparsely populated with beach grasses and is home to several rare plants such as seabeach knotweed and seabeach amaranth. It also supports nesting by several rare or listed shorebirds, including piping plovers, least terns, common terns, and black skimmers. Although this association is found in many park sites, it is particularly prevalent at Breezy Point Tip and Sandy Hook. These beach areas are often intermingled with or backed by the foredune communities, listed by Edinger et al. (2008b) as northern beachgrass dune, beachgrass/panicgrass dune grassland, overwash dune grassland, and North Atlantic coastal plain vine dune associations. Northern beachgrass dune is relatively common at the park, and is interspersed with patches of overwash dune grassland habitats. Beachgrass/panicgrass dune grassland is rarer, found in the park only at the northernmost end of Sandy Hook (Edinger et al. 2008b). North Atlantic coastal plain vine dune associations are found at Sandy Hook, Fort Tilden, and sections of the Jamaica Bay Wildlife Refuge and islands. Of these communities, the beachgrass/panicgrass dune grassland and North Atlantic coastal plain vine dune are globally imperiled. The remainder are not imperiled, but provide habitat for rare, unique, or listed plants or animals or species of management concern, such as horseshoe crabs.

Intertidal mudflat habitat occurs on islands in Jamaica Bay, at the Jamaica Bay Wildlife Refuge, and to a much lesser degree at Floyd Bennett Field and Great Kills Park. This habitat is important as a feeding ground for shorebirds and for horseshoe crab spawning and feeding. Atlantic ribbed mussels and other shellfish also use intertidal mudflats.

Jamaica Bay Unit

As noted above, all alternatives include implementation of a sand erosion control project at Plumb Beach. This would provide localized benefits by creating beach habitat and preserving existing mudflats for use by horseshoe crabs. Atlantic ribbed mussels and other shellfish would also be expected to benefit, including from new habitat created by the groins themselves.

Continued cooperation with federal, state, and local agencies to limit impacts on habitats in Jamaica Bay may improve conditions for estuarine mudflat habitat in this area if individual restoration projects target this kind of habitat. As noted in the "Wetlands and Floodplains" section of this GMP/EIS, substantial benefits for saltmarsh vegetation have already come from this kind of cooperative effort.

Continuing equestrian use at Bergen Beach would continue to result in the degradation of beach and dune habitat at this park site; the restoration of a portion of Bergen Beach is part of the no-action alternative, with possible localized benefits for these same habitats.

Continuing to mechanically rake and maintain Jacob Riis Park Beach for recreational swimming may to some degree prevent beaches or foredunes from revegetating and stabilizing; if so, this would be an adverse localized impact on vegetation associations and the wildlife that could use them.

Managing the beach and dune system at Fort Tilden as a natural area, including allowing natural coastal processes to dominate, would normally be a beneficial impact for beach and dune habitat. As noted in other sections of the GMP/EIS, the foredune at Fort Tilden was well developed, vegetated with beachgrass and North Atlantic coastal plain vine dune associations (an imperiled vegetative community), and extended along the entire park unit. However, dunes were substantially overwashed and eroded by several feet on the ocean-facing side of Fort Tilden by Hurricane Sandy. This illustrates the substantial localized adverse impacts that coastal processes like cyclones can have on available habitat for marine and foredune vegetation and the wildlife that use these habitats, particularly when human-built groins and jetties diminish sand supply. Although the no-action alternative includes continuing efforts to restore coastal vegetation when funds allow, this may not offset the impact of coastal storms and interrupted sand transport mechanisms.

Staten Island Unit

In the Staten Island Unit, Fort Wadsworth and Miller Field beach and dune habitat would continue to be left unmanaged and Hoffman and Swinburne Islands would continue to be off limits to visitors. Great Kills Park swimming beaches would be managed by raking; the northern shoreline of this park unit would be monitored for erosion. Crooke's Point, at the western end of this park site, would continue to be maintained as a natural area, and the park would partner with New York City to reestablish native species here. Great Kills Park also has dune grassland and mudflat habitat in addition to the beach areas common to all three park sites in this unit. As noted in the discussion of coastal processes, these sites have

a history of beach nourishment and deposited fills, and are currently eroded somewhat by longshore transport moving from northeast to southwest, with the exception of Crooke's Point (where sand accumulates). Continuing existing management is likely to result in continued losses of beach and foredune habitat from erosion and in some areas from coastal storm damage. Beneficial impacts on these vegetation associations would be likely at Crooke's Point under this alternative.

Sandy Hook Unit

At Sandy Hook, much of the northern beach and dune systems (including the imperiled beachgrass/panicgrass dune grassland vegetation association, which at Gateway only occurs at this park site) are maintained as a protected area. Coastal vegetation restoration is also ongoing in this area. North Atlantic upper ocean beach interspersed with overwash dune grassland and nearby mudflats and marshes for feeding makes Sandy Hook an ideal location for nesting shorebirds, and several rare or listed species breed here successfully each year. In addition to closing areas or installing protective fences around nests during nesting periods, the park also may transfer sand from a site in the surf zone offshore of the northern accreting areas to the southern/central "critical" zone to maintain habitat for breeding birds and other beach and dune natural resources. The environmental assessment for this sand slurry project (NPS 2004g) indicated the following:

- Some temporary impacts on vegetation and wildlife from the construction of the slurry system

- No long-term impacts on soils or wildlife from the loss of sand from Gunnison Beach, the borrow site (plovers and other shorebirds do not nest in the vicinity of Gunnison Beach)

- Few impacts on benthic marine life because of its location in the surf zone and the use of a mesh screen to filter larger organisms

The areas where plovers or other listed birds nest are largely protected from impacts of human activities during the nesting season. However, other vegetation associations, including beachgrass/panicgrass dune grassland, for example, do occur at locations on Sandy Hook where no nesting takes place and so are not fenced, closed, or otherwise restricted. In addition, all beaches of Sandy Hook are open to visitor use outside the nesting season. The loss of beach habitat from Hurricane Sandy at this park unit indicates its vulnerability, although operation of the sand slurry may provide substantial localized benefits in maintaining existing beach and dune habitat in the critical zone. Maintenance facilities in the north part of Sandy Hook as well as all beach centers along the ocean coast were also damaged.

Cumulative Impacts

A description of cumulative impacts on the marine zone at Gateway is part of the "Marine Resources" section in chapter 3, summarized here for convenience.

Coordinated research and management among federal, state, and local agencies at Jamaica Bay have resulted in the partial achievement of some ecosystem and resource restoration objectives, with substantial localized benefits to some saltmarsh and mudflat habitat.

The New York Bight is in a heavily urbanized watershed supporting the largest coastal population of people in the United States (USFWS 1997c). Major threats affecting the bight include coastal urbanization, wetland and coastal use modifications, ocean dumping and waste disposal, port development and maintenance, agricultural practices and development, transportation, energy production, marine mineral mining, and cumulative nonpoint sources of pollutants. The ocean area of the New York Bight has traditionally been used for the disposal of waste, including sewage sludge, dredged materials, chemical wastes, and radioactive materials. Organic loading is an emerging problem, as indicated by excessive algae blooms, shifts in algal species composition, high sediment biological oxygen demand at affected sites, and anoxic events in near coastal and estuarine waters (USFWS 1997c).

Urban sprawl and suburbanization have exerted tremendous pressure on the integrity and health of the coastal ecosystem, including those of Raritan Bay and its watersheds, and some of the upland and wetland buffer areas around the shoreline of Jamaica Bay. Intense demand for home sites, resorts, marinas, and commercial development has resulted in the loss of valuable wetland resources through filling, dredging, ditching, diking, and shoreline modification. Increased population intensifies recreational uses of the coastal areas, including the demands for boating facilities and access to the water (USFWS 1997b).

Mining for sand and gravel, as well as exploration and production drilling for oil or minerals of the outer continental shelf, have directly affected marine biota as well as indirectly affecting them through increases in turbidity and spills. Deep borrow pits in areas of minimal flushing can have decreased DO and may become seasonally or permanently anaerobic where mixing does not occur regularly (USFWS 1997b, 1997c).

The proposed Rockaway Lateral pipeline would have substantial impacts on marine fish and mammals in the Atlantic Ocean; these could potential be additive or cumulative with those from the GMP as the pipeline build approaches the Rockaway shoreline. Pile driving and associated noise are particularly adverse impacts on all marine life within a certain range of the activity and increases in turbidity would clog gills and creating breathing or visual difficulties for fish and marine mammals. Benthic species would be crushed or experience extreme turbidity and be covered with bottom sediments; species are not expected to recover in the 400-acre affected area for up to 2 years (FERC 2013). Some of this affected habitat is included as essential fish habitat for 21 species. Several of the affected species are endangered or threatened, including right whales and Atlantic sturgeon.

Climate change could have a dramatic and adverse impact on marine resources at Gateway, particularly through increases in sea level rise, which increases shoreline erosion, saltwater intrusion and estuary inundation. Much of the shoreline at the park is considered highly vulnerable to the impacts of sea level rise (USGS 2005), and inundation of habitats for intertidal species during storms and loss of shore or marsh habitat from incremental sea level rise is likely (Columbia University 2009). Sea level rise can also change fresh or brackish water habitats into ones that are substantially more saline and make them unsuitable for some vegetation or wildlife.

Given the overwhelming nature of adverse cumulative impacts in the marine environment surrounding the park, localized benefits under this alternative would not likely have more

than an imperceptible offsetting impact. Adverse effects from this alternative would also add to an imperceptible degree to cumulative adverse impacts.



Conclusion

Coordinated research and management among federal, state, and local agencies at Jamaica Bay have resulted in the partial achievement of some ecosystem and resource restoration objectives, with substantial localized benefits to some saltmarsh and mudflat habitat. Activities in the marine zone of Gateway include borrow sites for sand used in beach nourishment at several park sites, including at Plumb Beach and Sandy Hook (before the sand slurry project began). Although adverse impacts from these borrow activities were noted in the environmental assessments prepared as part of planning for these projects, none have shown the potential for significant adverse effects on marine resources. Similarly, although deposition of sand at the park would bury some marine plants and animals, impacts would be limited. In the longer term, localized benefits to marine wildlife, including mussels and horseshoe crabs, would result from the increased habitat from these beach nourishment or sand stabilization efforts. Other localized benefits to marine life from unspecified erosion control and dune restoration efforts at some park sites would continue; however, actions like raking (Jacob Riis Park, Great Kills Park) or even managing park sites where sediment transport is interrupted to allow natural coastal processes such as strong storms and flooding to occur without protection (Fort Tilden, Fort Wadsworth) could have localized adverse impacts on marine or beach organisms. Continuing to close portions of the park for nesting birds would help protect these important resources, as would continuing the sand slurry project because this preserves existing plover and tern nesting habitat at Sandy Hook. Benefits would be localized and substantial.

Although components of dune and beach systems may experience substantial benefits, the system itself includes sustainable sediment supplies, intact vegetative communities, protection from human development and disturbance, and healthy, fully functional wildlife species. Many of these components are currently degraded and would not improve under the no-action alternative. Because it is the complete beach and dune "system" that is considered a fundamental resource and evaluated in the "Marine Resources" section in this chapter of the GMP/EIS, benefits are not likely to be considered significant. Both adverse and beneficial impacts resulting from alternative A (no action) would be imperceptible compared to significant adverse cumulative impacts on the marine environment at Gateway.

Common to Both Action Alternatives

Impacts of Alternatives B and C

The marine zone would be unchanged under alternatives B and C compared to alternative A, as would the continuation of sand borrowing from the Ambrose Channel and other locations in New York Bay to nourish beaches. The action alternatives may increase the amount of sand from these borrow areas to help protect coastal areas from strong storms, which as noted above and in other sections of the GMP/EIS can substantially reduce sand volume from beaches and dunes. The impacts of taking sand from offshore to supply park sites at Gateway would be adverse and similar to or slightly worse than those described under the

no-action alternative. Both action alternatives include additional ferry or sightseeing by boat through Jamaica Bay. Wakes from these boats could increase shoreline erosion or cause wildlife disturbance. Impacts from wakes are adverse and localized; those to wildlife are discussed in the "Wildlife" and "Species of Special Concern" sections of this chapter of the GMP/EIS.

The action alternatives anticipate a much higher degree of coordination, which for the purposes of analysis it has been assumed would lead to joint funding and problem solving in Jamaica Bay to increase saltmarsh and other important habitats, including the marine mudflats and foredune associations described above. The commitment by the NPS to this increased level of partnering is shown by its participation in and likely hosting of the new JBSRI, a top-tier science research institute focused on urban ecosystem restoration and resiliency in Jamaica Bay. The JBSRI would be a public/private partnership with agencies, academia, foundations, and NGOs that would be encouraged to use Jamaica Bay as a laboratory to assess, research, and improve the ability of ecosystem components to function in the face of climate change and other cumulative impacts. Benefits to marine, intertidal, and coastal habitats from this research could be substantial.

Both action alternatives include several mitigation measures and a set of desired conditions for marine resources that are listed and explained in the "Alternatives" chapter. In addition to the direction of JBSRI to focus on current impacts to marine resources and means to alleviate them, these include preparing a multi-agency marine resource management plan to help evaluate user capacity that allows for healthy marine life and expanding signage, education and outreach to visitors on foot and in boats to protect sensitive marine wildlife, fragile coastlines and the unique ecology of Jamaica Bay. It is the desired condition of the NPS that fin and shellfish communities at the park have a high species richness and sustainable populations of each species as well as a sustainable fishery. Specifically, reestablishing key marine species such as eelgrass and oysters is a priority, as is providing visitors a chance to fish for finfish and shellfish species as indicated in the park's enabling legislation. The desired condition for Gateway waters and sediments is described in Chapter 2 as "free of chemical contaminants, such that less than one percent of the aquatic animal species will experience adverse biological effects…."

Marine, Beach, and Foredune Habitat at Park Sites

Although both action alternatives propose development at certain park sites, the level of development differs. Because development does potentially affect marine, beach, or foredune habitat differently, it is discussed under each alternative.

Efforts to control beach erosion at Plumb Beach would be included in both action alternatives, with similar localized benefits for marine or intertidal wildlife to those described for alternative A. Working to restore natural sand transport processes at Jacob Riis Park and at Great Kills Park could restore an essential component of beach and dune systems, a fundamental resource, at these park sites. Monitoring and protecting dunes at Fort Tilden in the aftermath of Hurricane Sandy to restore sand volume and ensure natural dune vine and beach vegetation returns would provide local benefits to this habitat.

Controlling beach erosion and maintaining natural beach and dune habitats at Bergen Beach, Fort Wadsworth, Sandy Hook, and Miller Field could benefit these systems if efforts result in natural dune formations, vegetation, and wildlife using them.

Increasing the protection of habitats at Breezy Point Tip, including for horseshoe crabs, is common to both action alternatives, with potential localized benefits for species of management concern.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

No changes to larger-scale actions identified under alternative A or actions common to alternatives B and C, such as increased collaboration on research and actions to restore Jamaica Bay habitat or to continue approved or ongoing sand replacement efforts, would occur specific to alternative B.

Marine, Beach, and Foredune Habitat at Park Sites

Actions at Floyd Bennett Field include development of visitor facilities in existing buildings and at other locations, including a wetlands center and enhanced marina area, as well as creating wetlands, saltmarsh, and areas of saline and freshwater habitats. Current estimates (WWT Consulting 2012) are 57 acres of open saline water, 12 of open freshwater, and a combined total of nearly 50 acres of wetlands. This is less than under alternative C, but could still increase habitat for mudflats, beaches, or important dune vegetation and wildlife. If so, localized benefits could be substantial. Improving the marina so that it can be used by visitors could require dredging of soils from Jamaica Bay, a localized adverse impact on marine resources.

Plumb Beach management would be the same as described under the no-action alternative, including the implementation of beach erosion and stabilization measures. Some new visitor amenities are proposed but these would not affect the marine zone. Launching from the shore could have temporary impacts on benthic species or disturb mobile wildlife, a localized adverse impact.

At Bergen Beach, equestrian use would be maintained, with the associated unwanted nutrients and disturbance of marine and beach or foredune habitat similar to under alternative A.

The development of facilities at Jacob Riis Park is unlikely to affect marine systems, because most of this area is already hardened or managed in a relatively unnatural state. Sediment transport is also interrupted at this park site, contributing to a less than natural condition for marine, beach, and foredune resources.

The development planned for Fort Tilden in this alternative would have the potential for substantially changing the natural, undisturbed nature of dunes at the site through camping,

Planning to improve water quality or habitat conditions to restore marine vegetation or wildlife, or to allow shellfishing may rely on some of this coordinated research, and could provide additional benefits for marine resources.

trails, and increased use. Some of this use would be more likely to affect terrestrial maritime vegetation such as that covering backdunes, shrublands, grasslands, and forests. Stabilizing Riis Landing buildings and facilities so that they can support increased ferry use could result in increases in turbidity and noise, as well as dredging of marine soils, a short-term adverse effect. However, alternative B would also include working closely with New York City and other landowners to improve conditions here and along the entire coastline of the Rockaway Peninsula to create a holistic beach management plan. To the extent that this includes restoring sand transport processes, natural stabilization of dunes and associated rare vegetation, and protection of these resources from human disturbance to allow widespread use by wildlife, the quality and resiliency of the intertidal and dune ecosystem could dramatically improve.

The presence of beach clubs at Breezy Point Tip could continue an ongoing adverse effect on marine systems by maintaining a human presence and by drawing visitors, actions that may be keeping dune vegetation from growing or wildlife, such as rare and listed shorebirds, from using or nesting in otherwise appropriate habitat.

The reestablishment of the marina at Great Kills Park would require dredging and construction, with increases in turbidity, potential direct loss of benthic species, and noise and vibration that could adversely affect sea turtles, fish, and marine mammals. Human activity associated with the marina would also keep many sensitive wildlife species from establishing here.

As at Plumb Beach, kayak launching and water-based recreation at Miller Field would have localized adverse impacts on marine shorelines, and potentially on vegetation or wildlife habitat.

Alternative B would include increasing camping and water recreation at ~~Horseshoe Cove~~, Batteries Kingman and Mills an action that could adversely affect some shoreline ~~beach or saltmarsh~~ habitat or wildlife using these habitats. ~~Additional and more structured camping facilities, such as cabins or yurts, are proposed for the ocean side of Sandy Hook; cabins would also be included under alternative B in the dunes at Fort Tilden.~~ More structure camping facilities, such as seasonal tents or cabins, could be constructed in the backdunes of Fort Tilden in Alternative B if site specific analysis and consultation supports it. To the extent that these new facilities would be located in or bring additional visitors to sensitive foredune habitats, such as North Atlantic coastal plain vine dune or beachgrass/panicgrass dune grassland, impacts would be adverse. Rebuilding beach centers at Sandy Hook could have temporary impacts on beach or marine wildlife from noise and disturbance.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative B) on marine resources are the same as described under alternative A. Given the dramatic and overwhelming nature of adverse cumulative impacts in the marine environment surrounding the park, localized adverse effects from this alternative would add to an imperceptible degree to cumulative adverse impacts. However, benefits from increased collaboration at Jamaica Bay and holistic management of the coastline along the Rockaway Peninsula could appreciably improve conditions for marine systems in these locations.

Conclusion

Most of the planned development or use of park sites or increased boating would have adverse localized impacts. Because these actions would not affect entire marine systems, they would not be significant. The potential planned actions at Fort Tilden may not only include camping or other visitor-related facilities ~~in or~~ near dunes, but would potentially also bring more visitors to these sites, with the potential for adverse impacts on sensitive dune vegetation or wildlife. These impacts could be substantial, but monitoring and protection by the NPS would likely keep them from being significant. Substantial localized benefits to mudflat or other intertidal marine systems would come from the increased coordination and application of research to Jamaica Bay common to both action alternatives, and to beach and foredune communities along the Rockaway Peninsula from efforts to holistically manage coastal resources to improve resiliency. Planning to improve water quality or habitat conditions to restore marine vegetation or wildlife, or to allow shellfishing may rely on some of this coordinated research, and could provide additional benefits for marine resources. Because these efforts could improve conditions for entire beach and dune systems, benefits could be significant and could appreciably offset significant adverse cumulative impacts to marine resources at the park as well.

The reestablishment of the marina at Great Kills Park would require dredging and construction, with increases in turbidity, potential direct loss of benthic species, and noise and vibration that could adversely affect sea turtles, fish, and marine mammals.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

No changes to larger-scale actions identified under alternative A or actions common to both action alternatives, such as increased collaboration on research and actions to restore Jamaica Bay habitat or to continue approved or ongoing sand replacement efforts, would occur specific to alternative C.

Marine, Beach, and Foredune Habitat at Park Sites

Actions at Floyd Bennett Field include a lesser degree development of visitor facilities than under alternative B, including an enhanced marina area and creating wetlands, saltmarsh, and areas of saline and freshwater habitats. Although it is not yet finalized, the number of acres of saline and saltmarsh marine habitat created at Floyd Bennett Field under alternative C would be greater than those reported above for alternative B, with potential substantial localized benefits for marine resources. Improving the marina so that it can be used by visitors could require dredging of soils from Jamaica Bay, a localized adverse impact on marine resources.

Impacts on marine and intertidal habitat at Plumb Beach would be the same as those under the other alternatives, with potential localized adverse impacts from boat launching.

At Bergen Beach, equestrian use would be discontinued, with potential localized benefits from reduced disturbance and nutrients in the intertidal or dune habitats at this park site.

The development of facilities at Jacob Riis Park is unlikely to affect marine systems, because most of this area is already hardened or managed in a relatively unnatural state. Sediment transport is also interrupted at this park site, contributing to a less than natural condition for marine, beach, and foredune resources.

The development planned for Fort Tilden under this alternative would be substantially less than under alternative B, without cabins, pods, or other structures in the dunes. Impacts would still have the potential to be adverse, however. Stabilizing Riis Landing buildings and facilities could result in increases in turbidity and noise, as well as dredging of marine soils, a short-term adverse effect. However, like alternative B, alternative C would include working closely with New York City and other landowners to improve conditions here and along the entire coastline of the Rockaway Peninsula to create a holistic beach plan. This could dramatically improve the resiliency of intertidal and dune ecosystems by restoring sand transport processes, stabilizing dunes and allowing them to naturally revegetate with rare vegetation associations, and protecting them from human disturbance to encourage wildlife. The benefits of this kind of approach for marine systems at these park sites could be substantial.

The presence of beach clubs at Breezy Point Tip could continue an ongoing adverse effect on marine systems by maintaining a human presence and by drawing visitors, actions that may be keeping dune vegetation from growing or wildlife, such as rare and listed shorebirds, from using or nesting in otherwise appropriate habitat.

The reestablishment of the marina at Great Kills Park would require dredging and construction, with increases in turbidity, potential direct loss of benthic species, and noise and vibration that could adversely affect sea turtles, fish, and marine mammals. Human activity associated with the marina would also keep many sensitive wildlife species from establishing here.

As at Plumb Beach, kayak launching and water-based recreation at Miller Field would have localized adverse impacts on marine shorelines, and potentially on vegetation or wildlife habitat.

Alternative C would include increasing camping and water recreation at ~~Horseshoe Cove~~, Batteries Kingman and Mills an action that could adversely affect shoreline ~~some beach or saltmarsh~~ habitat or wildlife using this ~~these~~ habitats. Sandy Hook hosts widespread nesting by several rare or listed shorebirds and is the only location in the park where the rare beachgrass/panicgrass dune grassland vegetation association grows. More intensive beach and dune study and habitat protection at Sandy Hook could therefore have additional localized benefits for these marine and intertidal or dune habitats relative to the other alternatives.

Cumulative Impacts

Impacts of the other actions that contribute to cumulative impacts (i.e., those not related to alternative C) on marine resources are the same as described under alternative A. Given the dramatic and overwhelming nature of adverse cumulative impacts in the marine environment surrounding the park, localized adverse effects from this alternative would add

to an imperceptible degree to cumulative adverse impacts. However, benefits from increased collaboration at Jamaica Bay and holistic management of the coastline along the Rockaway Peninsula could appreciably improve conditions for marine systems in these locations.

Conclusion

Most of the planned development or use of park sites or increased boating would have adverse but localized impacts on marine systems; the intensity of these impacts would be less than of those under alternative B and most would not be considered significant. The effect of planned uses at Fort Tilden would likely bring more visitors to these sites, with the potential for impacts on sensitive dune vegetation or wildlife. These impacts could be substantial, but monitoring and protection by the NPS would likely keep them from becoming significant. Localized benefits relative to alternative C from increasing monitoring and protection of dunes at Sandy Hook could be substantial for beach or dune resources. Substantial and potentially significant localized benefits to mudflat or other intertidal marine systems would come from the increased coordination and application of research to Jamaica Bay common to both action alternatives, and to beach and foredune communities from efforts to holistically manage park sites along the Rockaway Peninsula to improve the resiliency of coastal resources. Planning to improve water quality or habitat conditions to restore marine vegetation or wildlife, or to allow shellfishing may rely on some of this coordinated research, and could provide additional benefits for marine resources. These benefits would could appreciably offset significant adverse cumulative impacts to marine resources at the park as well.

Vegetation

This section focuses to a greater degree on terrestrial maritime vegetation than dune, beach, marine or wetland vegetation. For more information on these other vegetative communities, consult the "Marine Resources" or "Wetlands and Floodplains" sections of this GMP/EIS. Listed plant species are evaluated in the "Species of Special Concern" section.

Laws and Policies

NPS *Management Policies* 2006 (NPS 2006a) instruct parks to maintain all native plant species as part of the natural ecosystems of park units. The natural abundance, diversity, and distribution of native plant populations are to be preserved, and parks are to restore them when they have been extirpated by past human-caused actions (NPS 2006a, section 4.4.1). If a park proposes actions that remove native plants, it must evaluate whether the removal creates a need for population management of the plant community, including factors like natural distribution or whether the habitat is critical for a listed species (NPS 2006a, section 4.4.2.1).

Methods

This analysis uses descriptions of plant communities at the park as included in Edinger et al. (2008b), maps from Edinger et al. (2008b), and natural resource and zoning information provided by Gateway geographic information system (GIS) professionals to determine where natural plant communities (as opposed to human-altered vegetation associations) were

located and whether planned development would disturb them. Beneficial impacts were assessed in a similar way—by locating vegetation associations at park sites where habitat would be preserved or protected using these maps and descriptive information. This analysis focused particularly on imperiled vegetation associations.

Resource-specific contexts for assessing the impacts of the alternatives on vegetation include the following:

- The only vegetative community named as a fundamental resource at Gateway is the Sandy Hook maritime forest.

- Because maritime forest is considered fundamental at Sandy Hook, it is also considered important because of its rarity at other park sites where it occurs (Great Kills, Fort Tilden, Floyd Bennett Field, Canarsie Pier, and Jamaica Bay Wildlife Refuge).

- Rare vegetation associations are unique, a consideration when determining whether an impact is likely to be significant according to CEQ criteria summarized at the beginning of this chapter.

Alternative A: No Action

Impacts of Alternative A

Much of the vegetation at the park is human altered in some way. For example, of the 465 identified plant species, 33 to 50 percent are nonnative (Lawrence, Roman, and Frame 2010). Intertidal and subtidal mudflats throughout Jamaica Bay were once covered in eelgrass, but this important vegetative community that has since disappeared. Although the loss of saltmarsh in Jamaica Bay has slowed from its peak during the mid-1990s, it is still disappearing at a rate of 19 acres per year (NYDEC 2013b). Many of the park's upland forest and grassland sites are artificial, and are the result of filling former freshwater wetlands, saltmarsh, and intertidal mudflats. Floyd Bennett Field and Great Kills Park are examples of park sites underlain by mostly or nearly all fill materials, including garbage and urban rubble (see the "Soils and Geology" section in chapter 4 for more information).

Despite this, Gateway is home to nine vegetation associations considered rare in New York and/or New Jersey as well as four considered globally rare (American holly forest is all three) (Edinger et al. 2008b). It also contains important bird habitat for over 300 species, including more than 60 breeding birds (USFWS 1997c), and 35 different vegetation associations mapped by Edinger et al. (2008b).

Jamaica Bay Unit

Plumb Beach

Plumb Beach has beach and dune areas, as well as saltmarsh and upland shrub/forest communities. In addition to use of the beach for sunbathing, inlet fishing, and other activities, hand launching of non-motorized boats or other recreational craft occurs here. The upland vegetation is in poor condition from trampling and the creation of social trails

(Rowan 2012), an adverse impact that would continue or worsen in the no-action alternative. Dunes and beach lie primarily along the western end of this park site because of beach nourishment and coastal transport processes. These areas are relatively unvegetated, but are part of important habitat for horseshoe crabs, a park species of management concern. Rowan (2012) also indicated that the dunes may be unvegetated because of heavy foot traffic. Although the potential for additional habitat for coastal vegetation in the eastern and central portions of the site exists, sediment transport has been blocked and altered by building and dredging as described in the "Soils and Geology" section of chapter 3. All alternatives, including no action, include responding to these changes by installing groins and an offshore rock reef to trap sand and slow wave energy and erosion of the central beach, a potential beneficial impact for beach or dune vegetation.

Floyd Bennett Field

Floyd Bennett Field is a mostly manmade conglomerate of dredged fills, fly ash, garbage, and other urban fill. Nonetheless, a wide diversity of vegetation grows here, including successional maritime forest, northern beach heather dune shrubland, northern bayberry dune shrubland, and a host of human-modified associations such as early successional woodland, northeastern modified successional forest, and northeastern old field. Both successional maritime forest and northern bayberry dune shrubland are vulnerable or imperiled statewide. Although the grassland growing in the center of Floyd Bennett Field is human-modified little bluestem old field, it is important because it is the largest remaining grassland in the New York City area and provides nesting and migratory bird habitat (USFWS 1997b). Under the no-action alternative, vegetation would remain in these associations, although grasslands would continue to undergo succession and transition to shrublands and eventually to forest if they are not maintained through mowing, a practice the park currently uses to keep them as grasslands. Although this may not particularly benefit native plant species, it does continue to have a beneficial impact on wildlife dependent on grasslands. Trails are available in parts of the site, as is camping at the Goldenrod and Tamarack Campground. Ecology Village is an area of Floyd Bennett Field used for environmental education. Much of the site is paved and developed with airplane hangars and other buildings reused for a variety of purposes. Visitors walking through or camping at this park site might trample young vegetation, and existing paved and developed areas would continue to occupy space that could potentially become vegetated, although trails minimize the potential for trampling. An invasive subtype of *Phragmites* (also called common reed) is pervasive along the shore of Dead Horse Bay at this park site, as well as on the west side of the North Forty area. The park does remove *Phragmites* as time and money permit, a localized beneficial impact on native vegetation that would continue under the no-action alternative.

Bergen Beach

This park site is filled saltmarsh and vegetated with some dune and shrubland vegetation, although much of Bergen Beach is infested with *Phragmites*. This park site is primarily used for horseback riding under a concession contract and is characterized by Rowan (2012) as heavily used, as indicated by bare areas of sand and a network of unplanned pathways, several of which are below grade and flooded in wet weather.

Canarsie Pier through Hamilton Beach Park

These park sites lie along the Jamaica Bay shore and include both sides of the pier, Fountain Avenue and Pennsylvania Avenue Parks, Spring Creek, Frank Charles Memorial Park, and Hamilton Beach Park. Although much of this land is filled, it once was tidal freshwater or saltwater marsh. In less saline areas, such as Spring Creek, vegetation is dominated by *Phragmites*. These park sites show evidence of heavy use, with bare areas and a network of social trails. Some spotty but intact saltmarsh remains in the vegetation on either side of Canarsie Pier, Frank Charles Memorial Park, and Hamilton Beach Park. New York City Department of Environmental Protection (NYCDEP) is planting the former landfill sites with a mix of grasses, shrubs, and maritime woodland species. Soil depth is limiting for larger trees (NYCDEP 2010).

Jamaica Bay Wildlife Refuge



This park site includes both the filled main area of the refuge, as well as remaining "fast" islands and hassocks in the bay. Vegetation over most of the refuge is saltmarsh and intertidal mudflats (Edinger et al. 2008b), with some early successional woodland/forest on Canarsie Pol and northern bayberry dune shrubland and North Atlantic coastal plain vine dune vegetation associations at the main area and on Ruffle Bar and Little Egg, for example. Unusual vegetation associations including southern New England red maple seepage swamp, mixed forb marsh, and woolgrass marsh have grown adjacent to the filled near-freshwater (formerly 1–3 parts per thousand [ppt] but now at about 18 ppt since its destruction by Hurricane Sandy and subsequent repair) East Pond at the refuge. Successional maritime forest, a vegetation association considered rare, also grows at the main area of the refuge. Big Egg Island, the site of additional interpretive use under alternative B, is vegetated with saltmarsh and estuarine intertidal mudflat (Edinger et al. 2008b). The islands in the refuge are currently unused by visitors although boat tours are allowed to circle them. Trails currently circle West Pond and lie along both sides of East Pond; Hurricane Sandy caused substantial damage to West Pond, which resulted in breaching of the pond and substantial damage to the trail. Although East Pond was also breached during the hurricane, it has been repaired.

Under the no-action alternative, West Pond would remain breached. As noted in the "Affected Environment" chapter, the refuge was created by filling and excavating island and marsh habitat in the northern portion of Jamaica Bay, including portions of several hassocks and marshy bays. West and East Pond are artificially created habitats maintained by valves. The salinity at West Pond was 4–5 ppt before it was breached; that is, slightly brackish (NRCS et al. 2001). Although East Pond supports some unique vegetative communities, the primary vegetation in or dependent on West Pond has been *Phragmites*-dominated tidal marsh. Allowing West Pond to remain breached would increase the salinity to that of the east end of Jamaica Bay, or between 20 and 26 ppt. This would eliminate habitat for *Phragmites*, which can only withstand salinities up to 18 ppt. It would also potentially recreate shallow tidal saltwater habitat and would likely be recolonized with low and high saltmarsh species such as smooth cordgrass and saltgrass *(Distichlis spicata).* Overall, impacts from leaving West Pond breached would likely be localized and beneficial for vegetation.

In addition to these site-specific actions, alternative A would also continue agency coordination to improve conditions in Jamaica Bay and build marsh island habitat. To date (as described in the "Wetlands and Floodplains" section of the impact analysis), the NPS and New York Department of Environmental Conservation have completed restoration projects at Big Egg Marsh, Yellow Bar Hassock, Elders West Marsh Island, and Elders East Marsh Island and are currently restoring two additional marsh islands. Continuing this restoration effort under the no-action alternative could result in substantial and widespread beneficial impacts for saltmarsh in Jamaica Bay.

Jacob Riis Park

Most of this park site is developed and not vegetated. However, a small area of the northeastern side supports a small patch of dune shrubland. Beach and dunes do exist at Jacob Riis Park, but they are unvegetated. The beach is used for sunbathing and fishing, and inland areas are used for sports activities including baseball, paddle tennis, and a pitch-and-putt miniature golf course.

Fort Tilden



Vegetation at this park site is diverse and includes dune, shrub, field, and forest associations. Rare northern bayberry dune shrubland and northern beach heather dune shrubland and globally imperiled successional maritime forest grow at Fort Tilden. Other human-modified associations include early successional woodland/forest, bluestem old field, and northeastern old field. Hiking trails, generally following roads, exist in the interior of the site, and a food and drink concession (the Silver Gull Beach Club) occupies the west portion of the site. In addition to sunbathing and hiking, visitors also fish at Fort Tilden and can access Manhattan via water taxi docking at Riis Landing on the bay side of this park site. Some of the former Army buildings at Fort Tilden are occupied. Generally, vegetation at this site is characterized as undisturbed and in relatively natural condition (Rowan 2012). Park management includes removal of invasive species and planting of native plants when time and money are available, including in cooperation with New York City as part of its MillionTreesNYC program. These actions would continue under alternative A, with localized benefits to vegetation.

Breezy Point Tip

Between the NPS-managed Breezy Point Tip and Fort Tilden is Breezy Point Cooperative, ~~Co-Op,~~ a privately owned portion of the Rockaway Peninsula. Breezy Point Tip is relatively undeveloped, although two concession-operated beach clubs (Breezy Point and Silver Gull) offer beach equipment storage, food, cabanas, and pool use for members. Off-road permits are offered for beach access to fish during the shorebird nesting off season. Vegetation at Breezy Point Tip includes northern beachgrass dune, overwash dune grassland, and rare northern bayberry dune shrubland, coastal salt pond marsh, and northeastern Atlantic brackish interdunal swale. Visitors sunbathe and surf at this park site. Piping plovers and other rare shorebirds use the dunes at Breezy Point Tip for nesting; these areas are off limits to visitors during nesting season but nonetheless experience multiple violations. Fishing is available along the north shore by permit, including for over-sand vehicle access, during the nonbreeding season. Vegetation is in relatively undisturbed condition (Rowan 2012).

Staten Island Unit

Fort Wadsworth

The majority of this park site is either developed or planted lawns or other nonnative vegetation. Species include tree of heaven and black locust. A beach lies along one shore; the other is vegetated with shrub and successional forest species (Edinger et al. 2008b). Biological controls (goats) are used to keep historic batteries cleared of vegetation. Otherwise, no management of vegetation occurs and the few natural areas are relatively undisturbed.

Hoffman and Swinburne Islands

Hoffman and Swinburne Islands are wooded, but invasive species grow over much of the island; other areas remain open because of former human use. Visitor access is prohibited on both islands.

Miller Field

Although the majority of this park site is planted lawn used for sports, it also includes a rare relict swamp white oak forest and a line of dunes and beach where it faces the ocean. The forest lost its source of water when Moravian Creek was diverted in 1980 into a city storm sewer (Lawrence, Roman, and Frame 2010). Although this dramatically changed soil conditions, young trees indicate the swamp white oak population continues to regenerate. Trails are located in the swamp white oak forest, but off-trail visitor use occurs regularly. The beach is maintained by two groins, a constructed dike, and placement of artificial fill. Some dune and shrub vegetation grows here.

Great Kills Park

Great Kills Park has diverse vegetation, including rare successional maritime forest, North Atlantic Coast backdune grassland and northern tall maritime shrubland, as well as human-modified vegetation associations such as early successional woodland/forest and both little bluestem and northeastern old field areas. Much of Great Kills Park is covered in *Phragmites*-dominated reed/grass tidal marsh. The inland area, including developed spots in the reed/grass tidal marsh, was used for sport fields but is currently closed for radium ~~radon~~ remediation. Crooke's Point, on the western, accreting spit of Great Kills Park, is vegetated in successional maritime forest, northern tall maritime shrubland, overwash dune grassland, and northern beachgrass dune associations. It is currently managed as a natural area with access permitted along established trails. The NPS and New York City partner to remove invasive species and plant native ones as part of the MillionTreesNYC program. These efforts would continue to result in localized beneficial impacts on native vegetation at Crooke's Point. As described in other sections of the GMP/EIS, a long outfall pipe prevents natural sand transport from moving south along the Staten Island shoreline and nourishing Great Kills Park beach. This may be decreasing habitat for saltmarsh and/or intertidal mudflats at the north end of this park site, an adverse localized impact that would continue under no action.

Sandy Hook Unit

Vegetation at Sandy Hook varies from a wide array of beach and dune associations to grasslands at Fort Hancock to rare woodlands and shrublands in the internal part of this unit. Foredune and beach vegetation (see the "Marine Resources" section in chapter 3 for more information) includes imperiled beachgrass/panicgrass dune grassland and North Atlantic upper ocean beach interspersed with overwash dune grassland and intertidal mudflats. Backdune species include those in the rare Northeastern Atlantic brackish interdunal swale association, and farther inland, rare northern bayberry dune shrubland, successional maritime forest, and both red cedar and holly maritime forests grow. Each of these inland associations is vulnerable or imperiled at the state and/or global level. Saltmarsh, brackish interdunal swale vegetation, and reed/grass tidal marsh (e.g., *Phragmites* wetlands) dominate the bayside coastlines; some rare brackish meadow also grows north of Spermaceti Cove along the coast of Horseshoe Cove. Sandy Hook includes several beaches used for swimming and sunbathing, fishing, surfing, boating, and windsurfing. A campground inland of Horseshoe Cove is available by reservation. Existing structures at Fort Hancock are reused and/or interpreted, and an adjacent U.S. Coast Guard area vegetated with rare northern bayberry dune shrubland, northern beach heather dune shrubland, and beachgrass/panicgrass dune grassland associations is closed to visitors. Sandy Hook includes several shorebird nesting locations where protection measures, including restricted access, are put in place during the breeding season. Access to the holly forest is also restricted. Invasive species are removed as funding and staff are available. Limiting access and treating invasive species both have localized beneficial impacts on vegetation. The no-action alternative would also include repairing one or more of the three beach centers that sustained damage during Hurricane Sandy. Some temporary impacts on vegetation from the repair would be possible.

Cumulative Impacts

In addition to the usual disturbances associated with human settlement, such as conversion of open land to agricultural, timber, or urban development, there are large tracts composed of dredged soils, garbage, and discarded building materials used to fill low-lying saltmarshes and wetlands to create new land. Floyd Bennett Field, the Jamaica Bay Wildlife Refuge, and Great Kills Park are all examples. Disruption of sand transport and hardening of shorelines has also resulted in erosion and loss of habitat for beach, dune, or bayside vegetation associations, as described in the "Marine Resources" section in this chapter. Although inland forests such as the swamp white oak forest at Miller Field and the American holly forest at Sandy Hook grow on natural soils, the forests themselves have been disturbed by cutting, burning, trampling, and, in the case of the white oak forest, alteration of the drainage pattern. Other areas of the park have been deliberately planted with lawn or nonnative species (Fort Wadsworth, parts of Jamaica Bay Wildlife Refuge). Alteration of the ecosystem, such as at Jamaica Bay, from dredging and polluting of the bay as well as from changes in the depth and hydrology of the entire system, has also affected the saltmarsh vegetation. These effects are described in the "Wetlands and Floodplains" and "Water Resources" sections in this chapter of the GMP/EIS. Development or continued use of existing facilities at several park sites continue the adverse cumulative effect of lost habitat; roads, trails, parking lots, recreational fields, campgrounds, and concessions all contribute to this loss of habitat for what could otherwise be open areas for native vegetation to grow.

In addition to the effects on vegetation at or near park sites, statewide or even global loss of habitat or ecosystem changes related to development or pollutants have resulted in the designation of vegetative communities as vulnerable to extinction or imperiled and in more immediate risk of extirpation. In some cases, such as the American holly forest, Gateway is one of the last remaining known locations for a particular vegetation association. For these communities, impacts across their range have been and continue to be substantial and adverse. Preventing or limiting access to some of the areas where this vegetation grows (Sandy Hook dunes, holly forest) likely has had noticeable localized benefits in maintaining these rare vegetative communities in a relatively undisturbed state. Removing invasive species or allowing visitor use in other locations results in imperceptible beneficial or adverse contributions to cumulative impacts. Coordinating with New York City to plant native species and to restore marsh island vegetation has had and would continue to have a noticeable beneficial effect on saltmarsh.

Finally, predicted increases in sea level rise as well as projected increases in temperature, extreme precipitation and storm intensity could each have cumulative adverse impacts on vegetation. Sea level rise is associated with increased shoreline erosion and loss of intertidal marine or estuarine habitat, as well as with salt water intrusion into ground and surface water. Each of these could change vegetative composition, as could simple increase in inundation of marsh species that are normally only covered during high tides. Ultimately, this can change the range of some species, as can changes in temperature. Invasive species are also known to fare better in changing temperature or other harsh environmental conditions and may outcompete native ones and increasingly threaten them as climate change progresses (Columbia University 2009). More intense storms can alter tidal marsh vegetation and damage freshwater wetlands or maritime forest ecosystems at the park.

Implementing the approved sand stabilization plan at Plumb Beach would have localized benefits for beach and dune vegetation, but upland vegetation would continue to experience adverse effects from trampling.

Conclusion

Jamaica Bay Unit

Implementing the approved sand stabilization plan at Plumb Beach would have localized benefits for beach and dune vegetation, but upland vegetation would continue to experience adverse effects from trampling. Off-trail visitor use at Floyd Bennett Field would continue adverse impacts from trampling, but invasive species control *(Phragmites)* would have benefits for marsh vegetation here, at Dead Horse Bay, and at Bergen Beach. Adverse impacts from disturbance by horses and contamination by manure would continue at Bergen Beach. Heavy use at park sites from Canarsie Pier through Hamilton Beach Park would continue to adversely affect native plant species. Restoration work at the Pennsylvania Avenue and Fountain Avenue Parks would have potential localized benefits for native saltmarsh, shrubland, and maritime forest vegetation. Restricting visitor use at marsh islands in the Jamaica Bay Wildlife Refuge may have widespread beneficial impacts by protecting saltmarsh vegetation from trampling. Allowing the West Pond to remain breached would have localized beneficial impacts on saltmarsh. Localized benefits to vegetation at Fort Tilden would occur from removing invasive species and planting native ones. Current management to minimize visitation and therefore trampling of vegetation at Breezy Point Tip would be beneficial for vegetation, although adverse localized impacts on dune vegetation related to surf clubs and the visitor use of Breezy Point Tip do occur.

Continuing to work with the NYDEC to build marsh islands would have widespread benefits for saltmarsh vegetation, as could continued efforts to remove *Phragmites* from wetland areas. Because these wetland areas are rare and important systems, this kind of large-scale improvement could provide significant benefits. Otherwise, impacts on vegetation from ongoing management in this unit are not likely to be significant because they do not affect unique vegetation or vegetation considered a fundamental resource by the park.

Staten Island Unit

Restricting visitor access at Hoffman and Swinburne Islands may have localized beneficial impacts on vegetation by preventing trampling. Groins and a dike to keep beach sand in place at Miller Field may provide localized benefits to coastal vegetation by maintaining habitat. Removing invasives and planting native species at Great Kills Park would have localized beneficial impacts on vegetation here. Managing Crooke's Point as a natural area would help keep habitat available for vegetation; this is a potential localized beneficial impact. An existing outfall pipe keeps natural sand transport from bring sediment to Great Kills Park beaches, and erosion is having an adverse impact on habitat for mudflat and saltmarsh. Impacts on vegetation from ongoing management in this unit are not likely to be significant because they do not affect unique vegetation or vegetation considered a fundamental resource by the park.

Sandy Hook Unit

Limiting access to the northern dunes at Sandy Hook and to nesting areas for shorebirds may have localized benefits for rare dune and shrub vegetation associations. The same is true for the very rare holly forest. Removing invasive species would have additional beneficial effects, particularly for tidal marsh vegetation. If these removals are widespread, benefits could be significant because freshwater marsh is unique and potentially part of imperiled vegetation associations. Because the holly forest is considered a fundamental resource, its ongoing protection may also provide benefits that are localized but significant. Inconsequential localized adverse effects on surrounding vegetation may occur during the repair of beach centers.

Past land use practices, urban development, dredging and filling, and current pollutants have contributed to altered ecosystems, including the vegetation component, at the park. Development and loss of habitat on a state or global scale have also threatened the viability of several vegetative communities that exist at the park. Current practices of limiting access to some of these areas at Gateway may have had noticeable or even appreciable localized benefits in maintaining these communities. Removing invasive species and overall visitor use would have imperceptible adverse or beneficial impacts compared to cumulative adverse effects on vegetation.

In sum, continuing park management under alternative A would have localized beneficial and adverse impacts on vegetation, with possible significant benefits from restoration efforts at Jamaica Bay. Some park management actions may have had noticeable or even appreciable offsetting effects on the significant adverse cumulative impacts to unique vegetation.

Development and loss of habitat on a state or global scale have also threatened the viability of several vegetative communities that exist at the park. Current practices of limiting access to some of these areas at Gateway may have had noticeable or even appreciable localized benefits in maintaining these communities.

Common to Both Action Alternatives

Impacts of Alternatives B and C

The discussion of impacts at park sites includes relevant zoning proposed in the action alternatives. The most important zones for vegetation are the Natural Zone and a Sensitive Resources Subzone. Natural Zones are open and undeveloped areas managed to preserve natural resources while allowing for the enjoyment of the outdoors and nature. Moderate use is expected at centralized activity areas or points of entry, but visitors and programs are oriented toward appreciation of the natural world. The Sensitive Resources Subzone of the Natural Zone is applied to ensure that resources receive the highest level of protection, scientific investigation, and monitoring. Public access is restricted to minimize impacts, and restoration efforts are focused in these areas.

Jamaica Bay Unit

Plumb Beach

Both action alternatives would zone ~~the interior of~~ this park site as a natural area, although alternative C would go further by applying the Sensitive Resources Subzone to some wetlands and shrublands. Beach erosion would be controlled and natural beach and dune habitats would be maintained in both alternatives, and access to some natural areas controlled. Each of these could have localized beneficial impacts on vegetation at the site.

Floyd Bennett Field

Both action alternatives would zone a large area of Floyd Bennett Field known as the North Forty as a natural area, although the alternatives differ in the additional area each would zone as natural. In the North Forty, both alternatives would soften the shoreline and recreate a connection between the land and Jamaica Bay that would ultimately result in saltmarsh and marine associations growing on the site. Both would also construct inland freshwater wetlands and open freshwater areas in the North Forty. Although the acreage of wetlands, saltmarsh, and open water habitat differs between alternatives, both would result in at least 50 acres of wetlands. Given the dramatic loss of saltmarsh and freshwater wetlands in the Jamaica Bay region, as described in other sections of the GMP/EIS, and the designation of Floyd Bennett Field natural area (presumably including its vegetative communities and wildlife) as a fundamental resource of the park, creating 50 acres of functional wetland could result in substantial beneficial impacts on natural vegetation.

Like the no-action alternative, both action alternatives anticipate continuing to manage the grassland in the interior of the park site for wildlife habitat. This would have no impact on vegetation.

Development shared by alternatives B and C includes creating the JBSRI, a multimodal transportation hub, new maintenance areas, increased access, and increased security. Some of these could be new facilities and some would reuse existing historic structures. Those that require new building or increased footprint of existing buildings (if any) would have the potential to result in the removal of native vegetation.



Bergen Beach

Although the action alternatives zone Bergen Beach differently, both do include a large portion of natural area. Controlling erosion and protecting fringe wetlands would have localized benefits to these vegetative communities.

Canarsie Pier through Hamilton Beach Park

Both action alternatives would zone the shoreline east and west of Canarsie Pier as natural. Although recreational use would be increased at Canarsie Pier, it would not affect vegetation along the shoreline east and west of the pier. Both alternatives B and C would enhance native vegetation, protect wetlands, and improve habitat conditions along the shoreline areas, with localized benefits for vegetative communities, particularly shoreline saltmarsh.

Both alternatives would zone the Pennsylvania Avenue and Fountain Avenue Parks for recreation and community activities and anticipate some level of use of the former landfills to generate power. To the extent that this includes the development of new facilities, trails, and gathering spots and installing solar panels, transmission lines, or other energy-related equipment, existing and potentially newly planted native species may need to be removed, with localized adverse impacts.

Spring Creek, Frank Charles Memorial Park, and Hamilton Beach Park would each be developed to accommodate more visitor use than is currently the case. If development occurs in vacant areas in an already well-used area, impacts on vegetation may be inconsequential. Both action alternatives would also continue invasive species control and improve natural resource conditions at Spring Creek, and both anticipate restoring wetlands and shorelines, including by planting native vegetation at Frank Charles Memorial and Hamilton Beach Parks. This could result in localized beneficial impacts beyond those under no action.

Jamaica Bay Wildlife Refuge

Zoning at this park site for both action alternatives would be a mix primarily of Natural Zone and Sensitive Resources Subzone, ~~although both would leave the northern tip and developed areas as Recreation Zones.~~ Both action alternatives anticipate leaving West Pond breached until a study is completed under a more regional effort to reestablish freshwater wetlands. As noted in the no-action alternative, the immediate impacts of leaving the pond breached would be beneficial, particularly for saltmarsh species. Reestablishing a freshwater wetland that is more typical of those present before dredge and fill operations to create the Jamaica Bay Wildlife Refuge and artificially fill East and West Ponds could have substantial localized benefits for this vegetative community that go beyond those from retaining it as saltmarsh.

In addition to these site-specific actions, both alternatives B and C anticipate a greater commitment to working with agency, academic, NGO, and private partners to improve water quality and hydrologic, vegetation, and wildlife conditions in Jamaica Bay. Although a coordinated effort between the NPS and New York City has already resulted in substantial benefits to saltmarsh vegetation, additional coordinated research, application of results, funding, and decision making could dramatically increase benefits.

Jacob Riis Park

This park site would be zoned as recreation in both action alternatives, with an additional Community Activity Subzone in alternative B and a small natural area in alternative C. Both action alternatives would continue the use of this park site for recreation, including active beach uses, sports and recreation, visitor amenities, etc. However, both alternatives would entail the NPS working with New York City to discuss removing impediments to natural sediment-transport processes along the park sites on the Rockaway barrier spit, an action that could dramatically improve beach and dune habitat for vegetation associations requiring this habitat should discussions be successful. This is a potentially substantial, more widespread benefit for vegetation.

Fort Tilden

Both alternatives would zone a portion of the central part of this park site as natural, but differ in other ways described below under each alternative. Efforts to restore sand transport at Jacob Riis would also benefit beach and dune vegetation at Fort Tilden, which has been substantially damaged by Hurricane Sandy. Protection of dunes and beaches as they are restored over time from the impacts of visitor use would also be a beneficial and localized impact on vegetation. Both alternatives include some common development at Fort Tilden, such as an improved trail system and trails in the backcountry. Without careful planning, trails could result in the removal of relatively rare backdune or shrubland vegetation and/or increased access to these areas and with it the potential for off-trail use and trampling, a potential adverse and localized impact.

Breezy Point Tip

All alternatives include a commitment to keep Breezy Point Tip in a relatively undeveloped and natural condition. The zoning under alternatives B and C would include a large section of Sensitive Resources Subzone; the shores would be zoned as natural. Recreational activities would not change, and beach club cabanas would be stabilized and used to support recreation. Impacts on vegetation from the use of the beach would not change.

Staten Island Unit

Fort Wadsworth

Actions proposed at this park site that are common to alternatives B and C would not affect native vegetation.

Hoffman and Swinburne Islands

The NPS has chosen to keep sensitive resources subzoning at both Hoffman and Swinburne islands for both alternatives B and C; therefore no actions common to both B and C would affect these park sites. ~~Both action alternatives would zone Hoffman Island as a Sensitive Resources Subzone, but differ in the zoning at Swinburne Island. No actions common to alternatives B and C would affect these park sites.~~

Miller Field

Both action alternatives would zone most of this park site as Community Activity Subzone, although both also leave the beach area as natural. Both alternatives would improve the trail system in this park site's swamp white oak forest with more clearly delineated trail areas, a localized beneficial impact for this vegetation association. However, they would also add trails, play features, etc. that could bring additional visitors to the site, with the potential for increased off-trail trampling. Because the forest seems to be able to regenerate under current uses, many of which are off trail, this impact would likely be inconsequential. Both alternatives also include efforts to restore the beach and dune vegetation and minimize trampling by providing a distinct trail onto Miller Field from the beach. This would have localized beneficial impacts for dune vegetation. Both alternatives also anticipate a closer working relationship with adjacent landowners to restore natural sand transport processes. Given that sand is currently trapped by groins and a constructed dike, the degree of impact of restoring natural sand transport on beach or dune habitat for vegetation is unknown, although it would be beneficial for beach and dune species and associations.

Great Kills Park

Both alternatives zone the saltmarsh and coastal area of Great Kills Park largely as natural, ~~although alternative C also applies the~~ with some areas of Sensitive Resources Subzone here. Both also zone Crooke's Point as natural, with the interior maritime forest at the point as a Sensitive Resources Subzone only under alternative C. Rebuilding the Great Kills Park marina may require the removal of some submerged vegetation, with localized adverse impacts. Both alternatives include discussions with adjacent landowners to attempt restoration of natural sand transport processes. If successful, this action could improve current shoreline conditions along the park site coastline, with localized benefits for saltmarsh and intertidal mudflat vegetation near the existing wastewater outfall, and dune and beach vegetation along the remaining area. All alternatives include continuing the remove invasive and plant native species as described under no action.

Sandy Hook Unit

Zoning over much of Sandy Hook is natural, with interior forests and important rare dune grassland and shrubland vegetation at the north end as a Sensitive Resources Subzone. Following public comment and consultation with the US Fish and Wildlife Service, the NPS has also agreed to broaden the area zoned as Sensitive Resource Subzone at the north end of Sandy Hook, restricting access over much of the year to just that led by NPS rangers. While this is primarily aimed at protecting wildlife, it will also help in keeping impacts to Sandy Hook's unique vegetation minimized. A shoreline of Spermaceti Cove is also a Sensitive Resources Subzone in both alternatives~~.~~,an action that will limit or completely restrict visitors in sensitive marine areas. Both alternative B and C anticipate consolidating maintenance functions at Sandy Hook. If this involved a new structure, adverse localized impacts on vegetation from excavation and grading and the removal of soils and plants would occur. Both alternatives anticipate expanding camping in the existing youth campground at Sandy Hook. The campground is located in or near maritime successional forest, a rare vegetative community. Some localized adverse impacts are possible, particularly if tent pads or other

facilities require the removal of this vegetation. Additional more site specific analysis of these proposed activities may result in additional mitigation.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Jamaica Bay Unit

Plumb Beach

Alternative B would zone the coastline of Plumb Beach for low-impact recreation and would act as a new orientation portal to the park. Beach uses would continue as they are under Alternative A and a formalized trail through the remainder of the site established to minimize the use of social trails. The delineation of a trail would help in eliminating impacts of social trails and trampling on vegetation at the site, a localized beneficial impact. ~~and would include orientation, neighborhood connection, and new visitor amenities. Orientation and increased visibility of a delineated access route could have beneficial impacts on inland vegetation, which is currently trampled with multiple footpaths, although the placement of facilities would have potential localized adverse impacts.~~

Floyd Bennett Field

Alternative B would include ~~additional space zoned as~~ natural areas in the central portion of this park site but would include more recreation area surrounding Dead Horse Bay than alternative C. Although both alternatives anticipate additional development at Floyd Bennett Field, including a wetlands center, the center in alternative B would include an education center, trails and boardwalks, outdoor classrooms, observation facilities, interpretive media, and education exhibits. Alternative B ~~would also include~~ proposes a wider range of accommodations at this park site than alternative C, including more tent and recreational vehicle (RV) camping as well as cabins and a possible hotel in an existing historic building. These actions would likely require the removal of at least some vegetation. Although soils are not natural at Floyd Bennett Field, some rare native vegetation associations, including successional maritime forest and northern bayberry dune shrubland, grow here. An area maintained by mowing for rare grassland wildlife species in the center of the site may be perceived as open space for recreational use by campers, with impacts from trampling, soil compaction and erosion as a result. Careful planning could avoid impacts on these vegetative communities, but loss of natural vegetation, even of more common associations, would still be adverse. The addition of day use visitors ~~In addition, bringing more visitors~~ to Floyd Bennett Field would increase the potential for loss of vegetation from trampling, a localized adverse impact. Alternative B would also include the removal of some paved areas and "greening" of runways, a localized benefit if planted with native species.

Bergen Beach

Alternative B would zone Bergen Beach primarily as natural, with a small Recreation Zone. Limiting horses to existing trails would help reduce impacts on vegetation related to trampling. However, impacts on soils and indirectly on vegetation from manure and

increased unwanted nutrients would remain. The staging area for water-based sports could have localized adverse impacts on saltmarsh and the creation of a new trail to provide fishing access could require the removal of a small amount of vegetation.

Canarsie Pier through Hamilton Beach Park

All alternatives would zone and treat Canarsie Pier and surrounding vegetation the same. Alternative B would zone Spring Creek and the Pennsylvania Avenue and Fountain Avenue Parks for recreation and community activities, with a variety of visitor amenities including trails, bathrooms, observation platforms and view decks, and a large gathering place. To the extent that this development would require the removal of existing and potentially newly planted native species, it would result in localized adverse impacts.

Alternatives B and C are identical at Frank Charles Memorial and Hamilton Beach Parks. ~~At Spring Creek, no~~ No new actions beyond those described in the "Common to Both Action Alternatives" section would occur.

Jamaica Bay Wildlife Refuge

Although both action alternatives would zone this park site the same, alternative B anticipates increasing current nature-based and water-based recreation and a building connection with the JBSRI at Floyd Bennett Field. Neither of these changes in programming would affect vegetation.

~~Alternative B also anticipates allowing access to select islands in Jamaica Bay, including for backcountry camping at Canarsie Pol and for interpretation at Big Egg. Although vegetation at Canarsie Pol is primarily human-modified woodland, which may be less vulnerable to impacts from trampling, Big Egg is vegetated with saltmarsh and North Atlantic Coast estuarine intertidal mudflat. These latter associations may be more susceptible to degradation from human use, and possible localized adverse impacts from increasing interpretive activities here would be possible.~~

Jacob Riis Park

Alternative B would result in a number of programming changes that would not change impacts on vegetation. However, removing hard ball courts on one side of the park and making it a more natural area to improve resiliency to coastal storms could have a slight benefit for beach or dune vegetation.

Fort Tilden

In addition to zoning the central portion and bay coast of Fort Tilden as natural, alternative B would create a Recreation Zone area to the west. This area is vegetated in grasslands, dune, and dune shrublands that could be rare because Fort Tilden includes several state or globally vulnerable or imperiled vegetation associations. Alternative B plans new lodging, a variety of camping opportunities, and additional open space areas for visitors. Although coastal processes occur and dunes would be protected from visitor use until they are demonstrably able to tolerate impact, increasing the development and use of the area's

backcountry in this Recreation Zone and Natural Zones could have substantial localized impacts on rare maritime dune or shrub vegetative communities. Additional visitation and use of the site would also increase the potential for trampling or loss of soils from erosion, with indirect loss of vegetation as a result. This is particularly true because vegetation at this park site is currently relatively undisturbed. Native vegetation here is in excellent condition, and much of it is rare at the state or global level. Impacts from the loss of native vegetation through development of visitor-related amenities or use could be substantial and adverse, although they would also be small in scale. Careful siting of tent pads, trails, cabins, and other facilities in relatively undeveloped areas and signs, fences, or other means to protect adjacent rare vegetation could mitigate these impacts.

Breezy Point Tip

Impacts on vegetation under alternative B would be the same as described for alternative A, and for actions common to alternatives B and C.

Staten Island Unit

Fort Wadsworth

Several new activities and development of facilities, including community activity areas, lodging, and camping, would be included as part of alternative B. Camping closer to the coast or even on the coast would be possible, because alternative B would zone the shoreline facing New York Bay as a recreation area. This action would have the potential to result in the removal of some natural dune or beach vegetation, a localized adverse impact. Other actions, particularly those that take place in the more developed portions of Fort Wadsworth, would not affect native vegetation.



Hoffman and Swinburne Islands

Alternative B has been modified following public comments to eliminate a dock and visitor access. Therefore no impacts to vegetation at these park sites from alternative B are anticipated. ~~Alternative B would allow for the possibility of a dock and visitor access to Hoffman Island. Impacts on vegetation from trampling may occur, with inconsequential impacts on native vegetation because much of this island is disturbed.~~

Miller Field

Impacts are identical for alternatives B and C and are described in the "Common to Both Action Alternatives" section.

Great Kills Park

Alternative B would zone the interior of Great Kills Park as a recreation area, with trails, discovery zones for youth, and potential camping, biking, and hiking. Because this part of the park is already vegetated with nonnative lawns and covered in *Phragmites*, this programming change would be unlikely to have more than inconsequential localized adverse impacts on native vegetation.

Sandy Hook Unit

As noted above in actions common to alternatives B and C, the NPS has agreed to broaden the area zoned for protection of sensitive resources at the northern area of Sandy Hook. Although the park is considering adding camping on both the bay and beach sides of Sandy Hook, all measures described in the final GMP/EIS and the Gateway Shoreside Management Plan (NPS 2009e) apply to any selected alternative. These measures may restrict the location, configuration and operation of camping, particularly those on the beach side and near piping plover nesting habitat. Additional planning and/or NEPA documentation and public involvement would be required to determine whether beach camping is ultimately approved. Additional and related facilities, such as new and expanded trails, ~~Alternative B would include less Natural Zone, less Sensitive Resources Subzone, and more of the beach in the central and southern portion used as recreation areas than alternative C. New and expanded trails,~~ boating launch sites, camping facilities, and interpretive programs would be created. Direct connections between Fort Hancock and North Beach would be created and buildings at Fort Hancock would be used for lodging, food, tours, and interpretive programming. A direct connection between Fort Hancock and North Beach would need to be sited carefully to avoid removal of important saltmarsh, shrub, and dune vegetation, but would nonetheless have adverse localized impacts on vegetation from both development of the trail and potential off-trail use and trampling. On the bay side, an area ~~considered part of the Ruins Subzone on the southern end of Horseshoe Cove~~ in alternative C would be zoned as recreation in alternative B. The trail network ~~at Horseshoe Cove~~ would be expanded and new camping areas would be created if future planning indicates it can be sited without adverse impacts to sensitive resources. Water-based recreation would also be expanded. At the same time, access to sensitive or rare habitats, including some rare vegetation associations, would be controlled, and beach nourishment on the bayside would take place to slow shoreline erosion. Much of this rezoned area is currently brackish meadow, and careful planning and siting of camping areas and associated facilities would be needed to avoid adverse impacts on this rare vegetation association. Impacts on vegetation from increased development and use would be adverse and localized, and in addition to affecting brackish meadow, could adversely impact other rare vegetation, such as saltmarsh or maritime forests. ~~Beach camping including the use of yurts or cabins would become available in the Recreation Zone. These sites would be located primarily in North Atlantic upper ocean beach habitat, which is home to listed and rare plant and animal species at the park. Very careful planning and the use of exclosures, buffers, and other measures to avoid impacts on these species would be required to avoid substantial impacts on rare vegetation associations or rare plants.~~ Impacts on beach and dune vegetation would also increase from trampling and use, with localized adverse impacts.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative B) on vegetation are the same as described under alternative A. However, alternative B would have the potential for more intensive contributions to adverse cumulative impacts from increased development, such as at Fort Tilden or Sandy Hook, for example. Given the rarity of the potentially affected vegetative communities, these contributions could be noticeable. The same is true of benefits, because alternative B

would include the creation of the JBSRI and expanded coordination efforts (which would have the potential for baywide beneficial impacts on saltmarsh vegetation), as well as the creation of saltmarsh and freshwater marsh habitat at Floyd Bennett Field and the potential for freshwater wetlands to be created in a more natural way than West Pond at the Jamaica Bay Wildlife Refuge. In addition, alternative B calls for discussions to restore natural sand transport processes at sites along the Rockaway barrier spit and along the Staten Island shoreline, which could result in substantial and widespread restoration of beach and dune habitat and their accompanying vegetative communities. Over time, these actions would have noticeable and even appreciable beneficial offsetting effects on the cumulative adverse impacts on vegetation that have occurred and continue to occur from sources outside the park.

Conclusion

Alternative B would entail the NPS working with adjacent landowners to remove impediments to natural sediment transport processes at several park sites, an action that could dramatically improve beach and dune habitat for vegetation associations requiring this habitat. This would be a possibly significant benefit for beach and dune systems named as fundamental resources. Controlling beach erosion at Plumb Beach would have potential localized beneficial impacts, as could better delineation of a path through upland vegetation to the beach. Visitor-related amenities and/or accompanying increases in visitor use could have localized adverse impacts on vegetation at ~~Plumb Beach,~~ Bergen Beach, the Pennsylvania Avenue and Fountain Avenue Parks, Floyd Bennett Field, and Fort Tilden. Careful planning to avoid impacts on rare vegetation, particularly at Fort Tilden, would be needed because impacts on rare vegetation associations here could be considered significant without it. Restoring and/or building wetlands at Floyd Bennett Field could have significant beneficial impacts on vegetation, as could potentially recreating natural freshwater wetlands in the West Pond area at Jamaica Bay Wildlife Refuge, because freshwater wetlands are so rare. Increasing partnering for research and applying findings to jointly restore marsh islands could have widespread and substantial benefits for saltmarsh. Because these resources are fundamental (natural areas of Jamaica Bay Wildlife Refuge, submerged lands of Jamaica Bay), benefits would be considered significant. Efforts to control erosion and protect wetlands at Bergen Beach or Canarsie Pier and efforts to control invasive species and plant native species at several Jamaica Bay Unit park sites would have localized beneficial impacts. Protection from trampling by keeping areas with rare vegetation associations at Breezy Point closed to visitors has had beneficial impacts.

Adverse impacts from increasing coastal camping at Fort Wadsworth or increasing use of Miller Field ~~or allowing visitors to use Hoffman Island~~ would be localized and minor. Restoring natural sand transport at Great Kills Park could provide localized benefits for dune, beach, or mudflat vegetation. Beneficial impacts from directing visitors away from beach and dune vegetation at Miller Field could occur under both alternatives B and C.

Increased camping and trails at new Sandy Hook bayside sites, trails connecting Fort Hancock and North Beach, and increased water-based recreation on the bay side could result in the removal of and localized adverse effects on rare vegetation, including saltmarsh and brackish meadow. Restricting access to rare forest habitat, maintaining very limited access to

the north part of Sandy Hook, and controlling bayside shore erosion would have beneficial impacts. Beach camping could remove habitat otherwise available to listed plant (and animal) species and is discussed in more detail in "Species of Special Concern."

Past land use practices, urban development, dredging and filling, and current pollutants have contributed cumulative impacts and altered ecosystems, including the vegetation component, at the park. Development and loss of habitat on a state or global scale have also threatened the viability of several vegetative communities that exist at the park.

In sum, Alternative B would have significant beneficial impacts on park vegetation and localized adverse impacts that would require careful planning to prevent them from becoming significant. Alternative B could contribute noticeable adverse impacts to cumulative significant impacts to vegetation from development in the area, as well as noticeable or appreciable cumulative benefits from saltmarsh restoration and the creation of freshwater wetlands.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

No changes to larger-scale actions identified under alternative A or actions common to both action alternatives, such as increased collaboration on research and actions to restore Jamaica Bay habitat or to continue approved or ongoing sand replacement efforts, would occur specific to alternative C.

Jamaica Bay Unit

Plumb Beach

~~Although alternative C would include different development than alternative B,~~ The impacts on vegetation ~~from development~~ would be the same as described for alternative B. Alternative C would include a Sensitive Resources Subzone overlay and designated natural area of part of the eastern portion of Plumb Beach, more intensive natural area restoration, and coastal habitat enhancement. Restricting access to the upland area of this part of Plumb Beach could have substantial localized benefits for shrublands and forest vegetation.

Floyd Bennett Field

Zoning in alternative C would include a large historic area maintained in the center of this park site, as well as increased natural area zoning around Dead Horse Bay. Alternative C would include a lesser degree of development of visitor facilities than alternative B, and a larger created area of saltmarsh and freshwater wetlands. New built visitor facilities would be minimized and would be concentrated in pockets. This would help avoid any rare vegetation associations and likely would result in only inconsequential impacts on native and/or rare vegetative communities. As in alternative B, creating new wetlands, particularly freshwater wetlands and/or high quality saltmarsh, would have substantial beneficial impacts. The building of an anaerobic digester could have localized adverse impacts if it

requires a new facility and removal of native vegetation. If the park chooses to relocate equestrian use to Floyd Bennett Field, it would increase the potential for spread of exotic invasive vegetation from horse manure.

Bergen Beach

Zoning at Bergen Beach would be primarily Natural Zone. Equestrian use would be discontinued, with potential localized benefits to vegetation from reduced disturbance and nutrients in the soils of upland vegetation and water around saltmarsh or intertidal beach habitat.

Canarsie Pier through Hamilton Beach Park

All the alternatives would zone and treat Canarsie Pier, Frank Charles Memorial, and Hamilton Beach Park, ~~and Spring Creek~~ the same. However, at Spring Creek alternative C would include more extensive habitat enhancements in saltmarsh and forested areas, with potential localized benefits. Alternative C would zone the Pennsylvania Avenue and Fountain Avenue Parks for recreation, and visitor amenities would be diminished. Although impacts on vegetation may be less than under alternative B, they would still be localized and adverse.

Jamaica Bay Wildlife Refuge

Minor changes in alternatives ~~C~~ from existing conditions, such as expanding the East Pond trail system, would have potential localized adverse impacts on vegetation. ~~Limited and guided boat access to Canarsie Pol and Ruffle Bar could result in trampling of vegetation, with localized impacts, but requiring park guides would keep impacts to a minimum. Similar to alternative B, u~~Using the JBSRI to expand partnerships to research and restore habitats in Jamaica Bay would have the potential for significant benefits to saltmarsh, eelgrass, and other important vegetation. ~~Alternative C also anticipates~~ Both alternatives anticipate a more holistic examination of freshwater wetlands in the Jamaica Bay Unit to determine whether and where additional habitat should be created, a potential additional benefit beyond that from studying West Pond ~~in alternative B~~.

Jacob Riis Park

Zoning of this park site under alternative C would be primarily for recreation, although an area on the eastern border would be zoned as natural. Facility development would be less than under alternative B, with more open space and nature-oriented play and skills areas. Additional “softening” of the area by removing paved or hardened surfaces would occur relative to alternative B. Some benefits to vegetation by making habitat available would be possible.

Fort Tilden

Additional natural area zoning relative to alternative B, including a portion of the natural area zoned to protect sensitive resources, would occur under alternative C. Less development and only low-impact, moveable camping facilities like pods or removable tent pads would be

allowed in the backcountry. Some of the dune and upland vegetation associations described as rare would be protected from the impacts of human use by the Sensitive Resources Subzone overlay. Impacts would be adverse and localized, but substantially less severe than under alternative B, although if equestrian use is relocated to Ft. Tilden, it could increase the potential for adverse impacts from the spread of exotic invasive vegetation through seeds in manure.

Breezy Point Tip

Impacts and zoning would be nearly the same as described above for other alternatives, except that alternative C would include greater efforts to protect and enhance habitats at Breezy Point Tip. This difference would potentially provide important beneficial impacts for some of the rare vegetation associations at the site, including coastal salt pond marsh and Northeastern Atlantic brackish interdunal swale, because these communities are currently open to investigation by visitors, including those on over-sand vehicles accessing Breezy Point Tip for fishing.



Staten Island Unit

Fort Wadsworth

No coastal camping is proposed in alternative C, and other activities would not affect natural vegetation.

Hoffman and Swinburne Islands

Impacts would be as described for alternative A: vegetation would remain relatively undisturbed by visitors, but is already heavily disturbed from past land use practices.

Miller Field

Impacts would be as described in the section "Common to Both Action Alternatives."

Great Kills Park

Zoning of the interior section of Great Kills Park would be natural under alternative C, and land along the coast and the park's northeast corner would be overlaid with a Sensitive Resources Subzone. The interior, which is currently ball fields and *Phragmites*-dominated marsh, would be left natural with some trails and camping. These changes from current conditions could have a localized adverse impact on vegetation. However, alternative C would also include efforts to restore beach, dune, and upland vegetation beyond the invasive species control and native species planting currently taking place, a localized benefit to vegetation.

Sandy Hook Unit

Alternative C would include a larger area zoned as natural as well as comparable sensitive resources subzone overlays as in alternative B. ~~as well as additional Sensitive Resources~~

~~Subzone overlays compared to alternative B~~. All of Spermaceti Cove would be zoned for the protection of sensitive resources, and much of the central/southern oceanfront (except for beach areas B, C, and D; see maps of recreational use in chapter 1 for locations) would be zoned as natural. Impacts from development would be the same as described above in the "Common to Both Action Alternatives" section. Under alternative C, efforts to protect beach, dune, saltmarsh, and the holly forest would be increased, a potentially widespread (e.g., across the unit) and important benefit for these vegetative communities.

Creating wetlands at Floyd Bennett Field could have significant beneficial impacts on vegetation, as could studying and establishing freshwater wetlands where they are most ecologically appropriate across the Jamaica Bay Unit. Increasing partnering for research and applying findings to jointly restore marsh islands could have widespread and significant benefits for saltmarsh.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative C) on vegetation are the same as described under alternative A. Alternative C would contribute localized adverse impacts from some small-scale development at park sites like Fort Tilden or Sandy Hook, but these would be localized and imperceptible relative to cumulative impacts from sources outside the park. Benefits could be more noticeable, because alternative C would include the creation of the JBSRI, which has the potential for baywide beneficial impacts on saltmarsh vegetation, as well as the creation of saltmarsh and freshwater marsh habitat at Floyd Bennett Field and the potential for freshwater wetlands to be studied for all of Jamaica Bay and created where they would be most beneficial. Alternative C calls for discussions to restore natural sand transport processes at sites along the Rockaway barrier spit and along the Staten Island shoreline, which could result in substantial and widespread restoration of beach and dune habitat and their accompanying vegetative communities. It would also include intensive habitat protection of unique vegetative communities at Sandy Hook, Breezy Point Tip, and Fort Tilden. The combination of these actions would have noticeable and even appreciable beneficial offsetting effects on the cumulative adverse impacts on vegetation that have occurred and continue to occur from sources outside the park.

Conclusion

Controlling beach erosion at Plumb Beach would have potential localized beneficial impacts, as could restricting access to upland vegetation. Visitor-related amenities and/or accompanying increases in visitor use could have localized adverse impacts on vegetation at ~~Plumb Beach,~~ Bergen Beach, the Pennsylvania Avenue and Fountain Avenue Parks, Floyd Bennett Field, and Fort Tilden, but impacts would be less than those associated with alternative B. Creating wetlands at Floyd Bennett Field could have significant beneficial impacts on vegetation, as could studying and establishing freshwater wetlands where they are most ecologically appropriate across the Jamaica Bay Unit. Increasing partnering for research and applying findings to jointly restore marsh islands could have widespread and significant benefits for saltmarsh. Intensive protection of unique vegetative communities at Sandy Hook, Breezy Point Tip, and Fort Tilden, including restricting visitor access, could maintain these communities in a relatively undisturbed condition, a localized or even widespread benefit. Efforts to control erosion and protect wetlands at Bergen Beach or Canarsie Pier and to control invasive species and plant native species at several Jamaica Bay Unit park sites would have localized beneficial impacts.

Restoring natural sand transport at Great Kills Park could provide localized benefits for dune, beach, or mudflat vegetation. Additional efforts to restore beach, dune, and upland

associations under alternative C would result in additional benefits for vegetation at this park site. Beneficial impacts from directing visitors away from beach and dune vegetation at Miller Field could occur under either alternative B or C.

Minor development would have localized adverse effects at Sandy Hook on some vegetation, such as at existing campgrounds. Maintaining existing restrictions and adding protection measures including closures to protect unique vegetative communities would have additional, potentially more widespread benefits for vegetation at this park site.

Past land use practices, urban development, dredging and filling, and current pollutants have contributed cumulative impacts such as altered ecosystems, including of the vegetation component, at the park. Development and loss of habitat on a state or global scale have also threatened the viability of several vegetative communities that exist at the park.



In sum, Alternative C would have significant beneficial impacts on park vegetation and localized adverse impacts that would are less likely than in Alternative B to become significant. Alternative C could contribute imperceptible adverse impacts to cumulative significant impacts to vegetation from development in park sites with rare vegetative communities, as well as noticeable or appreciable cumulative benefits from saltmarsh restoration and the creation of freshwater wetlands.

Wildlife

Laws and Policies

Marine wildlife is regulated by laws and policies described in the "Marine Resources" section in this chapter.

The Migratory Bird Treaty Act of 1918 prohibits killing, capturing, buying or selling, or importing or exporting migratory birds, eggs, feathers, or other parts. Harassment or habitat modification resulting in the direct loss of birds, eggs, or nests is also prohibited.

The NPS *Management Policies* 2006 indicate that parks are to take actions to maintain natural population fluctuations and processes that influence the dynamics of individual animal populations, communities, and migratory animal populations in parks (NPS 2006a, section 4.4.1.1).

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on wildlife using agency reports, the scientific literature, and information about habitat in each park unit. Because wildlife species are mobile for the most part, the analysis assesses impacts by habitat and types of wildlife in park unit rather than by individual park site. It also focuses on larger issues and differences between alternatives for that reason.

Resource-specific contexts for assessing the impacts of the alternatives on wildlife include the following:

- Wildlife is not separately named as a fundamental resource of the park.

- Because the surrounding area is highly urbanized with little natural habitat remaining, the park represents a high percentage of available habitat for some species.

- Natural areas at Breezy Point Tip, Crooke's Point, Floyd Bennett Field, Great Kills Park, Hoffman and Swinburne Islands, Jamaica Bay Wildlife Refuge, and Sandy Hook are named as fundamental resources.

- The region in which the park is located is situated such that it funnels migratory species both from the east to the west and from the south to the north into the New York Bight and New York Bay, making it a unique area for some wildlife.

Alternative A: No Action

Impacts of Alternative A

Jamaica Bay Unit

Continued visitor use, occupation of reused buildings, and operation of visitor and other facilities in several park sites at the Jamaica Bay Unit disturb wildlife and may displace them from otherwise suitable habitat. This is true of Floyd Bennett Field's developed area, camping and environmental education center, and trails; of visitor use at all beach sites (Plumb, Bergen, Jacob Riis Park, Fort Tilden, and Breezy Point Tip) and local neighborhood park sites (Canarsie Pier through Spring Creek); and of the Jamaica Bay Wildlife Refuge.

Implementing the approved sand stabilization plan at Plumb Beach would increase the extent, stability, and quality of beach and dune habitat, with benefits for horseshoe crabs and other marine or intertidal wildlife. Atlantic ribbed mussels and other shellfish would experience slight benefits from the addition of habitat from new groins installed in this effort. Visitors accessing Plumb Beach and off-trail use at Floyd Bennett Field would result in trampling of shrub and forest vegetation, with impacts on upland invertebrates, small mammals, and upland birds.

Invasive species control *(Phragmites)* would benefit marsh wildlife at Floyd Bennett Field, Dead Horse Bay, and Bergen Beach. Maintenance of the grassland at Floyd Bennett Field through mechanical means (primarily mowing) would continue, with localized benefits for grassland nesting birds, including horned lark, eastern meadowlark, upland sandpiper, savannah sparrow, northern harrier, American kestrel, and common barn owl. Many of these species also depend on Floyd Bennett Field grasslands for overwintering, as do short-eared owls and rough-legged hawks. Historically, the Jamaica Bay and Long Island region was thought to contain some of the largest contiguous grassland habitats east of the Mississippi River (Drennan 1981, as cited in NYCDEP 2007). Although the 140-acre grassland at Floyd Bennett Field is artificially maintained by mowing, it is extremely rare as remaining large grassland habitat in the New York City area. Its unique character and ability to support wildlife that would otherwise not be present in the park in more than an incidental way provides substantial benefits for grassland species.

Restoration work at the Pennsylvania Avenue and Fountain Avenue Parks would have potential localized benefits for native saltmarsh, shrubland, and maritime forest vegetation and the wildlife that use these habitats, including waterbirds, upland small and medium-sized mammals, reptiles, and insects.

Continuing to restrict visitor use at marsh islands at Jamaica Bay Wildlife Refuge may have widespread beneficial impacts by protecting saltmarsh and nesting waterbirds, which are only able to successfully nest on islands and away from predators.

Allowing the West Pond to remain breached would have localized beneficial impacts for saltmarsh bird species. However, freshwater wetlands were once numerous in the watershed, including those at Fresh Creek, Paerdegat Creek, Bergen Creek, and Hassock Creek, supporting a diverse association of macroinvertebrates, fish, and amphibians that attracted larger predatory birds, reptiles, and mammals. Freshwater wetlands are critical habitat for many species of native wildlife, providing breeding grounds for amphibians like salamanders, which can spend one or two years in the water before emerging as an adult, and several species of frogs and toads, including wood frogs *(Rana sylvatica),* northern spring peepers, and Fowler's toads (NYCDPR 2013). The park has reintroduced some of these species, as well as snakes and snapping turtles, to freshwater habitat at Jamaica Bay Wildlife Refuge. Birds, such as red-winged blackbirds *(Agelaius phoeniceus)* and yellow warblers *(Dendroica petechia),* and mammals like muskrats also require freshwater wetland habitat. In addition to housing these native species, freshwater wetlands also provide resting, breeding, and feeding grounds for hundreds of thousands of migrating birds, including for many species of ducks, geese, swans, grebes, herons, ibis, egrets, and loons. Freshwater wetlands in the Jamaica Bay watershed are now almost completely gone, covering less than 1 percent of the 224,000 acres of New York City area they did historically (USACE and PA 2009). As noted in other areas of this GMP/EIS, the sources of freshwater to Jamaica Bay are heavily polluted, and for the most part consist of wastewater treatment effluent and combined sewer outfalls. Before it was breached, West Pond provided 45 acres of freshwater habitat. Given the scarcity of this habitat in the watershed, a decision to leave it breached will likely mean a substantial adverse localized adverse impact on freshwater wetland-dependent species.

Continuing to work with New York Department of Environmental Conservation to build marsh islands would have potential substantial and widespread benefits for saltmarsh vegetation and the species that depend on it. As explained in the "Wildlife" section in chapter 3, these islands are used by at least 326 species of birds, and provide nesting habitat for colonial nesting waterbirds, including herons, ibis, and egrets, as well as shorebirds like common terns and the only nesting colony of laughing gulls in the state of New York. The islands support populations of aquatic invertebrates including shellfish as well as waterfowl and seabirds. The islands also provide important stopover habitat for migratory shorebirds, which feed in the saltmarsh and on mudflats at low tide, as well as at East and West Ponds and on beaches. Plovers, sanderlings, and sandpipers all use these habitats extensively on their migrations in the fall, as does the state-listed red knot in the spring, a species that depends on horseshoe crab eggs for nutrition during its migration. Well over 250,000 individuals of 32 species of ducks have been recorded in a single year using habitat at Jamaica Bay (USFWS 1997b). The partnership between the NPS and New York Department of Environmental Conservation has already resulted in the creation of over 130 acres of saltmarsh island habitat and would continue to restore additional habitat as funding and

staff are available. This is a substantial benefit for wildlife that is also widespread, extending across the bay.

The park has also set several objectives for clean-up of Jamaica Bay that would result in improved water quality and aquatic habitat conditions for fish and other species. Many species of fish in danger of becoming overfished have essential fish habitat located in Jamaica Bay, Sandy Hook Bay or offshore of Staten Island (see the "Wildlife" section of "Affected Environment" for species specific information). In Jamaica Bay, the target of clean-up efforts in the partnership between the park and New York Department of Environmental Conservation in this alternative, whiting, red hake, winter flounder windowplane flounder, black sea bass, summer flounder and several species of sharks lay eggs or mature larvae or juveniles. Improving water quality is a key step in creating and maintaining aquatic habitat for these species. In addition, it would help in facilitating the restoration of key aquatic life including oysters, eelgrass and scallops. The park has conducted numerous surveys, experimentation and planning for restoring these species, which are considered a central part of an ecological web that includes upwards of 150 species of algae, single celled animals, invertebrates, fish and birds and provide protection to marshes and dampen wave energy (NPS 2010b).

Management by the park of Fort Tilden and Breezy Point Tip as relatively undisturbed areas has preserved dune, shrub, forest, and even offshore habitats. Less human use also means wildlife is less likely to be disturbed or displaced by noise or sensitivity to human presence. Both of these park sites are host to large numbers of migrating raptors during the spring, and grasslands and shrublands at Fort Tilden offer habitat for a number of songbird species. In addition to its use by migrating hawks and owls, Breezy Point Tip also has excellent shorebird habitat, used by multiple sensitive or listed shorebird species as well as waterfowl and upland passerine birds. Breezy Point Tip also provides nesting habitat for terrapins. Maintaining these park sites to preserve natural characteristics is beneficial for wildlife, and it may allow particularly species that are particularly sensitive to human disturbance and therefore rare in the region to occupy habitat at both park sites.

Staten Island Unit

Restricting visitor access at Hoffman and Swinburne Islands is likely to have been highly beneficial for colonial wading birds that nest here, including herons, ibis, and egrets, as well as for harbor seals, which are winter visitors. Recreationists can disrupt foraging, social behavior, feeding animals, and communication and can cause energy losses and reduced nesting success in some species. Birds nesting in dense colonies can be particularly vulnerable to disturbance (Burger et al. 2010). Scientific literature reports that birds alter their behavior by taking flight (flushing), increasing vigilance, and changes in daily activities such as feeding or foraging (Borgmann 2011). When a nesting bird flushes or leaves the nest, it expends energy and leaves eggs or chicks unguarded and vulnerable to predation or the effects of weather. If the adult birds are unable to make up the energetic loss, they can become malnourished and unable to withstand severe weather or eventually to migrate. Nesting success and productivity also are reduced. The distance at which a bird flushes varies by species, time of year, type of approach, reproductive stage, time of day, previous

encounters with people, density of human activity, and body condition (Burger et al. 2010). Those that flush when a disturbance, such as a person on foot or in a boat, is farther away are considered more sensitive. This sensitive group includes many of the species that nest or are related to nesting species at Hoffman and Swinburne Islands, as well as marsh islands in Jamaica Bay, such as great egret, snowy egret, great blue heron, and common loon (Borgmann 2011). Harbor seals are also easily disturbed by humans (NPS 2010h).

Other actions in the Staten Island Unit that may affect wildlife include efforts to keep a beach and dune system in place at Miller Field, and efforts at Great Kills Park to control invasive species and plant native species. These actions improve habitat for wildlife, a localized beneficial impact.

Sandy Hook Unit

The bay shoreline of Sandy Hook is mostly vegetated with saltmarsh associations and provides habitat for shellfish, finfish, estuarine and marine invertebrates, and migratory and wintering concentrations of birds, as well as for nesting terrapins. Uplands at Sandy Hook also are used by insects, reptiles, passerine birds, and mammals. Harbor seals also haul out in areas of Sandy Hook. Sandy Hook supports some of the highest concentrations of beach-nesting birds in the entire New York Bight coastal region, including federally listed piping plovers and several other state-listed or rare species of shorebirds, gulls, and wading birds. It is also important as a site for migrating raptors to rest and feed, including at grasslands in the Fort Hancock area. Ospreys and other birds nest in the trees of maritime forests at Sandy Hook. Current management at this park site includes restricting access to some areas in the northern portion of this unit as well as to the very rare maritime holly forest. These restrictions help maintain the diversity and quantity of wildlife, although use of the area, such as for sunbathing, surfing, fishing, camping, reuse of Fort Hancock buildings, etc., may keep wildlife from occupying additional space or increasing in number.

In the vicinity of the park, impacts on wildlife have included loss of habitat from urban development, contamination of soils and surface waters, invasive species, predation, and human disturbance.

Cumulative Impacts

Wildlife species in the park are parts of populations that have experienced impacts that may stretch along an entire migration route or be confined to the local area. In the vicinity of the park, impacts on wildlife have included loss of habitat from urban development, contamination of soils and surface waters, invasive species, predation, and human disturbance. Climate change has affected habitat for wildlife, from changing temperature regimes to sea-level rise and related changes in storm surge, groundwater characteristics, and salinity in large embayments such as Jamaica Bay. Impacts from many of these factors are not just historical but ongoing and likely to worsen in the future. Additional adverse cumulative impacts on wildlife habitat are characterized in other sections of this chapter of the GMP/EIS, such as "Wetlands and Floodplains," "Vegetation," and "Marine Resources."

Much of the shoreline at Gateway is considered to be highly or very highly vulnerable to flooding and loss from climate change. Simple inundation as the sea level rises could affect low marshland habitat, with indirect impacts on shorebirds, fish, and some reptiles that use this habitat. Storm surge from projected increasingly frequent and/or severe storms



associated with climate change could result in drowning of small mammals and other vertebrates in coastal wetlands, including from inundation of the nests of terrapins, plovers, and other beach or foredune nesting species. Inlets or overwash can increase salinity in freshwater habitats that are usually protected by dunes, resulting in the loss of ponds, palustrine wetlands, or other important freshwater habitat that is extremely rare in the park. These changes in habitat quality and changes in climate can also leave open a window for increases in invasive species at the park. For example, mild winters may favor nonnative species such as ticks, mosquitoes, and fire ants over native species adapted for cooler weather. Temperature-related range changes could also result in mistimings between food sources and migrating species and redistribution of species into and away from park habitats (Columbia University 2009).

Although the park posts entry restrictions, the park is large and rangers cannot be at all locations all the time. This means visitors sometimes enter areas where wildlife habitat, rare species or other sensitive resources exist. Crushing, disturbance, poaching or loss of habitat can result.

Beneficial cumulative actions affecting wildlife by improving habitat conditions include multiphased programs to address impacts of wastewater and combined sewer/stormwater flows into Jamaica Bay, landfill closures, and other restoration projects by NYCDEP and other agencies (NYCDEP 2007; USACE and PA 2009).

Implementing alternative A would contribute imperceptible adverse cumulative impacts on wildlife from continued visitor use and other activities that disturb wildlife, such as park operations and maintenance. Restricted visitor access to relatively natural areas at Breezy Point Tip, Sandy Hook, and Fort Tilden contributes noticeable beneficial cumulative impacts for migrating birds, nesting shorebirds, terrapins, and other wildlife species. Working with NYCDEP to restore marsh island habitats at Jamaica Bay has noticeable beneficial impacts for marsh-dependent species such as nesting colonial wading birds, shorebirds, and gulls. Research conducted under the auspices of the JBSRI would also provide potential noticeable localized benefits by increasing understanding about how to improve the resiliency of wildlife in the face of climate change impacts. Allowing West Pond to remain breached could have noticeable adverse cumulative impacts on freshwater wetland–dependent wildlife.

Conclusion

Visitor use disturbs wildlife, and facilities related to visitor use or park operations may displace wildlife from otherwise available habitat. This is true in most park sites. However, management of large natural areas at other sites, such as Breezy Point Tip, Fort Tilden, and portions of Sandy Hook, minimize disturbance to wildlife and have allowed these locations to become habitat for sensitive species. Both the adverse and beneficial effects from allowing and restricting visitor use may be significant, as wildlife is an important component to these natural areas, named as fundamental park resources.

Park management to stabilize or improve wildlife habitat by invasive species control, beach nourishment, or restricted visitor access at several park sites would result in localized benefits. Maintenance of grasslands at Floyd Bennett Field, Fort Hancock, and Fort Tilden would provide substantial benefits for grassland-nesting birds as well as for migrating

raptors. Although the 140-acre grassland at Floyd Bennett Field is artificially maintained by mowing and is not a designated fundamental resource, it is extremely rare as remaining large grassland habitat in the New York City area and is valuable for its ability to support wildlife that would otherwise not be present in the park in more than an incidental way. Benefits may be significant for wildlife because of these factors.

Keeping visitors off marsh islands in Jamaica Bay and Hoffman Island could have substantial and even significant benefits for sensitive species, and in particular for colonial-nesting waterbirds. Keeping West Pond breached may have short-term beneficial impacts on saltmarsh species but substantial or even significant adverse impacts on freshwater wetland–dependent wildlife. Continuing to restore marsh habitat in Jamaica Bay would likely continue to provide substantial and possibly significant benefits for saltmarsh-dependent birds such as nesting waterbirds, ducks, and other waterfowl, as well as migratory shorebirds and fish that depend on Jamaica Bay as a nursery or shellfish that use it as habitat.

Cumulative impacts on wildlife include substantial habitat loss, contamination of soils and surface waters, invasive species, predation, human disturbance, and climate change. Climate change is expected to worsen and adversely affect wildlife by inundation from sea-level rise, destruction of habitat and drowning during coastal storms, and contamination of fresh groundwater and surface water through inlets and overwash. Warmer temperatures are expected to increase the competitive advantages of invasive species, wildlife moving north as temperatures increase, and mistimings between food sources and migrating species. Beneficial impacts from restoration efforts by New York Department of Environmental Conservation and others would offset some of these adverse effects.

Implementing alternative A would contribute imperceptible adverse cumulative impacts on wildlife from human activities and noticeable beneficial effects by continuing to keep several sites in a natural and relatively undisturbed condition. Working with NYCDEP to restore marsh island habitats at Jamaica Bay would have noticeable beneficial impacts for marsh-dependent species such as colonial-nesting wading birds, shorebirds, and gulls. Research conducted under the auspices of the JBSRI would also provide potential noticeable localized benefits by increasing understanding about how to improve the resiliency of wildlife in the face of climate change impacts. Allowing West Pond to remain breached could have imperceptible beneficial impacts on saltmarsh wildlife but noticeable adverse cumulative impacts on freshwater wetland–dependent wildlife.

In sum, Alternative A would result in significant adverse and beneficial impacts, which are likely to have both noticeable adverse and beneficial contributions to significant adverse cumulative impacts that currently affect park wildlife.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Jamaica Bay Unit

Controlling beach erosion at Plumb Beach would have potential localized beneficial impacts on coastal wildlife, including horseshoe crabs, as would better delineation of a path through upland vegetation to the beach. Currently, visitors access the beach through this upland

vegetation, and defining a clear path would minimize disturbance to upland birds and small mammals. Increasing visitor-related amenities and/or the accompanying rise in visitor use could have localized adverse impacts from disturbance at ~~Plumb Beach,~~ Bergen Beach, the landfill sites, Floyd Bennett Field, and Fort Tilden. Limiting visitor access around new moon and full moon high tides during May and June would help mitigate impacts on horseshoe crabs from additional visitation. As noted in the discussion of alternative A, the grasslands at Floyd Bennett Field and Fort Tilden are particularly beneficial for wildlife, including ground-nesting birds and migrating raptors. Both alternatives call for increases in visitor-related facilities for activities such as camping and outdoor education, and would include the reuse of existing buildings. These changes would both directly impact wildlife species by removing habitat and indirectly affect them by increasing noise and human activity. Parking for special events at Floyd Bennett Field along runways could interrupt normal movements of the state listed Savannah sparrow during breeding season.

Creating wetlands and open water habitat at Floyd Bennett Field is also an action alternatives B and C share, although the acreage may be different. As noted in the description of impacts from alternative A, freshwater wetlands are particularly scarce at the park, although they were once an integral and widespread component of the ecosystem. Saltmarsh is also critical wildlife habitat, and the park has committed to restoring saltmarsh islands in Jamaica Bay. Both alternatives call for restoring over 100 acres of wetland and fresh or marine open water habitat through reestablishing connections with Jamaica Bay or constructing inland freshwater habitats. This is likely to provide substantial benefits for wetland-dependent species.

Efforts to control erosion and protect wetlands at Bergen Beach or Canarsie Pier and to control invasive species and plant native species at several Jamaica Bay Unit park sites would have localized beneficial impacts by improving the quality of wildlife habitat.

Both action alternatives anticipate leaving West Pond breached until a study is completed as part of a more regional effort to reestablish freshwater wetlands. The immediate impacts of leaving the pond breached would be beneficial for saltmarsh species, and reestablishing a freshwater wetland that is more typical of those present before dredge and fill operations to create the Jamaica Bay Wildlife Refuge and artificially fill East and West Ponds could have substantial benefits for wildlife that go beyond those from retaining it as saltmarsh. Because less than 1 percent of freshwater wetlands at Jamaica Bay remain, the benefits of creating more natural freshwater wetlands at the Jamaica Bay Wildlife Refuge could be particularly important.

In addition to these site-specific actions, both alternatives B and C anticipate a greater commitment to working with agency, academic, NGO, and private partners to improve water quality and hydrologic, vegetation, and wildlife conditions in Jamaica Bay. Although a coordinated effort between the NPS and New York City has already resulted in substantial benefits to saltmarsh-dependent wildlife, additional coordinated research, application of results, funding, and decision making could dramatically increase benefits. Benefits to fish and other wildlife from this increased effort would be greater than those from coordinated restoration under alternative A.

Staten Island Unit

Leaving the beach area and swamp white oak forest at Miller Field as a more natural area, as well as delineating a route from the beach through the park site, could provide localized benefits for wildlife. Restoring natural sand transport at Miller Field or Great Kills Park could provide localized benefits for dune, beach, or mudflat wildlife.

Sandy Hook Unit

Both alternatives B and C anticipate management of the northern part of Sandy Hook as it is now--that is, access during the nesting season would be very limited and would always be accompanied by NPS personnel. ~~Very few changes to Sandy Hook are common to alternatives B and C.~~ Restricting access to interior forests, rare dune grassland and shrubland vegetation at the north end, and a shoreline of Spermaceti Cove and continuing to fence shorebird nesting habitat during nesting season would have localized benefits for some wildlife species. Expanding camping in the existing youth campground at Sandy Hook could increase disturbance to wildlife in the vicinity, with localized adverse impacts.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Jamaica Bay Unit

Alternative B includes substantially more development of Floyd Bennett Field for visitor-related activities than alternative C. In some cases, such as with camping and a wetlands center, new facilities are likely to be needed, resulting in the removal of vegetation and potential wildlife habitat with adverse localized impacts. However, the development of Floyd Bennett Field would be expected to bring in hundreds of thousands of additional visitors over those who currently visit the site. Paved areas and existing buildings would be expected to experience heavy use as well. These additional people, cars, night lighting, and noise would disturb and likely displace some wildlife, with adverse impacts over much of this park site. Increased access to fishing in many park sites of the Jamaica Bay Unit could have localized adverse impacts on fish. Avoiding important habitat like the grasslands or saltmarsh areas at Floyd Bennett Field could help minimize direct impacts from habitat loss. Removing some paved areas and "greening" them with grass, shrubs, or trees could have beneficial impacts for wildlife by increasing habitat.

Alternative B calls for restricting equestrian use at Bergen Beach to existing trails only; this could have localized benefits for dune or beach wildlife by eliminating direct trampling of individuals and trampling of habitat. At the Pennsylvania Avenue and Fountain Avenue Parks, using land for visitor amenities would mean the loss of wildlife habitat and increases in disturbance to upland wildlife here.

Allowing visitor access to Canarsie Pol (on a very limited basis, accompanied by NPS personnel) or to Big Egg Island would have the potential for impacts on herons, ibis, or other wading birds, as well as on saltmarsh-dependent species. Impacts would be similar in type to those described in alternative A (for Hoffman Island). Herons and egrets also prefer



nesting in vegetation with intact structural elements (G. Phillips, NYC Audubon pers. comm., 2013) and may be adversely affected by trampling from visitors to Canarsie Pol or Big Egg Islands. However, allowing interpretation of the Big Egg restoration project could also result in unknown long-term benefits on wildlife through visitor education. Restricting access so that it does not take place from March 15 through August 31 would mitigate visitor-related impacts on herons or other wading birds nesting on saltmarsh islands in Jamaica Bay. Alternative B plans new lodging, camping, environmental education, and development of the parade ground and reuse of buildings to bring many new daytime and overnight visitors to Fort Tilden and the adjacent Jacob Riis Park. Grassland habitat here is used by birds and small mammals and is a source of resting and food for migrating raptors. Shrublands are also used by passerines, and the splash zone at this park site has been noted for its potential diverse marine invertebrate fauna (Rowan 2012). Vegetation here is also in relatively undisturbed condition and is likely to provide higher-quality habitat for upland species. New development could both remove habitat and bring additional disturbance for wildlife at Fort Tilden, a potentially more serious localized adverse impact than at other more altered sites like Jacob Riis Park.

Staten Island Unit

The primary proposed activity at this unit under alternative B that could impact wildlife is the use of Hoffman Island for visitors. Although NPS considered this addition in early planning, it has been rejected because of its potential for impact to wildlife. Because this decision is based on impacts to birds, the analysis in the FEIS of what would have been the impact from visitation to Hoffman Island remains, although it is now most germane to boating close to the island's shore. Alternative B also anticipates blueways along the coast of both Hoffman and Swinburne Islands. ~~Before making a decision, the park would study the potential for impacts on wildlife, including on heron rookeries and harbor seals, in more detail. However,~~ As noted in the impacts discussion for alternative A, wading birds like herons, ibis, and egrets are considered species sensitive to human disturbance, as are harbor seals. A summary of literature on flushing distances (Borgmann 2011) found the average distance at which common loons flushed when a non-motorized boat approached was 167 feet, breeding great blue herons flushed at 88 feet and nonbreeding great blue herons at 325 feet, great egrets flushed at 118–167 feet, and snowy egrets flushed at 265 feet. Flushing distances when faced with people on foot were also recorded for some of these species: 104 feet for great blue herons, 98 feet for great egrets, 88 feet for snowy egrets, and 102 feet for black-crowned night-herons. Several studies also noted that beaches where there were recreationists but that were otherwise appropriate habitat consistently had fewer individuals and fewer species of shorebirds. These studies also suggested buffer sizes, which ranged from 270 feet for great blue herons to 715 feet for common loons for boats, and were generally around 300–350 feet for most species for approaching on foot. If these or similar buffers for visitors in boats ~~or on foot~~ are honored, impacts on wildlife from using Hoffman Island would be minimized. ~~In addition, the park is likely to mitigate impacts from visitation by closing the island to human access during the nesting period from March 15 to August 31 to protect nesting by herons and other wading birds on Hoffman Island.~~ Even boating closer than distances noted by Borgmann (for some species as far as 700 feet, for others in the 267 foot range) could result in potentially substantial impacts on energetics,

resilience and nesting success of birds on either island. Future planning and decision making on any restrictions such as buffers would take place through the Marine and Estuarine Resource Management Plan as described in the "Alternatives" chapter of this GMP/EIS. ~~Otherwise, impacts on energetics, resilience, and nesting success of birds on the island could be substantial.~~

Sandy Hook Unit

Development of facilities and amenities, including trails, boat launch sites, and camping, are proposed in alternative B. At the same time, access to sensitive or rare habitats, including some rare vegetation associations, would be controlled, and beach nourishment on the bayside would occur to slow shoreline erosion. The northern part of Sandy Hook, Spermaceti Cove shoreline and much of beach side not used now for recreation would be zoned for resource protection with very limited access possible. ~~Camping and trails in the Horseshoe Cove area could require removal of saltmarsh habitat or result in indirect impacts from erosion.~~ The bayside of Sandy Hook in the Spermaceti Cove area is an important feeding/ resting area for a wide variety of shorebirds, waterfowl and diamondback terrapins, as well as harbor seals in the winter and spring (G. Phillips, NYC Audubon pers. comm., 2013). On the ocean site, ~~yurts or cabins~~ any additional camping adjacent to beaches where unique shorebirds nest could add to existing impacts from visitors. These species are known to be especially sensitive to humans (see "Species of Special Concern" section of this chapter) and impacts on these shorebirds could be especially adverse. Careful siting and more site specific analysis of impacts of campgrounds and trails could avoid more substantial impacts, but saltmarsh, shrub, dune, or maritime forest habitat could still be removed. In addition, an influx of visitors, including overnight visitors, would disturb wildlife and if sustained could displace them. Several commenters on the public draft of the GMP/EIS indicated visitors violate closures, including of rare holly forest or red-cedar forest habitat, an activity that could disturb similarly rare wildlife such as barrel owl for example.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative B) on wildlife are the same as described under alternative A. However, alternative B would have the potential for more intensive contributions to adverse cumulative impacts from habitat loss associated with increased development, such as at Fort Tilden or Sandy Hook, or from boating too close to Hoffman, Swinburne or Jamaica Bay marsh islands. ~~allowing visitor use of marsh islands or Hoffman Island, than alternative A.~~ The same is true of benefits, because alternative B includes the creation of saltmarsh and freshwater wetland habitat, increased efforts to restore Jamaica Bay saltmarsh and improve water quality, research into how to increase wildlife resiliency in the face of climate change and the potential for holistic freshwater wetlands created in appropriate locations in the Jamaica Bay Unit, all of which would have noticeable or appreciable beneficial offsetting impacts for cumulative impacts on wildlife habitat in the Jamaica Bay watershed. Adverse impacts from alternative B are unlikely to be more than imperceptible compared to existing cumulative adverse impacts on wildlife.

Conclusion

Increasing the visitor-related amenities and/or accompanying increases in visitor use could have localized adverse impacts from disturbance at ~~Plumb Beach,~~ Bergen Beach, the Pennsylvania Avenue and Fountain Avenue Parks, Floyd Bennett Field, and Fort Tilden as well as localized impacts to fish populations at several park sites . Controlling beach erosion at Plumb Beach could benefit coastal species, and delineating a path through upland vegetation would reduce disturbance of wildlife. Efforts to control erosion and protect wetlands at Bergen Beach or Canarsie Pier and to control invasive species and plant native species at several Jamaica Bay Unit park sites would have localized beneficial impacts by improving the quality of wildlife habitat. Alternative B anticipates leaving West Pond breached while the park studies how best to create freshwater wetlands in the Jamaica Bay Unit. This benefits saltmarsh-dependent wildlife in the short term, and could offer substantial and even significant benefits for freshwater species in the long term. This is because freshwater wetlands were once abundant and integral parts of many wildlife species' habitats but are now extremely rare in the watershed. Because the natural area of Floyd Bennett Field is a designated fundamental resource and wetlands are a unique and important habitat in the New York City area, substantial and even significant benefits are also possible from the creation of saltmarsh and freshwater wetland habitat at Floyd Bennett Field under either action alternative. Establishing the JBSRI and working with additional partners to research and apply the results to restore the Jamaica Bay ecology would have widespread and substantial benefits for wildlife in this park unit. Because natural areas of Jamaica Bay Wildlife Refuge are fundamental resources and freshwater wetland habitat is both natural and important to the area and is now unique because of cumulative losses, the benefits to shellfish, finfish and other wildlife from this expanded coordination would be considered significant even compared to those from coordinated restoration under alternative A.

Substantial facility development and increased visitor use in Floyd Bennett Field and Fort Tilden, as well as at Sandy Hook and at the newly planted former landfill sites in the Jamaica Bay Unit, would have the potential for adverse localized impacts on wildlife. These increases would add to existing possibly significant adverse impacts to wildlife from existing visitation but because wildlife are already displaced from human activities would be unlikely to have substantial additional impacts. ~~The exceptions to this are if visitors are allowed at Canarsie Pol, Big Egg Island, and Hoffman Island, where they are currently restricted. If so, nesting birds could be disturbed by visitors in boats or on foot, with possible substantial localized adverse impacts on energy reserves or nesting success.~~ Because natural areas at ~~Hoffman Island and~~ Jamaica Bay Wildlife Refuge (including its marsh islands) are named as fundamental resources and nesting rookeries are rare, impacts from increased access and nearby visitation could be potentially significant for herons and other wading birds. Measures such as buffers and closures during nesting would substantially mitigate these impacts.

Localized benefits for wildlife from managing park sites as natural areas in both the Staten Island and Sandy Hook Units and restoring sand transport processes to the Great Kills Park coast would occur under alternative B.

The development of facilities and amenities at Sandy Hook under alternative B could adversely affect wildlife by removing habitat and bringing additional visitors and human disturbance. This is true of planned changes on both the bay and ocean side; those on the ocean side could particularly affect feeding or nesting rare shorebirds.

Cumulative impacts on wildlife include substantial habitat loss, contamination of soils and surface waters, invasive species, predation, human disturbance, and climate change. Climate change is expected to worsen and adversely affect wildlife by inundation from sea-level rise, destruction of habitat and drowning during coastal storms, and contamination of fresh groundwater and surface water through inlets and overwash. Warmer temperatures are expected to increase the competitive advantages of invasive species, wildlife moving north as temperatures increase, and mistimings between food sources and migrating species. Beneficial impacts from restoration efforts by New York Department of Environmental Conservation and others would offset some of these adverse effects. Implementing alternative B would contribute imperceptible adverse cumulative impacts on wildlife and noticeable or appreciable beneficial cumulative impacts by research into how to increase wildlife resiliency in the face of climate change and creating saltmarsh and freshwater wetland habitat and restoring critical elements of a healthy Jamaica Bay ecology.

In sum, alternative B would have significant beneficial impacts for wildlife but could also have significant adverse impacts from opening areas to visitors. In the context of the significant cumulative impacts facing wildlife, alternative B would contribute imperceptible adverse and noticeable or appreciable beneficial impacts.

Protection and enhancement of rare habitat at Breezy Point could also continue to provide or improve habitat quality and reduce the potential for human disturbance or displacement of wildlife.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Generally, impacts on wildlife from facilities development and use and from increased visitation would be somewhat reduced under alternative C compared to alternative B, although they would still be greater than under alternative A and would result in localized adverse impacts on wildlife related to habitat loss and disturbance. This is true for Floyd Bennett Field, Bergen Beach, sites from Canarsie Pier through Hamilton Beach Park, Jacob Riis Park and Fort Tilden, and Sandy Hook.

Jamaica Bay Unit

Beneficial impacts on wildlife from creating wetlands at Floyd Bennett Field could be greater under alternative C than alternative B, because additional created acreage is proposed. As in alternative B, benefits to wildlife could be considered significant from this action. Actions such as studying the potential for creating freshwater wetlands over much of the unit and leaving West Pond breached until findings are finalized and applied would have short-term benefits for saltmarsh-dependent wildlife and possibly significant long-term and more widespread benefits for freshwater species, as in alternative B. Establishing the JBSRI and working with partners to jointly research and apply the findings to restore habitats in Jamaica Bay would likely have significant and widespread benefits for aquatic and saltmarsh species, as it would under alternative B.

Decisions to eliminate equestrian use at Bergen Beach or to restrict access to the upland area of Plumb Beach, to increase efforts to restore habitat at Plumb Beach or at park sites from Canarsie Pier through Hamilton Beach Park, or to eliminate some hardened shoreline at Jacob Riis Park would each have localized benefits by improving the quality of habitat or reducing disturbance.

Protection and enhancement of rare habitat at Breezy Point Tip could also continue to provide or improve habitat quality and reduce the potential for human disturbance or displacement of wildlife. In addition to being an important resting and feeding site for migratory birds, Breezy Point Tip provides shorebird nesting habitat for several species of special concern, as well as a number of rare vegetative communities. Increasing protection of these areas and working to improve habitat quality could provide substantial localized benefits for wildlife.

Staten Island Unit

Impacts from alternative C on wildlife would either be the same as under the no-action alternative (at Fort Wadsworth and Hoffman and Swinburne Islands) or as described for actions common to alternatives B and C (Miller Field), with the exception of Great Kills Park. Areas of this park site are currently closed for radium ~~radon~~ remediation, but have been used in the recent past for sports and recreation. Alternative C would zone these areas as natural and restrict visitor use to walking trails and some camping. It would also restore beach, dune, and upland vegetation at this park site, with potential benefits for wildlife habitat.

Sandy Hook Unit

Alternative C would add a protective subzone for many of the areas in Sandy Hook, including Spermaceti Cove and much of the central/southern oceanfront. These and other important wildlife areas at Sandy Hook (including shorebird nesting locations in the north and along the central/southern coast, as well as saltmarsh and rare vegetative communities along Horseshoe Cove and Spermaceti Cove and American holly or other maritime forest associations) would be kept as natural areas and become the sites for targeted restoration efforts. Protection and restoration would be greater than is currently the case, with potential localized beneficial impacts on wildlife.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative C) on wildlife are the same as described under alternative A. Alternative C may contribute imperceptible adverse impacts from small-scale habitat loss associated with increased development and visitor use. The beneficial contribution of alternative C would be the same as for alternative B, and includes research into how to increase wildlife resiliency in the face of climate change, the creation of saltmarsh and freshwater wetland habitat, increased efforts to restore Jamaica Bay saltmarsh and improve water quality, and the potential for holistic freshwater wetlands created in appropriate locations in the Jamaica Bay Unit. Each of these actions would have noticeable or appreciable beneficial offsetting impacts for cumulative impacts on wildlife habitat in the Jamaica Bay watershed.

Conclusion

In alternative C, increasing the visitor-related amenities and the accompanying rise in visitor use could have localized adverse impacts from disturbance at Plumb Beach, Bergen Beach, the Pennsylvania Avenue and Fountain Avenue Parks, Floyd Bennett Field, and Fort Tilden. Controlling beach erosion at Plumb Beach could benefit coastal species, and delineating a path through upland vegetation would reduce disturbance of wildlife. Efforts to control erosion and protect wetlands at Bergen Beach or Canarsie Pier and to control invasive species and plant native species at several Jamaica Bay Unit park sites would have localized beneficial impacts by improving the quality of wildlife habitat. Alternative C anticipates leaving West Pond breached while the park studies how best to create freshwater wetlands in the Jamaica Bay Unit. This would benefit saltmarsh-dependent wildlife in the short term, and could offer substantial and even significant benefits for freshwater species because freshwater wetlands were once abundant but are now extremely rare in the watershed. The same is true for saltmarsh and freshwater wetland habitat that would be created at Floyd Bennett Field. Establishing the JBSRI and working with additional partners to research and apply the results to restore the Jamaica Bay ecology would have widespread and significant benefits for fish and other wildlife in this park unit. Protection and restoration efforts at Breezy Point Tip could result in continuation of current beneficial impacts on wildlife or localized habitat improvement.

Small-scale facility development and increased visitor use in Floyd Bennett Field and Fort Tilden, as well as at the newly planted Pennsylvania Avenue and Fountain Avenue Parks in the Jamaica Bay Unit, would have the potential for adverse localized impacts on wildlife under alternative C.

Localized benefits for wildlife from managing park sites as natural areas in both the Staten Island and Sandy Hook Units and restoring sand transport processes to the Great Kills Park coast would occur under alternative C. Additional protection for rare habitats or habitats used by unique shorebirds at Sandy Hook would result in localized benefits for wildlife.

Cumulative impacts on wildlife include substantial habitat loss, contamination of soils and surface waters, invasive species, predation, human disturbance, and climate change. Climate change is expected to worsen and adversely affect wildlife by inundation from sea-level rise, destruction of habitat and drowning during coastal storms, and contamination of fresh groundwater and surface water through inlets and overwash. Warmer temperatures are expected to increase the competitive advantages of invasive species, wildlife moving north as temperatures increase, and mistimings between food sources and migrating species. Beneficial impacts from restoration efforts by New York Department of Environmental Conservation and others would offset some of these adverse effects. Implementing alternative C would contribute imperceptible adverse cumulative impacts on wildlife and noticeable or appreciable beneficial cumulative impacts by research into how to increase wildlife resiliency in the face of climate change and creating saltmarsh and freshwater wetland habitat and restoring critical elements of a healthy Jamaica Bay ecology.

The Jamaica Bay Unit includes known locations for several state-listed plants, including Schweinitz's flatsedge at Floyd Bennett Field in sandy, windblown dune sites, and yellow flatsedge in wetter sandy sites, including along the shores of coastal ponds. Species in sandy coastal locations, including old field or other grasslands at park sites in the Jamaica Bay Unit, include southern arrowwood and cut-leaved evening-primrose.

In sum, alternative C would have significant beneficial impacts for wildlife and localized adverse impacts from facility development and increased visitor use. In the context of the significant cumulative impacts facing wildlife, alternative B would contribute imperceptible adverse and noticeable or appreciable beneficial impacts.

Species of Concern

Laws and Policies

Threatened and endangered species are protected by the federal Endangered Species Act, as well as by statutes in both New Jersey and New York. NPS *Management Policies* 2006 also contains language directing parks to protect listed or rare species (NPS 2006a).

The purpose of the federal Endangered Species Act of 1973 (7 USC 136; 16 USC 460 et seq.) is to conserve the "ecosystem upon which endangered and threatened species depend" and to conserve and recover listed species. This act requires all federal agencies to consult with the Secretary of the Interior on all projects and proposals having potential adverse impact on federally endangered and threatened plants and animals. The two bureaus of the Department of the Interior that conduct this consultation are the U.S. Fish and Wildlife Service (USFWS) and, if the species is marine or anadromous, NOAA–Fisheries. If the GMP/EIS analysis finds that the preferred alternative "may affect" a listed species or its critical habitat, a separate biological assessment is submitted for USFWS review and concurrence before a "take" (e.g., an impact that harms or kills an individual) is permitted. If none of the effects is considered "adverse" as defined by the Endangered Species Act, no further consultation is required. However, if an adverse effect exists, formalized consultation with the USFWS or NOAA–Fisheries begins and mitigation or constraints to ensure that the species is not jeopardized added to the preferred alternative. No finding regarding "take" is required for listed plant species, although an assessment of whether an action would put an entire species of listed plants in jeopardy is required. The USFWS may also decide that a programmatic review under section 7(a)(1) of the Act is more appropriate and that site specific consultation for future actions are required. That is the case for this GMP/EIS, as described by the USFWS letter to the park dated March 10, 2014 in Appendix C.

NPS *Management Policies* 2006 states that parks are to both proactively conserve and prevent detrimental effects on native listed species or their habitat in park units (NPS 2006a, section 4.4.2.3). In addition to species listed under the federal Endangered Species Act, parks are to inventory other native species of special management concern (such as rare, declining, sensitive, or unique species) and manage them to maintain natural distribution and abundance. This includes state- or locally listed species, which are to be managed in a manner as similar as possible as that for federally listed species.

Both New Jersey and New York have passed laws regulating management and treatment of endangered species. New Jersey has a law that regulates wildlife (New Jersey Endangered and Nongame Species Act of 1973 [NJSA 23:2A-13]) and another that governs plants (New Jersey State Endangered Plant Species Act of 1989 [NJSA 13:1B-15, 151]). New York has passed

the Environmental Conservation Law, which includes regulations, definitions, and lists of endangered and threatened species and species of special concern in section 11 0535.

Methods

This is a primarily qualitative analysis of the beneficial or adverse effects on species of special concern using agency reports, lists of species of management concern, state and federal lists of threatened or endangered animals and plants, state lists of species of special concern, the scientific literature, and information about habitat and confirmed presence of species in each park unit. The use of the term "adverse effect" in this section is a generic term for a negative impact under NPS NEPA practice and are not defined the same way as the term under the Endangered Species Act.

It is important to note that monitoring and protection measures currently taken by the park for all federal threatened and endangered species would continue as a priority under any alternative and in any management zone. If additional recreational opportunities are proposed, these measures would be enhanced with additional mitigation or monitoring to continue to protect these species.

Resource-specific contexts for assessing the impacts of the alternatives on species of special concern include the following:

- The criteria used by all agencies to determine whether an impact is significant (CEQ criteria) include one that addresses adverse effects on listed species or their habitat.

- The CEQ criteria include whether a resource is unique; by default, a rare, threatened, or endangered animal or plant is unique.

- No listed or rare species are also identified as fundamental resources by the park.

- Because the area is urbanized with little habitat for listed species, the open and natural areas of the park may represent a high percentage of available habitat for listed species and be particularly important for their survival in the New York City area. This is not true for all listed species at the park.

- Beach, dune, and natural areas at several park sites are listed as fundamental; a species of special concern may be key to the functioning of these systems.

- Because listed species are scarce, the Endangered Species Act finds that even harassment of a single individual is a take and requires consultation and a permit before a federal action can move forward.

Alternative A: No Action

Impacts of Alternative A

Jamaica Bay Unit

The Jamaica Bay Unit includes known locations for several state-listed plants, including Schweinitz's flatsedge at Floyd Bennett Field in sandy, windblown dune sites, and yellow flatsedge in wetter sandy sites, including along the shores of coastal ponds. Species in sandy coastal locations, including old field or other grasslands at park sites in the Jamaica Bay Unit, include southern arrowwood and cut-leaved evening-primrose. Smooth bur-marigold, smartweed dodder, gypsy wort, and narrow leaf sea-blite occupy wetland or saltmarsh habitat. Slender crabgrass, which inhabits dune, brackish meadows, and saltmarsh, has been found in the Jamaica Bay Unit at Fort Tilden and Breezy Point Tip. A few woodland species, including sweetbay magnolia and willow oak, also occupy habitat in this unit. Federally listed seabeach amaranth occupies open overwash or barrier beach habitat in the Jamaica Bay Unit, primarily at Breezy Point Tip, although Fort Tilden and Jacob Riis Park host small populations.

Listed or rare wildlife in the Jamaica Bay Unit includes checkered white butterfly, eastern hognose snake, eastern box turtle, and northern diamondback terrapin. Nesting sites for the terrapin are known on two of the islands in Jamaica Bay, at dunes south of the visitor center, and at Floyd Bennett Field. The highest number of ospreys in any unit of the park nest in the Jamaica Bay Unit. Piping plovers, a federally threatened species, as well as several state-listed shorebirds including common tern and least tern, nest in beach or overwash habitat at park sites in the Jamaica Bay Unit, primarily at Breezy Point Tip. Occasionally, federally endangered roseate terns have also nested at Breezy Point Tip. Breezy Point Tip is also an important habitat for many migrating raptors, as are grasslands at Floyd Bennett Field. These grasslands are also home to several grassland-dependent species, including listed horned lark, upland sandpiper, savannah sparrow, and northern harrier. Several species of wading birds nest on islands in Jamaica Bay, including at Canarsie Pol, Elder's Point, Little Egg Island, ~~Ruffle Bar~~ and Subway Island, and other islands including Joco and Silver Hole are known nesting sites for common terns. Saltmarsh and mudflat habitat supports feeding by many species of shorebirds and wading birds. Plumb Beach and other shorelines of Jamaica Bay provide important habitat for various life stages of the horseshoe crab, a species of management concern. Eelgrass, eastern oyster, and Atlantic Bay scallops were all key species in Jamaica Bay but have since disappeared (NPS 2010b, G. Phillips, NYC Audubon, pers. comm., 2013). Each remains a species of management concern.

Under alternative A, continued visitor use, occupation of reused buildings, and operation of visitor and other facilities in several park sites at the Jamaica Bay Unit would disturb wildlife of concern and may displace them from otherwise suitable habitat. This is true of visitor use at several sites (Plumb Beach, Fort Tilden, and Breezy Point Tip), boat traffic near Jamaica Bay islands, and hiking off trail or camping at Floyd Bennett Field. On the other hand, park managers take many measures to protect and enhance habitat for wildlife of special concern. These measures are described in the "Affected Environment" chapter and are focused primarily on protecting piping plovers and other shorebirds. They include fencing to keep visitors away from nesting birds, signs, predator removal, closures (to dogs, for example), buffer zones, prohibition of certain recreational activities (e.g., kite flying, kite surfing, fireworks during the breeding season), and visitor education. Although the park has not reached its recovery goal for plover nesting of an average of 1.5 chicks per

nesting pair over five years, the Jamaica Bay population has fledged up to 1.89 checks per pair at Breezy Point Tip and 2 at the Breezy Point Surf Club location in past years, indicating that park management efforts are beneficial for plovers. Other listed species, including least tern, common tern, seabeach knotweed, and seabeach amaranth, occupy the same habitat as piping plovers in the park, and have similarly benefited from park protection efforts. Continuing these efforts under the no-action alternative would continue substantial localized benefits for these species of concern.

Plumb Beach

Implementing the approved sand stabilization plan at Plumb Beach would increase the extent, stability, and quality of beach and dune habitat, with benefits for horseshoe crabs. The environmental assessment for the plan noted that adverse impacts from building a terminal groin needed to capture sand would occur because it would be located in or near a spawning area. However, mitigation would help minimize impacts by constraining construction so it takes place outside the spawning months of May and June and does not occur during evening tides when the majority of spawning takes place.

Fort Tilden and Breezy Point Tip are managed by the park to protect shorebirds and other important natural resources and keep habitat relatively undisturbed.

Floyd Bennett Field

At least one state-listed plant species (Schweinitz's flatsedge) and likely others occur at Floyd Bennett Field. It is possible that visitors trample individual plants, or that development at this park site has covered habitat where listed plants could otherwise grow. However, Floyd Bennett Field was primarily created by filling wetlands and spaces between marsh islands with artificial soils like fly ash, rubble, and dredged material, which may make it a less likely area for native species to grow. In addition, Dead Horse Bay, which is less developed, is infested with thick stands of *Phragmites*, reducing its value as habitat for rare native plant species. Continuing visitor use as it currently takes place at this park site would likely have no more than an incidental adverse localized impact on listed plants because of these factors.

Maintenance of the grassland at Floyd Bennett Field through mechanical means (primarily mowing) would continue, with localized benefits for a few listed grassland species, including checkered white butterfly, horned lark, savannah sparrow, and northern harrier. Listed grassland birds that have been confirmed nesting at Floyd Bennett Field include horned lark, upland sandpiper, savannah sparrow, and northern harrier (USFWS 1997b). Each of these species nests over a vast portion of North America, but horned larks and upland sandpiper numbers in New York have fallen dramatically in the last few decades, primarily from habitat loss. The availability of large, contiguous tracts of grasslands is an important feature of breeding habitat for upland sandpipers and northern harriers, and the grasslands at Floyd Bennett Field are adequate for nesting. Continuing to maintain the grasslands at this park site may provide localized substantial beneficial impacts for these listed wildlife species.

Bergen Beach

As at Floyd Bennett Field, the mostly unnatural filled saltmarsh and infestation by *Phragmites* of possible habitat at Bergen Beach likely minimize the potential for rare plant species to grow. However, allowing equestrian use over the entire site may be adversely

affecting habitat that could be vegetated with rare or listed plant species, because some dune and shrubland vegetation occurs here. The impacts of continuing equestrian use would be adverse, but likely to be localized and incidental.

Canarsie Pier through Hamilton Beach Park

Heavy use and hardened or planted grounds at park sites from Canarsie Pier through Hamilton Beach Park may also be preventing the colonization of these areas by listed plant species, a possible localized adverse impact.

Jamaica Bay Wildlife Refuge

At least two species of listed wading birds (yellow-crowned and black-crowned night-herons) and many listed shorebirds (least tern, roseate tern, common tern, and black skimmer) use island or shoreline habitat in Jamaica Bay that is considered part of the Jamaica Bay Wildlife Refuge park site for nesting and feeding. The great majority of the 25 osprey nests in this park unit are located on marsh and wooded islands in the bay, and northern diamondback terrapins also nest on islands in the bay. These species benefit by park policies of keeping islands visitor free and working with New York Department of Environmental Conservation to complete restoration projects, including building marsh habitat. The benefits of these activities could be substantial and relatively widespread. The same may be true for listed plants, many of which could grow in marsh, mudflat, or wet sandy environments on islands or at undeveloped shorelines of the bay. In addition to the benefits from restoring habitat, maintaining the islands relatively free from human use may also have had benefits for rare plants by keeping their habitat free from foot traffic. Continuing these efforts under the no-action alternative would continue beneficial impacts for rare and listed plants and animals.

The park has reintroduced several reptile species of management concern at habitats in this park site, including the eastern hognose snake and eastern box turtle. Continuing this practice would likely result in localized benefits for these species.

Park Sites on the Rockaway Peninsula

Fort Tilden and Breezy Point Tip are managed by the park to protect shorebirds and other important natural resources and keep habitat relatively undisturbed. As noted in other sections of this GMP/EIS, this means that rare vegetation associations grow in these areas and that they are used by tens of thousands of migrating birds each spring and fall. It is likely that listed plant species such as slender crabgrass and many others grow in these undisturbed habitats. Seabeach amaranth grows in open overwash and barrier island beach habitat at Breezy Point Tip, along both the ocean side and inlet coast. Although habitat at Fort Tilden and Jacob Riis Park is available, no recorded seabeach amaranth individuals were noted in a 2012 survey (NPS 2012g). This could be a result of heavy visitor use, as recent surveys of dune habitat at these park sites showed signs of trampling (NPS 2012g).

Piping plover nesting at these park sites is primarily limited to Breezy Point Tip, where plovers nest at several locations. They are generally absent from Fort Tilden and Jacob Riis Park; again, a possible result of more intense visitor use as well as more narrow beaches. Visitation to Breezy Point Tip from mid-March to September is restricted to protect piping

plover nesting as well as seabeach amaranth. Although common terns and least terns have historically nested at Breezy Point Tip, numbers have decreased in recent years (see the "Species of Special Concern" section of this chapter) and breeding has taken place at the Breezy Point Cooperative outside the park. This is likely to be due at least in part to the increasingly dense dune and shrub vegetation that has grown up in the absence of coastal storms, a condition that has been changed by Hurricane Sandy. The scouring associated with Hurricane Sandy could have a beneficial effect on these species, as well as on piping plovers, which require open habitat to minimize impacts from predation. Generally, maintaining Breezy Point Tip in relatively undisturbed condition, as well as protecting piping plovers and incidentally protecting other state-listed shorebirds and seabeach amaranth, has resulted and would continue to result in beneficial impacts on these species of special concern. Allowing heavy visitor use at dunes and beach at Jacob Riis Park and Fort Tilden would continue adverse effects.

Staten Island Unit

To the extent that state-listed herons nest at Hoffman or Swinburne Island, restricting visitor access has potential substantial localized benefits, because nesting birds can leave chicks or eggs vulnerable to predation or effects from weather, or can expend energetic reserves and stop feeding, when approached by humans in boats or on foot. This impact is described in more detail in the "Wildlife" section of this chapter.

Great Kills Park, and in particular Crooke's Point, is the site of a few state-listed plant species, including sanddune sandbur, hop sedge, retrorse flatsedge, and fringed boneset on dunes and beaches, as well as white-bracted boneset, which grows on the shores of shallow ponds. At least one osprey pair nests in the Staten Island Unit as well. Keeping Crooke's Point as a natural area may have localized benefits for these species by reducing the potential for the trampling of plants or disturbance of osprey.

Currently, horseshoe crab habitat at Crooke's Point exists but is adversely affected by dredging of the entry to Great Kills Harbor by the USACE, a practice that occurs periodically to keep littoral drift from closing the entrance to the harbor.

Sandy Hook Unit

A large population of seabeach amaranth grows at Sandy Hook and piping plover nesting takes places at several locations along the ocean and bay sides. Many other listed species or species of management concern occupy habitat at Sandy Hook, including red knot, American oystercatcher, black skimmer, least tern, roseate tern (on occasion), common tern, osprey, black rail, American bittern, seabeach evening primrose, seabeach knotweed, Northeastern beach tiger beetles, northern diamondback terrapins, and horseshoe crabs. The updated management plan for piping plovers at Sandy Hook (NPS 2007a) describes expanded conservation measures the park implements to protect this species. Although these measures are particularly targeted at protecting the federally listed piping plover and its habitat (including seabeach amaranth), they would also offer similar protection for all species noted above because they are part of the same beachfront ecological community (NPS 2007a). Many of these measures are aimed at reducing human disturbance, considered a major source of impacts on listed or other sensitive species. For example, ORV use is prohibited in

northeastern beach tiger beetle areas, and limiting human use to no more than 50 people per week along the water's edge in summer and fall is proposed to protect the beetles. However, recent inventories suggest that the tiger beetle population may have died out despite these protective measures.

Use of bayside habitats at Sandy Hook for recreational kite surfing and allowing visitors to bring pets has had substantial impacts on shorebirds (NPS 2007a). Pets can also disturb nesting terrapins and spawning horseshoe crabs. In response, the park has closed Spermaceti Cove and the saltmarsh and tidal creeks at Horseshoe Cove to recreational use, with beneficial impacts on shorebirds, horseshoe crabs, and nesting terrapins. Seabeach amaranth protection involves limiting human use and locating dune crossovers and patrol routes away from known locations. The updated management plan (NPS 2007a) proposes expanding these measures to include seabeach knotweed and seabeach evening-primrose and eliminating beach raking, sand scraping, and any ORV use within 33 feet of seabeach amaranth. Predation management, including trapping of foxes or feral cats, managing trash to reduce crows and other avian predators, and predator deterrents like electrified fences, were each proposed and evaluated in the updated management plan, and many have been implemented. Beach nourishment to help provide habitat for tiger beetles, terrapins, horseshoe crabs, and shorebirds has also been evaluated, approved, and implemented at Sandy Hook. These measures would all continue to have substantial areawide beneficial impacts under the no-action alternative for all listed species or species of management concern in Sandy Hook's beach and bay coastal habitats.

Cumulative Impacts

Although cumulative impacts on listed plants or animals vary, most have suffered as a result of habitat losses, whether through direct development or through alteration by pollutants, invasive species, dredging or filling, recreation or other human uses, increases in feral predators like dogs or cats, or changes in agricultural practices (and their effect on available grassland habitat, for example). Climate change has affected habitat for wildlife, from changing temperature regimes to sea-level rise and related changes in storm surge, groundwater characteristics, and salinity in large embayments such as Jamaica Bay. For listed species that have become rare over time because they are specialized, climate change can mean substantial loss of individuals as conditions are too quickly altered for these species to relocate. Impacts from many of these factors are not just historical but ongoing and likely to worsen in the future. Dune, beach, and other coastal species have lost habitat because of groins, jetties, and other structures that affect transport systems, as well as limited supplies of sediment (see the "Soils and Geology" section for more information).

Much of the shoreline at Gateway is considered to be highly or very highly vulnerable to flooding and loss from climate change. Simple inundation as the sea level rises could affect low marshland habitat, with indirect impacts on listed shorebirds and nesting terrapins. Storm surge from potentially increasingly frequent and/or severe storms associated with climate change could result in inundation and drowning of eggs in terrapin, plover, or other shorebird nests, or in destruction of the nests by wind and waves. Inlets or overwash can increase salinity in freshwater habitats that are usually protected by dunes, resulting in the loss of ponds, palustrine wetlands, or other important freshwater habitat that is extremely rare in the park and that may support unique aquatic invertebrates or state-listed plants,

although some species including seabeach amaranth and piping plover may experience benefits from newly created overwash habitat. These changes in habitat quality and changes in climate can also leave open a window for increases in invasive species at the park, which can outcompete native plants or animals, particularly those that are specialized, immobile, or rare. For example, the northern diamondback terrapin is extremely vulnerable to warmer temperatures because drier summers reduce nesting success (NPS 2009h). Data collected over a two-year period show a dramatic decline in the hatching success of the terrapin during a hot and dry year. As sea-level rise accelerates, areas of shallow water covering deeper sandy beaches needed for horseshoe crab spawning are quickly disappearing under deeper water, with potential adverse cumulative effects across this species' coastal habitat (NPS 200h9). Beneficial cumulative actions affecting wildlife by improving habitat conditions include multiphased programs to address the impacts of wastewater and combined sewer/stormwater flows into Jamaica Bay, landfill closures, and other restoration projects by NYCDEP and other agencies (NYCDEP 2007; USACE and PA 2009).

Implementing alternative A would contribute noticeable adverse cumulative impacts on some listed animal species from continued visitor use and other activities that disturb wildlife, including recreational uses like kite surfing, walking, or sunbathing in the vicinity of nesting birds; violations of closures by visitors, including those with dogs; and over-sand vehicle use by park rangers in areas like Sandy Hook or Breezy Point Tip. Some of these could also result in crushing of individual plants or small populations, with imperceptible to noticeable impacts. Impacts are likely to be noticeable rather than imperceptible because population numbers in the region and at the park are low, so the loss of even a few individuals would be measurable. Restricted visitor access to relatively natural areas at Breezy Point Tip, Sandy Hook, and Fort Tilden contributes noticeable beneficial cumulative impacts for these same species. Maintaining grasslands at Floyd Bennett Field may also contribute noticeable beneficial impacts for some listed grassland species. The park working with NYCDEP to restore marsh island habitats at Jamaica Bay may have noticeable beneficial impacts for marsh-dependent listed species such as night-herons, shorebirds, and terrapins.

Conclusion

Continued visitor use and operation of visitor and other facilities in several park sites could result in trampling and loss of listed plants or disturbance of listed wildlife, with localized adverse impacts. Park management to protect listed species, such as with signs, closures, predator management, buffer zones, and prohibitions of certain recreational uses, has had and would continue to have beneficial localized impacts on listed species. Plumb Beach sand nourishment would have short-term adverse and long-term beneficial impacts on horseshoe crabs. Maintenance of grasslands at Floyd Bennett Field could provide substantial localized benefits for at least four listed grassland birds. Because listed wildlife species are unique and considered important in their own right under the CEQ criteria for significance, these benefits could be considered significant. Maintaining Jamaica Bay islands as natural areas without visitors and restoring saltmarsh island habitat would provide substantial, widespread, and potentially significant benefits for listed wildlife, and localized benefits for state-listed plants. This may be true for night-herons nesting on Hoffman Island as well. Heavy visitor use at Fort Tilden and Jacob Riis Park may be preventing seabeach amaranth growth and limiting piping plovers and other listed shorebirds from using otherwise suitable habitat, a localized adverse impact that would continue under the no-action alternative.

Although a coordinated effort between the NPS and New York City has already resulted in substantial benefits to some listed species or species of management concern, such as terrapins, least terns, common terns, night-herons, or ospreys that nest on islands in the bay, additional coordinated research, application of results, funding, and decision making could dramatically increase benefits to these and other listed species.

Maintaining Breezy Point Tip as a relatively undisturbed area would be beneficial for these same species. The presence of several state-listed plants at Crooke's Point may mean that keeping this area in a relatively natural state would continue localized benefits. Closures, fencing, buffers, and other measures to reduce disturbance of nesting shorebirds and minimize impacts on listed plants and horseshoe crabs, for example, may have had substantial, widespread, and potentially significant beneficial impacts for several species, including piping plover, least terns, common terns, seabeach amaranth, seabeach knotweed, seabeach evening-primrose, osprey, terrapins, and horseshoe crabs.

Cumulative adverse impacts on listed species include habitat loss, pollution, recreation or other visitor uses, increases in feral predator populations, and climate change. Increases in sea level can swamp and kill species of special concern or damage or destroy shorebird and terrapin nests, and rapid increases in temperature can particularly adversely affect specialists or vulnerable rare species like terrapins or key species like horseshoe crabs.

In sum, continuing current management would have significant benefits for and localized adverse impacts on species of special concern. Implementing alternative A would contribute noticeable adverse and beneficial cumulative impacts from continuing human disturbance and from protection measures.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Jamaica Bay Unit

Plumb Beach

Controlling beach erosion at Plumb Beach would have potential localized beneficial impacts on horseshoe crabs. ~~Increasing visitor-related amenities and/or the accompanying rise in visitor use could have localized adverse impacts on crabs from crushing or disturbance.~~

Floyd Bennett Field

As noted in the discussion of alternative A, the grasslands at Floyd Bennett Field and Fort Tilden are particularly beneficial for at least four listed species of birds as well as for the rare checkered white butterfly. Both alternatives call for increases in visitor-related facilities for activities such as camping and outdoor education, and would include the reuse of existing buildings. If visitors are encouraged to hike through or investigate the grasslands as part of their environmental education programming, nesting grassland birds would be disturbed and could temporarily or even permanently abandon nests. Seasonal restrictions would mitigate the impact.

Creating wetlands and open water habitat at Floyd Bennett Field is also an action that alternatives B and C share, although the acreage may be different. Both alternatives call for restoring over 100 acres of wetland and fresh or marine open water habitat through reestablishing connections with Jamaica Bay or constructing inland freshwater habitats.

This is likely to provide beneficial localized impacts for listed species such as wading birds, waterfowl, or shorebirds that use saltmarsh or freshwater marshes for feeding and resting. Although waterfowl may experience particularly beneficial impacts, no waterfowl using this habitat would be likely to be state- or federally listed species.

Both action alternatives anticipate leaving West Pond breached until a study of a more regional effort to reestablish freshwater wetlands is completed. The immediate impacts of leaving the pond breached would be beneficial for listed saltmarsh species. Although reestablishing a freshwater wetland that is more typical of those present before dredge and fill operations could have substantial benefits for wildlife, few of these species are listed. Benefits to species of concern from creating freshwater wetlands at West Pond would therefore be less consequential.

Restoring natural sand transport at Miller Field or Great Kills Park could provide localized benefits for listed plant species, including hop sedge or sanddune sandbur, for example.

Jamaica Bay Wildlife Refuge

Both alternatives B and C anticipate a greater commitment to working with agency, academic, NGO, and private partners to improve water quality and hydrologic, vegetation, and wildlife conditions in Jamaica Bay. Although a coordinated effort between the NPS and New York City has already resulted in substantial benefits to some listed species or species of management concern, such as terrapins, least terns, common terns, night-herons, or ospreys that nest on islands in the bay, additional coordinated research, application of results, funding, and decision making could dramatically increase benefits to these and other listed species. Imposing a buffer zone around the park's osprey nests on the saltmarsh islands of Jamaica Bay, as well as at other locations in Sandy Hook and Crooke's Point where nests are located, would help in keeping nesting success for this species high.

Park Sites on the Rockaway Peninsula

Both action alternatives would include discussions with neighboring landowners to holistically manage sand transport processes and return them to a more natural condition. The addition of sand to beaches along the Rockaway barrier spit could provide important beach habitat that would support listed plants like seabeach amaranth and seabeach knotweed, as well as nesting piping plovers and other shorebirds. This could be a substantial localized benefit for these listed coastal species. However, if the sand is added by artificial means (e.g. not by restored coastal process), it could have substantial adverse impacts by covering otherwise suitable habitat, particularly in the short term.

Both action alternatives include some development of Fort Tilden, as well as possible programming changes at Jacob Riis Park or Fort Tilden. New or expanded trails could remove habitat for listed plants and disturb or displace any listed animal species using vegetation in Fort Tilden's backcountry, an adverse impact. Both alternatives also include protection of dunes and beaches as they are restored over time at Fort Tilden. Although this could help some listed dune or beach plants grow, heavy dune vegetation would keep several shorebirds, including least terns, black skimmers, and possibly piping plovers, from successfully nesting here, a possible adverse effect.

Breezy Point Tip

All visitors are restricted from entering nesting areas for piping plovers or fenced amaranth areas from mid-March through September 1 at Breezy Point Tip. These restrictions and current, relatively undisturbed conditions would continue at this park site under either alternative, as would park management to both protect listed species and allow visitor uses. Impacts would be both adverse and beneficial for listed species, as described above for no action.

Staten Island Unit

Leaving the beach area and swamp white oak forest at Miller Field as a more natural area, as well as delineating a route from the beach through the park site, could provide localized benefits for wildlife. Restoring natural sand transport at Miller Field or Great Kills Park could provide localized benefits for listed plant species, including hop sedge or sanddune sandbur, for example. Some feeding grounds for listed shorebirds could also be created by controlling erosion through restoring sediment transport, including for mudflat and beach habitat, a localized benefit.

Currently, horseshoe crab habitat at Crooke's Point exists but is adversely affected by dredging of the entry to Great Kills Harbor by the USACE, a practice that occurs periodically to keep littoral drift from closing the entrance to the harbor. Working with the USACE to change the direction of dredging to preserve crab habitat at Crooke's Point would improve the quality and extent of horseshoe crab habitat and is included as a mitigation measure the park would consider.

Sandy Hook Unit

~~Very few changes to Sandy Hook are common to alternatives B and C.~~ Restricting access to interior forests, rare dune grassland, and shrubland vegetation at the north end, as well as the shoreline of Spermaceti Cove, and continuing to fence shorebird nesting habitat during nesting season would have localized benefits for listed wildlife. Changes to alternative B to make it the same as alternative C such as applying the Sensitive Resources Subzone to the majority of the north end of Sandy Hook during plover nesting season and rezoning some recreational areas along the beach side as natural would provide additional protection from increased visitor use in both alternatives. Listed species that would benefit from these restrictions include nesting ospreys, Henry's elfin butterflies (which live in the maritime holly forest), seabeach knotweed, piping plovers, least terns, common terns, black skimmers, and seabeach amaranth. Expanding camping in the existing ~~youth~~ campground at Sandy Hook could increase disturbance to wildlife in the vicinity, with localized adverse impacts.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Jamaica Bay Unit

Plumb Beach

No impacts on listed species would occur beyond those discussed for actions common to both alternatives B and C.

Floyd Bennett Field

Alternative B would include substantially more development of Floyd Bennett Field for visitor-related activities and predicts a higher degree of increase in visitor use than does alternative C. These additional people, cars, night lighting, and noise would disturb and likely displace some listed wildlife, including those using newly created marsh or open water areas or nearby grasslands, an adverse impact on listed species.

Jamaica Bay Wildlife Refuge

Allowing visitor access to Canarsie Pol or to ~~Big~~ LIttle Egg Island would have the potential for adverse impacts on feeding or nesting night-herons or shorebirds from disturbance. Following public comments on the draft GMP/EIS and consultation with the USFWS, the NPS has broadened the application of the Sensitive Resources Subzone to include the Refuge islands and restrict visitor access.

Park Sites on the Rockaway Peninsula

Alternative B plans new lodging, camping, environmental education, and development of the parade ground and reuse of buildings to bring many new daytime and overnight visitors to Fort Tilden and the adjacent Jacob Riis Park. Grassland habitat here is used by birds and small mammals and is a source of rest and food for migrating raptors. Several raptors are state listed and may experience disturbance or even displacement from traditional feeding and resting grounds along their migration because of visitors using the new facilities at Fort Tilden. The same is possibly true for feeding shorebirds, which because of the presence of and sensitivity to humans, would avoid using a known source of invertebrates in the splash zone of Fort Tilden. Through future site specific analysis and compliance with the USFWS, camp sites will be appropriately designed and sited to avoid impacts to any threatened or endangered species at Fort Tilden.

Staten Island Unit

The primary action in alternative B that could have adversely affected wildlife of special concern in the Staten Island Unit was the possible dock and visitation at Hoffman Island. As noted in other sections of the GMP/EIS, this has been removed because of concern over impacts to nesting birds like herons, ibis and egrets, some of which are highly sensitive to human disturbance and/or rare or state-listed. These impacts are described in the "Wildlife" section of this chapter. Alternative B would continue to map out blueways along the coast of both Hoffman and Swinburne Islands which could have potentially substantial adverse impacts on nesting species of special concern from mid-March to September 1 if they come too close to shore. ~~The primary proposed activity at this unit under alternative B that could impact wildlife is the use of Hoffman Island for visitors. Alternative B also anticipates blueways along the coast of both Hoffman and Swinburne Islands. Before making a decision,~~

~~the park would study the potential for impacts on wildlife, including on heron rookeries where it is possible that listed night-herons nest. However, wading birds like herons, ibis, and egrets are sensitive to human disturbance, as described in the "Wildlife" section of this chapter. If listed herons or other species of management concern are present at Hoffman Island, adequate buffers for both boats and visitors on foot would be needed to prevent disturbance. It is likely that the park would also impose a restriction on visitors so they cannot visit the island between March 15 and August 31. Otherwise, localized impacts on energetics, resilience, and nesting success could be substantial, and the rookeries may be in danger of abandonment.~~

Sandy Hook Unit

Development of facilities and amenities, including trails, boat launch sites, and camping, are proposed in alternative B. At the same time, access to sensitive or rare habitats, including some rare vegetation associations, would be controlled, and beach nourishment on the bayside would occur to slow shoreline erosion. Following public comments on the draft EIS and consultation with the USFWS, the NPS has broadened the application of the Sensitive Resources Subzone to include most of the north end of Sandy Hook and will continue to enforce closures resulting from this subzone at the Spermaceti Cove shoreline. Camping and trails ~~in the Horseshoe Cove area~~ could require removal of ~~saltmarsh~~ habitat or result in indirect adverse impacts from erosion and will require additional site specific analysis to minimize impacts.

On the ocean side, the addition of ~~yurts or cabins~~ overnight camping on or adjacent to beaches could affect shorebirds like the piping plover or least tern. Currently, protected areas at Sandy Hook alternate with open recreational public beaches, particularly in the southern half of the site. ~~Although adding cabins or yurts to these recreational beaches would not necessarily directly impact listed species, t~~The addition of overnight visitors who may walk the beach in the evening or early morning when visitation is currently very low could have adverse impacts on shorebirds. Following consultation with the USFWS, the park has agreed to limit beach camping that may add to existing impacts to piping plovers so that it does not take place during nesting (mid-March to September 1). In addition, the park will conduct additional analysis and site specific consultation with the USFWS to ensure impacts from camping are avoided. Piping plovers are highly sensitive to the presence of humans, and the park currently employs a variety of intensive management efforts to keep people and predators away from nesting birds. These management measures are described in more detail in the "Federally listed birds" subsection of Chapter 3 and stem from the park's *Shoreside Threatened and Endangered Species Beach Management Plan* (NPS 2009e). These measures would continue regardless of the alternative selected. Even so, beachgoers, dogs, large moveable objects such as kites or sails, fireworks, or other human disturbances cause piping plovers to flush from their nests, increase alert behavior, decrease foraging, and even abandon otherwise suitable nesting sites (NPS 2004f). A 2004 biological assessment of impacts on piping plovers at Sandy Hook concluded that the presence of people at the beaches of Sandy Hook may be deterring piping plovers from using a larger percentage of the site. The addition ~~of structures and~~ overnight visitors would worsen impacts from visitor use by increasing disturbance and potentially causing birds to abandon an even larger portion of the beach.

Additional adverse impacts on shorebird feeding would result from the development and use of boat launches, trails, and additional campsites on the bay side, because this is where adults often feed. Terrapins and horseshoe crabs could also experience adverse effects from this development and the additional visitors it would bring. Any impact on horseshoe crabs would also have an indirect impact on the state-listed red knot, because this species depends solely on the eggs of horseshoe crabs to sustain its long migration.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative B) on species of special concern are the same as described under alternative A. However, alternative B would have the potential for more intensive contributions to adverse cumulative impacts from habitat loss associated with increased development, such as at Fort Tilden or Sandy Hook, or from use of blueways close to the shores of Hoffman or Swinburne Islands or marsh islands of Jamaica Bay. ~~allowing visitor use of marsh islands or Hoffman Island.~~ The same is true of benefits, because alternative B would include the creation of saltmarsh and freshwater wetland habitat and increased efforts to restore Jamaica Bay saltmarsh and improve water quality, both of which could have noticeable beneficial offsetting impacts for adverse cumulative impacts on habitat for listed plants or animals in the Jamaica Bay watershed. Adverse cumulative impacts from alternative B would also be noticeable, and greater than those described for alternative A.

Conclusion

Beneficial impacts on listed species would come from restoring natural sand transport processes, creating wetland or open water habitat, working with partners to research and apply results to create saltmarsh habitat and restore water quality, maintaining West Pond as a saltmarsh environment, mowing to maintain an existing large grassland, and continuing restrictions and protection of listed species through fencing, buffers, and closures. Listed species are both unique and listed by CEQ as important to consider in their own right when determining whether impacts are considered significant. The New York City area is urbanized and the park may provide the only habitat, or a large portion of the habitat, for a listed species in the area. For these reasons, creating additional habitat and protecting listed species from disturbance or direct losses could each have significant beneficial impacts. Adverse effects would come from continued visitor use, which is unrestricted in some areas where listed species habitat exists, and from increases in trails or other small-scale visitor amenities. Visitor use could result in trampling of plants or harassment, energy losses, and reduced nesting success in shorebirds where visitors do not follow restrictions or are allowed in park sites where nesting could take place. The NPS is currently working with the USFWS to minimize impacts to federally listed species. However, “incidental take” or harassment or loss of an adult, egg or chick, would require a permit from the USFWS and be considered a potentially significant impact. ~~This could be a take under the Endangered Species Act and a significant adverse impact on some species such as seabeach amaranth or piping plovers, requiring consultation and approval by the USFWS.~~

Substantial facility development and increased visitor use in Floyd Bennett Field and Fort Tilden under alternative B would have the potential for adverse localized impacts on listed species, as could allowing visitors to some Jamaica Bay islands. Increasing recreational

amenities at Sandy Hook could have adverse effects on shorebirds by increasing visitor use at both the bay and ocean sides of the site.

Cumulative adverse impacts on listed species include habitat loss, pollution, recreation or other visitor uses, increases in feral predator populations and climate change. Increases in sea level can swamp and kill species of special concern or damage or destroy shorebird and terrapin nests, and rapid increases in temperature can particularly adversely affect specialists or vulnerable rare species like terrapins or key species like horseshoe crabs.

In sum, alternative B could have both significant beneficial and adverse impacts compared to no action. It would contribute noticeable adverse cumulative impacts from visitor use and development and noticeable beneficial cumulative impacts from continuing protection measures and adding saltmarsh, grassland, and wetland habitat restoration.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Generally, impacts on wildlife from facilities development and use and from increased visitation would be somewhat reduced under alternative C compared to alternative B, although they would still be greater than under alternative A and could result in localized adverse impacts on listed species related to habitat loss and/or disturbance. This is true for Floyd Bennett Field, Bergen Beach, Jacob Riis Park and Fort Tilden, and Sandy Hook.

Jamaica Bay Unit

Plumb Beach

No impacts beyond those discussed for actions common to both alternatives B and C would occur to listed species.

Floyd Bennett Field

Alternative C would include some development of Floyd Bennett Field for visitor-related activities and an increase in visitor use. These additional people, cars, night lighting, and noise would disturb and likely displace some listed wildlife, including those using newly created marsh or open water areas or nearby grasslands, an adverse impact on listed species that would be less than under alternative B.

Beneficial impacts on wildlife from creating wetlands at Floyd Bennett Field could be greater than under alternative B, because additional created acreage is proposed under alternative C.

Jamaica Bay Wildlife Refuge

No impacts from actions specific to alternative C would occur.

Park Sites on the Rockaway Peninsula

Small-scale development at Fort Tilden could disturb and/or displace listed species, including piping plovers or seabeach amaranth, which are currently not occupying otherwise suitable habitat at this park site at beach and dune sites showing evidence of heavy trampling and use. Protection and enhancement of rare habitat at Breezy Point Tip could also continue to provide or improve habitat quality and reduce the potential for human disturbance or displacement of wildlife. In addition to being an important resting and feeding site for migratory birds, Breezy Point Tip provides shorebird nesting habitat for several species of special concern, as well as a number of rare vegetative communities. Increasing protection of these areas and working to improve habitat quality could provide substantial localized benefits for listed wildlife.

Staten Island Unit

Impacts from alternative C on listed species would either be the same as under the no-action alternative (at Fort Wadsworth and Hoffman and Swinburne Islands) or as described for actions common to alternatives B and C (Miller Field), with the exception of Great Kills Park. Areas of this park site are currently closed for radium ~~radon~~ remediation, but have been used in the recent past for sports and recreation. Alternative C would zone these areas as natural and restrict visitor use to walking trails and some camping. It would also restore beach, dune, and upland vegetation at this park site, with potential benefits for listed plants or wildlife.

Sandy Hook Unit

Alternative C would add a protective subzone for many of the areas in Sandy Hook, including Spermaceti Cove and much of the central/southern oceanfront. These and other important wildlife areas at Sandy Hook (including shorebird nesting locations in the north and along the central/southern coast, as well as saltmarsh and rare vegetative communities along Horseshoe Cove and Spermaceti Cove and American holly or other maritime forest associations) would be kept as natural areas and become the sites for targeted restoration efforts. Protection and restoration would be greater than is currently the case, with potential localized beneficial impacts on listed beach and dune plants and animals.

Cumulative Impacts

Impacts of outside actions that contribute to cumulative impacts (i.e., those not related to alternative C) on species of special concern are the same as described under alternative A. Alternative C may contribute noticeable adverse impacts from continuing and adding to visitor use and from small-scale habitat loss associated with increased development. The beneficial contribution of alternative C would be the same as for alternative B, and includes the creation of saltmarsh and freshwater wetland habitat, increased efforts to restore Jamaica Bay saltmarsh and improve water quality, and the potential for holistic freshwater wetlands created in appropriate locations in the Jamaica Bay Unit. Each of these actions would have noticeable beneficial offsetting impacts for cumulative impacts on wildlife habitat in the Jamaica Bay watershed.

Conclusion

Beneficial impacts on listed species would come from restoring natural sand transport processes, creating wetland or open water habitat, working with partners to research and apply results to create saltmarsh habitat and restore water quality, maintaining West Pond as a saltmarsh environment, mowing to maintain an existing large grassland, and continuing restrictions and protection of listed species through fencing, buffers, and closures. Listed species are both unique and listed by CEQ as important to consider in their own right when determining whether impacts are considered significant. The New York City area is urbanized and the park may provide the only habitat, or a large portion of the habitat, for a listed species in the area. For these reasons, creating additional habitat and protecting listed species from disturbance or direct losses could each have significant beneficial impacts.

Adverse effects would come from continued visitor use, which is unrestricted in some areas where listed species habitat exists, and from increases in trails or other small-scale visitor amenities. Visitor use could result in trampling of plants or harassment, energy losses, and reduced nesting success in shorebirds where visitors do not follow restrictions or are allowed in park sites where nesting could take place. This could be a take under the Endangered Species Act and a significant adverse impact on some species such as seabeach amaranth or piping plovers, requiring consultation and approval by the USFWS.

The small-scale facility development and increased visitor use in Floyd Bennett Field and Fort Tilden, as well as at the newly planted Pennsylvania Avenue and Fountain Avenue Parks in the Jamaica Bay Unit, would have the potential for adverse localized impacts on listed species under alternative C.

Cumulative adverse impacts on listed species include habitat loss, pollution, recreation or other visitor uses, increases in feral predator populations, and climate change. Increases in sea level can swamp and kill species of special concern or damage or destroy shorebird and terrapin nests, and rapid increases in temperature can particularly adversely affect specialists or vulnerable rare species like terrapins or key species like horseshoe crabs.

In sum, alternative C could have both significant beneficial and adverse impacts compared to no action, although adverse impacts from development and increased visitor use would be less than alternative B. It would also contribute noticeable adverse and beneficial cumulative impacts.

Cultural Resources

Laws and Policies

The NPS is charged with management and protection of cultural resources through a variety of guidance documents, policy, and legislation followed by NPS managers to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. Cultural resources are nonrenewable and adverse impacts can consume, diminish, or destroy these resources in such a way that they cannot be recovered. In addition to the

National Environmental Policy Act (NEPA), for which this document has been prepared, the primary regulatory and policy framework for cultural resources managed by the NPS includes the following:

Director's Order 28: ***Cultural Resources Management Guidelines*** (NPS 1998a) is the fundamental guidance document for the management of cultural resources in the national park system and contains park management standards and other requirements for cultural resources.

Director's Order 28A: ***Archeology*** (NPS 1998b) provides a common management framework for planning, reviewing, and undertaking archeological activities and other activities that may affect archeological resources in the national park system.

NPS ***Management Policies 2006*** (NPS 2006a) outlines NPS management policies for cultural resources including the identification and evaluation of cultural resources, the integration of this information in planning and decision making, and the stewardship to ensure that cultural resources are preserved and protected.

The **National Historic Preservation Act, as amended,** provides a legislative framework for the preservation and management of cultural resources. Section 110 of the National Historic Preservation Act directs federal agencies to establish preservation programs for the identification, evaluation, and nomination of historic properties to the National Register of Historic Places (National Register). Section 106 of the act requires all federal agencies to consider the effects of their actions on historic properties. Compliance with section 106 of the National Historic Preservation Act is being conducted as a separate effort and is not included in this analysis.

Executive Order 11593, "Protection and Enhancement of the Cultural Environment," requires federal agencies to support the preservation of cultural properties they manage and to direct their policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical, architectural, or archeological significance are preserved, restored, and maintained. Agencies are required to locate, inventory, and nominate all properties under their jurisdiction or control that appear to qualify for listing in the National Register. It also directs agencies to reconsider any plans to transfer, sell, demolish, or substantially alter any property determined to be eligible for the National Register and to afford the Advisory Council on Historic Preservation an opportunity to comment on any such proposal.

Gateway's enabling legislation includes the provision of appropriate programs for the preservation, restoration, interpretation, and use of historic properties (16 USC 1).

The ***Programmatic Agreement Among the NPS, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers*** (Service-wide Programmatic Agreement) (NPS et al. 2008) provides coordination between the NPS, the Advisory Council on Historic Preservation, and the National Conferences of State Historic Preservation Officers for the section 106 process, providing a roadmap to minimize adverse effects to cultural resources resulting from day-to-day operations, management and administrative undertakings.

The ***Archaeological Resources Protection Act*** of 1979 complements requirements of the Antiquities Act through the strengthening of the permitting process for conducting archeological fieldwork on federal and Indian lands, establishing more rigorous fines/ penalties for unauthorized excavation on and removal of resources from federal and Indian lands, and prohibiting public disclosure of the nature and location of archeological resources on federal and Indian lands.

Mitigation Measures

The laws and policies detailed above have given rise to a standardized set of mitigation measures that would apply regardless of the alternative. These apply to historic district, historic structures, archeological resources, and cultural landscapes and include the following:

- In the event of new cultural resource discoveries made during the implementation of the GMP, the park will initiate consultation with the appropriate SHPO in compliance with section 106 of the National Historic Preservation Act.

- Should human remains or funerary or sacred objects be encountered, work will immediately cease and the park staff will notify and consult with appropriate American Indian Tribes as required under the Native American Graves Protection and Repatriation Act of 1990 (NPS 2003c, 51–52).



- Unless otherwise stated, the Secretary of the Interior's Standards will guide work affecting any historic properties. The standards include, among others:
  - Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1992)
  - Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (NPS 1996)
  - Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation
  - Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation
  - Professional Qualifications Standards

- Where they exist (also see the "Affected Environment" chapter), cultural landscape reports will be used to provide guidance for work in historic districts / cultural landscapes. These reports contain treatment guidelines for all aspects of the cultural landscape, including spatial organization, natural systems and features, land use, circulation, topography, buildings and structures, vegetation, and small-scale features.

- When historic properties, identified in the Ruins Subzone, are left unmanaged and are expected to deteriorate and decay, additional section 106 consultation will take place to identify mitigation measures as outlined in the section 106 Programmatic Agreement developed for this GMP.

Impact Analysis for Cultural Resources

This document includes analysis of impacts on historic districts and historic structures, archeological resources, and museum collections. The topic of ethnographic resources was dismissed because it was determined that there would be no impact or a negligible impact on these resources as a result of the implementation of the GMP/EIS.

Fundamental resources are presented at the beginning of the analysis sections for each cultural resource type. Please refer to the "Affected Environment" chapter for information on resources that have been identified as fundamental for Gateway.
The following assumptions have been made for the evaluation of impacts on cultural resources:

- Compliance with section 106 of the National Historic Preservation Act for actions proposed in this GMP/EIS is being completed through a separate process and will be guided by a Programmatic Agreement currently being developed between the NPS and the New Jersey and New York SHPOs.

- Most of the park's historic structures fall within the boundaries of and are integral to the park's nine historic districts. For this reason, analysis of historic structures is included in that of historic districts.

- Archeological resources are finite, non-renewable resources. Impacts on these resources have the potential to cause irretrievable loss. Ground-disturbing activities have the potential to disturb archeological resources. This can be caused by any action that breaks the soil surface—vegetation management (planting, etc.), grading, excavation, structure removal, or trenching—or as a result of natural factors such as storms. The potential to affect buried, intact archeological resources is dependent on the natural processes that have shaped the area as well as the history of land use of the area (for instance, whether it has it been filled/graded).

- Many of Gateway's cultural resources sustained damage from Hurricane Sandy in the fall of 2012. Damage assessments and management recommendations are ongoing. Detailed resource-specific condition information is not yet complete. Preliminary information to date suggests that almost all of the park's historic properties that are listed in, have been determined eligible for, or are considered eligible for listing in the National Register are assumed to retain their NRHP status.

Historic Districts and Historic Structures

Historic districts and their contributing historic structures are presented together in this analysis under the category of Historic Districts (see the "Methods" section below). Historic districts are resources that possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development (NPS 1998a). Nine historic districts have been recorded inside the park boundaries. Historic structures include buildings, bridges, roads, forts and associated earthworks, monuments, ruins, and other manufactured objects that extend the limits of human capability.

All of the fundamental cultural resources identified for Gateway—those that are critical to maintaining the park's purpose and significance—fall within three historic districts. All historic districts are listed below.

Historic districts containing fundamental resources:

- Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District (also referred to as Fort Hancock and Sandy Hook Proving Ground)—Fundamental resources include Endicott/Taft-era batteries, the parade ground, the Nike Missile Launch Site / Radar Site, the Sandy Hook Lighthouse, and the Spermaceti Cove Life Saving Station.

- Fort Tilden Historic District—Fundamental resources include Battery Harris and the Nike Missile Launch Site.

- Fort Wadsworth Historic District—Fundamental resources include Battery Weed, Endicott/Taft-era batteries, Fort Tompkins, and the torpedo-storage building.

Other historic districts:

- Floyd Bennett Field Historic District
- Miller Army Air Field Historic District (also referred to as Miller Field)
- Jacob Riis Park Historic District
- Silver Gull Beach Club Historic District
- Breezy Point Surf Club Historic District
- Far Rockaway Coast Guard Station Historic District

Laws and Policies

The primary regulatory and policy framework for historic districts managed by the NPS

includes the following:

- Director's Order 28: *Cultural Resources Management Guidelines*
- NPS *Management Policies 2006*
- The National Historic Preservation Act
- Executive Order 11593, "Protection and Enhancement of the Cultural Environment"
- Enabling Legislation, Gateway National Recreation Area
- Service-wide Programmatic Agreement

Methods

Information on Gateway's historic districts and their contributing historic structures and associated landscapes was obtained through the review of historic district nomination forms, determination of eligibility documentation, cultural landscape reports, cultural landscape inventories, landmark designation documentation, the park's List of Classified Structures (LCS), historic structure reports, general Gateway history overview documents, and project-specific reports addressing historic districts.

Cultural landscapes are often associated with historic districts and are defined as geographic areas associated with a historic event, activity, or person (refer to the "Affected Environment" chapter). In the case of Gateway, cultural landscape reports documenting landscape features and providing management guidance exist for five of the park's nine historic districts. Anticipated use of this important information to guide work within cultural landscapes is described under "Mitigation Measures."

Historic districts are placed in the National Register when it has been determined that they possess significance in their ability to convey historical, architectural, archeological, engineering, or cultural values. Districts can contain buildings, structures, sites, objects, or open space that demonstrate a continuity of elements that are united historically or aesthetically by plan or physical development. Not all elements within the defined geographic boundary of a historic district must be determined to contribute to the district's significance, but the majority of components that add to the district's character must possess integrity, as must the historic district as a whole (NPS 1990a).

Gateway manages over 550 historic structures, which make up the primary components of the historic districts of the park. Impacts on these resources are integrally connected with and critical to the significance of historic districts. Contributing resources can become non-contributing resources through inappropriate modification/alteration, if they are moved from their original locations, if they have deteriorated to the point where their integrity is lost, etc. For this reason, they have been integrated into the analysis of impacts on historic districts.

Impacts on historic districts and historic structures anticipated by the implementation of the Gateway GMP are related to removal or alteration of contributing elements (e.g., structures), as well as to the implementation of the park's management strategies for each historic district and the contributing resources included in each district.

The resource-specific context for assessing significance of impacts on historic districts (including historic structures) includes the following:

- The ability of a historic district to continue to represent and convey historical events and themes determined to be fundamental to Gateway—these themes are related primarily to military, aviation, and maritime history

- The degree to which the National Register significance and integrity of historic districts containing fundamental resources—those vital to the park's purpose and significance—is retained as the plan is implemented

- The degree to which the proposed management of historic districts, national historic landmarks, and historic structures complies with the park's enabling legislation by providing for appropriate programs for preservation, restoration, interpretation, and use of important cultural resources

- The degree to which proposed management of historic districts, national historic landmarks, and historic structures complies with section 110 of the National Historic Preservation Act regarding the preservation and use of historic properties to the maximum extent feasible



The Sandy Hook Lighthouse and the Spermaceti Cove Life Saving Station, individually designated as national historic landmarks, would continue to be maintained in good condition under the no-action alternative.

Alternative A: No Action

Impacts of Alternative A

Under the no-action alternative, historic districts/landmarks, cultural landscapes, historic structures, archeological resources, and museum collections would continue to be managed through maintenance and repair where feasible and when funding becomes available. Many vacant buildings would continue to deteriorate. Basic protections related to existing legislation and NPS policies would continue. Museum collections and archives would be maintained in their current locations. Assessing and/or repairing damage to cultural resources related to Hurricane Sandy is being prioritized; although measures taken as a result of the storm may be mentioned in this GMP/EIS, they are not analyzed because much of this work continues outside the GMP.

The following presents an analysis of historic districts containing fundamental resources (historic structures) first, followed by other historic district resources in the park.

Historic Districts Containing Fundamental Resources

The Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District is composed of over 200 contributing structures, including Endicott- and Taft-era batteries related to the coastal defense of New York Harbor. Under the no-action alternative, Endicott-era batteries Potter, Gunnison, and Mortar would continue to be maintained, stabilized, and interpreted as funding is available. A recent assessment of Batteries Potter and Gunnison describes their general pre–Hurricane Sandy condition as fair to poor, with storm damage ranging from none to moderate (appendix B). The continuing maintenance and stabilization that are currently taking place at the batteries would result in direct long-term beneficial impacts on the individual historic structures, as well as on the historic district. However, should funding be unpredictable or insufficient, this strategy would result in long-term direct adverse impacts on these structures and the larger historic district. Mitigation measures would lessen the impacts but they would remain adverse.

Some Endicott- and Taft-era batteries (Morris, Urmston, Peck, Arrowsmith [already defined as a ruin], Kingman, and Mills) at Fort Hancock and Sandy Hook Proving Ground would remain in their current state, without additional maintenance/stabilization. A recent assessment of these batteries describes their general pre–Hurricane Sandy condition as ranging from poor to serious, with storm damage ranging from none to minimal (appendix B). Left unmanaged, these structures can be expected to deteriorate further over time, resulting in possible loss of integrity and their contributing status to the historic district, a long-term direct adverse impact on both the historic district and the individual historic structures. Mitigation measures would have the potential to lessen the impact but it would remain adverse.

The Nike Missile Launch Site at Fort Sandy Hook Proving Ground continues to be threatened by erosion; maintenance of both the radar and launch sites occurs as funding is available. A recent assessment of the launch and radar site facilities describes their general pre–Hurricane Sandy condition as ranging from poor to good, with storm damage ranging

from minimal to moderate (appendix B). The uncertainty of the timing and degree of maintenance that would occur in the future would have the potential to result in further deterioration of the resources, possibly jeopardizing their contributing status to the historic district. This situation would result in direct long-term adverse impacts on both the historic district and the individual historic structures. Mitigation measures would have the potential to lessen the impacts.

Under the no-action alternative, the park would continue to explore the best methods for the maintenance, stabilization, and rehabilitation of Fort Hancock buildings. The Fort Hancock 21st Century Advisory Committee would continue to advise the park on future preservation and potential uses for Officers' Row, the parade ground, and select other buildings. Most of the buildings are described as being in poor condition, although the condition of two of the buildings is listed as fair (History House, Lieutenants' Quarters 1) and the condition of one is listed as good (Lieutenants' Quarters 18). Damage sustained from Hurricane Sandy ranged from minimal to moderate (appendix B). The continued efforts to identify and use the best methods for maintenance, stabilization, and restoration of these buildings would be considered a long-term benefit both to the historic district and to the individual historic structures.



The continuing stabilization and preservation efforts under the no-action alternative would equate to direct and long-term benefits to Battery Weed and Fort Tompkins and the larger historic district.

The Sandy Hook Lighthouse and the Spermaceti Cove Life Saving Station, individually designated as national historic landmarks, would continue to be maintained in good condition under the no-action alternative. Prior to Hurricane Sandy, the Sandy Hook Lighthouse was considered to be in fair condition and the Spermaceti Cove Life Saving Station was listed as being in good condition. The Sandy Hook Lighthouse sustained no apparent damage from the storm, whereas the lifesaving station sustained moderate damage (appendix B) and will require repairs. The continued maintenance of these two important historic structures would be a direct long-term benefit to the historic district, as well as to the individual structures.

From the early 20th century, Fort Tilden functioned as an integral part of the New York Harbor coastal defense system, complementing the defensive capabilities present at Fort Wadsworth and Fort Hancock and Sandy Hook Proving Ground. Under the no-action alternative, Taft-era Batteries Kessler, Harris, and Construction 220 at Fort Tilden would remain unmanaged and continue to deteriorate and become overgrown with vegetation. Both Battery Kessler and Battery Construction 220 were assessed as in poor condition prior to Hurricane Sandy and sustained minimal to moderate storm damage. Battery Harris was listed as in fair condition prior to Hurricane Sandy and was not impacted by the storm (appendix B). All these batteries contribute to the significance of the historic district and under this alternative, the lack of systematic maintenance and stabilization actions would result in the further deterioration of the structures. Batteries Kessler and Construction 220 would be at risk of more rapid decline as a result of their oceanside location. Absent ongoing and systematic maintenance and stabilization, impacts on these resources would be expected to be direct, long term, and adverse for both the historic district and the individual historic structures. Mitigation measures would have the potential to lessen the impacts but they would remain adverse.

The Fort Tilden Nike Missile launch site, once an integral part of an important surface-to-air defense program located in the New York Harbor area, would continue to be used as

a maintenance yard under the no-action alternative. The launch site is considered to be in poor condition but does not appear to have been affected by Hurricane Sandy (appendix B). Its current use would continue to detract from the historic significance of the structure and the larger historic district and hamper its interpretation. This ongoing situation would be considered a direct adverse impact on both the historic district and the launch site itself.

Along with Fort Hancock and Sandy Hook Proving Ground and Fort Tilden, Fort Wadsworth has been associated with the coastal defense system of New York Harbor for some 200 years. Under the no-action alternative, 11 batteries would continue to be unmanaged by the park, including Catlin, Bacon, Turnbull, Barbour, Hudson, Mills, Dix, Upton, Barry, Richmond, and Ayers. They are collectively included in a separate National Register listing (NPS 1985), as well as contributing to the significance of the larger historic district (NPS n.d.b). The batteries continue to be overgrown with vegetation and some are fenced off due to safety concerns. They would not undergo specific stabilization treatment under this alternative. All but one of these was considered to be in either serious or poor condition prior to Hurricane Sandy; storm damage to the structures ranged from no apparent impact to moderate impacts. Battery Duane is considered to be in fair condition and sustained no apparent impact from the hurricane (appendix B). Left unmanaged, these already compromised resources would be expected to deteriorate further, a notably long-term adverse impact on both the historic district and the individual historic structures. Mitigation measures would have the potential to lessen the impact but it would remain adverse.

At the same time, the removal of vegetation from selected batteries at Fort Wadsworth would occur. Because vegetation growing unchecked on batteries can destabilize the structures, its removal is considered a direct benefit to both the historic district and the individual historic structures. This benefit would likely delay the ultimate deterioration of the batteries expected from the lack of maintenance and stabilization efforts.

Under this alternative, stabilization and preservation efforts for Battery Weed and Fort Tompkins (Fort Wadsworth) would continue when funding is available. Battery Weed is one of the earliest structures remaining in its entirety in the historic district; Fort Tompkins remains an outstanding example of third system military architecture. Both are listed separately in the National Register and also contribute to the significance of the larger historic district. Prior to Hurricane Sandy, they were both listed as being in fair condition. Although storm impacts were described as minimal, a recent assessment (appendix B) included specific damage related to Battery Weed and its associated seawall. The continuing stabilization and preservation efforts under the no-action alternative would equate to direct and long-term benefits to Battery Weed and Fort Tompkins and the larger historic district. However, if funding is not sufficient and unpredictable, direct long-term adverse impacts could also be expected.

Other Historic Districts

The Floyd Bennett Field Administration Building, currently used as the Ryan Visitor Center, would continue to be rehabilitated for visitor and park operation purposes. Hangars 1 and 2 would continue to be stabilized under a lease with a private energy company. These

efforts would result in long-term benefits both to the historic district and to the individual historic structures.

The park continues to work with New York City to reestablish native tree species in the Floyd Bennett Historic District. Some aspects of vegetation are believed to contribute to the Floyd Bennett Field cultural landscape. Using vegetation-related guidance provided in the cultural landscape report (Cody and Auwaerter 2009) would result in long-term benefits to the historic district.

Cumulative Impacts

Cumulative impacts on cultural resources occur incrementally as impacts unrelated to those proposed under this GMP/EIS take place, regardless of what agency (federal or non-federal) or person undertakes those actions. A description of projects and actions within and around the park that have had or have the potential to result in cumulative impacts on historic districts and historic structures follows.

Dating primarily to the 19th century and later, historic land uses of the area within and surrounding the currently designated park boundaries have undoubtedly resulted in a wide variety of impacts on historic districts and their historic structures. The alteration/destruction of historic structures through time has likely altered the presence, composition, and integrity of historic districts in the park. Numerous historical development activities—primarily grading and landfilling—over the decades in areas that are now designated as Gateway have almost certainly destroyed or buried an unknown number of historic structures or their remnants (for instance, foundations). A variety of infrastructure projects—roads, sewer/water facilities, utility transmission lines, etc.—have also likely resulted in the loss of an unknown number of historic structures in the New York Harbor area. It is possible that some of these lost resources would have been located in areas now designated historic districts/landmarks in the park, or that they could have been components of other historic districts. Such losses of unknown magnitude are considered direct adverse cumulative impacts on the historic districts and historic structures of Gateway.



The NPS has been managing much of the park for over 40 years with a focus on the preservation of its historic properties in compliance with their enabling legislation. A variety of park projects have contributed to the maintenance, stabilization, preservation, and adaptive reuse of historic structures and cultural landscapes within and outside the park's historic districts. Collectively, these preservation efforts have resulted in cumulative benefits to historic districts in the park.

Natural processes (erosion, wave action, wind, storm surges) over the past several hundred years have undoubtedly resulted in the loss of an unknown number of potentially historic properties in and around the park that may have contributed to existing or additional historic districts. These losses would be particularly pronounced along the New York Harbor coastline environments, which are subject to more damaging impacts of wind and water than are areas farther inland. It is unknown how many historic resources that may have contributed to the park's historic districts have been lost due to natural processes, but these processes are considered to have had an adverse cumulative impact on the park's historic districts and historic structures.

The effects of climate change on the New York Harbor area are a result of the combination of sea-level rise, and projected possible extreme precipitation events, heat waves, and increases in severe winds and other weather phenomena. A number of cultural resources have sustained damage over the past few decades because of extreme weather events (such as winds and storm surges). These include historic districts containing the park's fundamental resources—Fort Hancock and Sandy Hook Proving Ground, Fort Wadsworth, and Fort Tilden—as well as most other historic districts. In the fall of 2012, Hurricane Sandy's winds and storm surge resulted in considerable damage to cultural and natural resources of the park, as well as to major infrastructure facilities. The storm, in addition to many others in the past, is a reminder of the importance of considering such future events in the responsible planning for the management of the park's cultural resources.

Other agency projects located in areas surrounding the park have been or will be completed in the future, potentially adding incremental impacts to the park's historic districts and historic structures. This could occur if historic structures or historic districts associated with and/or complementary to the history and themes reflected by park resources have been or will be impacted by these projects. For instance, a variety of recreation, environmental restoration/enhancement, and development projects proposed by New York City (Vision 2020 plan, New York City Waterfront Action Agenda) (NYCEDC n.d.; NYCDCP 2011) could potentially impact historic properties in areas surrounding park lands.

In addition, the Transcontinental Gas Pipeline Company is currently proposing the Rockaway Delivery Lateral Project which consists of a 26" pipeline and associated facilities. The pipeline would extend 3.2 miles from an offshore connection to an onshore delivery point on the Rockaway Peninsula. A portion of the pipeline would be constructed on Gateway lands and would affect an historic airplane hangar complex at Floyd Bennett Field Historic District (Federal Energy Regulatory Commission [FERC] 2013). An Historic Structures Report has been prepared as a planning tool to guide project work at the historic hangars. The FERC has recommended that work be delayed until all outstanding requirements of the Section 106 (NHPA) process have been completed. This work includes survey and evaluation reports, design/construction drawings for the hangars, a construction protection plan and a treatment plan (FERC 2013).

Undoubtedly, past projects have affected an unknown number of cultural resources in these areas. Many of these development actions are assumed to have resulted in or would result in some degree of ground disturbance, potential impacts on archeological resources, and possible impacts on historic structures through removal and alteration. If potentially historic properties have been or will be damaged, demolished, or modified in inappropriate ways, indirect adverse cumulative impacts are assumed. Conversely, if cultural resources encountered during project implementation have been or are preserved and/or rehabilitated for use, long-term indirect benefits to the cultural resources of the park are expected.

It is believed that the continuing management actions under the no-action alternative would contribute noticeable adverse increments to the cumulative impacts on historic districts and historic structures. Beneficial cumulative impacts on historic districts and historic structures under this alternative are believed to be imperceptible in scope.

Conclusion

Under the no-action alternative, beneficial impacts on historic districts would be realized through the continuing maintenance and stabilization of historic structures (batteries, the Sandy Hook Lighthouse, and the Spermaceti Cove Life Saving Station), primarily within historic districts containing fundamental resources. Benefits to other historic districts derive from rehabilitation of historic structures and vegetation management (Floyd Bennett Field).

At the same time, a variety of adverse impacts on historic districts would be expected, resulting primarily from the lack of management of historic structures in historic districts. It is likely that under this management strategy, fundamental resources of the park and other contributing resources of historic districts would be degraded or lost. The fundamental resources of the park expected to be adversely impacted under this alternative are associated primarily with military history and the coastal defense of New York Harbor over the past 150 years. These include over 20 Endicott- and Taft-era batteries and Nike Missile sites at Fort Hancock and Sandy Hook Proving Ground and Fort Tilden. These adversely affected resources are considered non-renewable and their loss would be permanent.

The National Historic Preservation Act (section 110) and the NPS *Cultural Resource Management Guidelines* (NPS 1998a) strongly discourage the neglect or demolition of National Register properties. Appropriate documentation and consultation, as required under the National Historic Preservation Act, would partially mitigate the loss of unmanaged historic properties. Still, many of the fundamental resources located in some of the park's historic districts would be directly and adversely impacted, hampering the park's ability to maintain the integrity of historic districts in ways that convey the important events and themes of the park. The loss of these resources would also have the potential to affect the National Register listing (loss of contributing properties, integrity, etc.) of historic districts at Fort Hancock and Sandy Hook Proving Ground, Fort Tilden, and Fort Wadsworth. In addition, the intent of the park's enabling legislation regarding the preservation, restoration, interpretation, and use of significant historic properties would not be fulfilled as a result of the loss of fundamental resources. Historic districts not containing resources considered fundamental to the park would not be expected to experience the same level of impacts, although direct impacts on these resources would still be considered adverse. The majority of beneficial impacts expected for all historic districts would be expected to be limited in scope, with the exception of the maintenance of the Sandy Hook Lighthouse and the Spermaceti Cove Life Saving Station. Although beneficial impacts are expected to occur for the Fort Wadsworth Historic District (stabilization/preservation of Battery Weed and Fort Tompkins), this alternative also proposes that 11 Endicott-era batteries go unmanaged within the historic district. Beneficial impacts are not believed to be sufficient to mitigate the substantial adverse impacts expected on fundamental resources in historic districts related to the potential loss of fundamental resources under this alternative.



Implementation of the no-action alternative would result in a higher level of continuing adverse impacts on the park's historic districts, particularly those containing fundamental resources, when compared to the action alternatives. The impacts on historic districts anticipated under the no-action alternative would be considered a significant and

permanent adverse impact on cultural resources. The impacts of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable adverse cumulative impacts on historic districts.

Impacts on historic structures anticipated under the no-action alternative would be considered a significant adverse impact on cultural resources. The impacts of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable adverse cumulative impacts on the park's historic structures.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Some of the historic structures in the park's historic districts are considered fundamental to the park but are in very poor condition.

Impacts related to actions common to both action alternatives on historic districts containing historic structures considered fundamental to the park's purpose and significance are discussed first, followed by a discussion of other historic districts.

Historic Districts Containing Fundamental Resources

Cultural resource management under the action alternatives would be more focused on long-term preservation, research, and interpretation of fundamental coastal defense and maritime resources compared to the no-action alternative. The Fort Hancock 21st Century Advisory Committee would continue to advise the park on future preservation and potential uses for Officers' Row, the parade ground, and select other buildings. A small number of associated batteries in the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District would be stabilized and interpreted for visitors. The Sandy Hook Lighthouse and the Spermaceti Cove Life Saving Station, also considered fundamental resources, would also be maintained. The involvement and guidance provided by the Fort Hancock 21st Century Advisory Committee, the stabilization of batteries, and the maintenance of the Sandy Hook Lighthouse and the lifesaving station would result in considerable long-term direct benefits to the historic district, as well as to the individual historic structures that contribute to its significance.

Under both action alternatives, the removal of invasive vegetation threatening coastal batteries and other fundamental cultural resources would be increased, resulting in benefits to these important resources, many of which are considered fundamental to the park. Because vegetation growing unchecked on batteries can destabilize the structures, its removal would be considered a direct benefit both to the historic districts and to the individual historic structures that contribute to their significance.

Certain historic structures would be stabilized under both action alternatives, including many of those considered fundamental to the park and located in historic districts (for instance, Battery Harris at Fort Tilden). This action would be considered a long-term direct benefit for the individual historic structures as well as for the historic districts in which they are located.

Both action alternatives propose new lodging/camping development within the Fort Tilden Historic District through the rehabilitation/reuse of historic buildings surrounding the parade ground. The parade ground is a feature of the landscape within the historic district. The rehabilitation and reuse of these historic structures would be a long-term benefit to the historic district and the contributing historic structures. The *Fort Tilden Cultural Landscape Report* (Selvek 2005) will be used to guide planning for the adaptive reuse proposals, resulting in a positive impact.

Portions of the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, Fort Tilden Historic District, and Fort Wadsworth Historic District are zoned as "historic" under both action alternatives (see chapter 2). The zone includes fundamental and historic sites, structures, and landscapes important to the park's purpose and significance and varies slightly in size between the two alternatives (see chapter 2). Resources located in this zone would be the focus of preservation projects and would be managed to ensure the long-term protection of their historic integrity. This zoning designation lends an additional layer of protection for resources within it and would be considered a substantial long-term direct benefit to the three historic districts and the individual historic structures affected. Some of the historic structures in the park's historic districts are considered fundamental to the park but are in very poor condition. Some of these have been identified by the park as ruins (appendix B) and fall under the subzone "ruins" in the Historic Zone (see chapter 2). These structures would remain as ruins under action alternatives, continuing to decay naturally. Despite their current condition, these structures have been determined to contribute to the significance of the historic districts in which they are located. Examples of fundamental historic structures that would be managed in this way, by historic district, include the following:



- Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District—Batteries Granger, Morris, Peck, and Urmston

- Fort Tilden Historic District—Batteries Kessler and Construction 220 and Nike Missile structures associated with the launch site

- Fort Wadsworth Historic District—Batteries Ayres, Barry, Mills, Richmond, and Upton (for a complete list of those structures to be managed as ruins, please refer to appendix B and "Chapter 3: Affected Environment," for information related to these specific resources)

For these resources, the park would prioritize their documentation and, in some cases, create interpretive media to convey information about their history and significance. Left unmanaged, the historic structures can be expected to deteriorate over time, likely resulting in loss of integrity and their contributing status to the historic districts in which they are located, a substantial permanent direct adverse impact on both the historic districts and individual historic structures. Mitigation measures (documentation, etc.) would have the potential to lessen the impact but it would remain notably adverse.

Other Historic Districts

Although some of the park's historic districts include historic structures that are in very poor condition, many have been determined to contribute to the significance of the historic districts in which they are located. As is the case for fundamental resources, the park has identified some of these resources as ruins (appendix B). These structures would remain unmanaged under the action alternatives, being allowed to decay naturally. Examples of historic district structures that would be managed in this way include the following:

- Floyd Bennett Field Historic District—Married Officers' Quarters, torpedo-storage building, and magazines

- Jacob Riis Park Historic District—Boiler room, garages, and playing courts

- Far Rockaway U.S. Coast Guard Station Historic District—Garages (for a complete list of the structures that would be managed as ruins, please refer to appendix B; refer to "Chapter 3: Affected Environment," for information related to these specific resources)

As is the case for fundamental park resources, the park would prioritize the documentation of these resources and, in some cases, create interpretive media to convey information about their history and significance. Left unmanaged, these structures would deteriorate over time, resulting in loss of integrity and possibly their contributing status to the historic districts in which they are located, a permanent direct adverse impact on both the historic district and the individual historic structures. Mitigation measures (documentation, etc.) would have the potential to lessen the impact but it would remain adverse.

Under both action alternatives, a wetlands center facility (visitor facilities, education center, trails, etc.) is proposed for the Jamaica Bay Unit of the park, possibly in Floyd Bennett Historic District. It is possible that the center may be housed in rehabilitated historic structures in the historic district. This adaptive reuse of important historic structures in the park would result in a long-term direct benefit to the historic district and the individual structures.
Under both alternatives, a new cooperative stewardship program among the park, New York City, and others, tentatively named the JBSRI, would require a facility. The JBSRI may be housed in rehabilitated historic structures in Floyd Bennett Field Historic District in the Jamaica Bay Unit of the park. This adaptive use of important historic structures in the park would result in a long-term direct benefit to the historic district and the individual historic structures.

In an effort to build the park's resiliency to the effects of climate change, measures would be implemented to protect select historic structures from the threats of storm surges and flooding. This could include modifications to landscapes and topography. Most of Gateway's historic structures are encompassed in larger historic districts and are considered contributing to the historic district's significance. This effort would result in a substantial long-term direct benefit to the historic district in which these structures are located, as well as to the individual historic structures. At the same time, potentially adverse effects (possible disturbance of a district's archeological resources) are possible; implementation of mitigation measures would lessen adverse impacts (see Archeological Resources below).

Public/private partnerships that assist with the reuse and preservation of fundamental and other historic structures for a wide variety of uses would be pursued, a long-term direct benefit to historic districts, as well as to the individual historic structures that contribute to their significance.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

The impacts of the implementation of alternative B on historic districts containing historic structures considered fundamental to the park's purpose and significance are discussed first, followed by a discussion of other historic districts and structures.

Historic Districts Containing Fundamental Resources

The Nike Missile launch site at the Fort Tilden Historic District would be stabilized, which would be considered a long-term direct benefit to the historic district as well as to the individual historic structures.

The historic structures at Riis Landing (Fort Tilden Historic District and Far Rockaway Historic District) would be stabilized, which would be considered a long-term direct benefit to the historic district as well as to the individual historic structures.

Within the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, the parade ground would be preserved, the Nike Missile radar and launch sites would be stabilized, and Batteries Kingman and Mills would be rehabilitated to allow for visitor access. All of these actions would result in long-term benefits to the historic district, as well as to the individual historic structures.

The use of historic structures at the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District would be expanded to include lodging, food service, and other visitor services. This alternative would include the widest variety of potential adaptive reuses for the Fort Hancock buildings. Adaptive reuse would be considered a long-term direct benefit to the historic district, as well as to the individual historic structures that contribute to its significance.

Under alternative B, Battery Weed and Fort Tompkins (Fort Wadsworth Historic District) would be preserved. These two historic structures are an integral part of Fort Wadsworth Historic District and the military history of the New York Harbor. In addition to the batteries stabilized through actions specified in the "Common to Both Action Alternatives" section, several additional batteries will be stabilized for greater visitor interpretation and access. This will occur through vegetation removal and landscape enhancements. These actions would result in long-term direct benefits to the historic district and the individual structures.

Under this alternative, Mont Sec and New York Avenues in the Fort Wadsworth Historic District would be preserved and some interpretation provided. These two streets and their historic structures (Officers' Row, the entry gate and gatehouse, etc.) represent some of the

core elements of past life at Fort Wadsworth. Their preservation would represent a long-term direct benefit both to the historic district and to the historic structures involved.

Other Historic Districts

Under alternative B, the cultural landscape at Floyd Bennett Historic District would be preserved to reflect its significance as a municipal airport. However, fewer landscape features would be included in these preservation efforts when compared to alternative C. Important historic structures—Ryan Visitor Center, hangars, runways—would be preserved and interpreted for visitors in the Aviation District. Other historic structures would be rehabilitated and adaptively reused for interpretive visitor exhibits. The preservation and adaptive reuse of historic structures at Floyd Bennett Field Historic District would be a direct benefit for both the individual historic structures and the historic district in which they are located.

At Floyd Bennett Field Historic District, Hangar B and its surroundings would be converted to an entertainment venue. Hangar B represents the largest structure at the field and is a contributing structure to the historic district. It currently houses the Historic Aircraft Restoration Project groups and numerous historic aircraft, which would be moved to other hangars at Floyd Bennett Field. If the management guidance included in the *Floyd Bennett Field Cultural Landscape Report* (Cody and Auwaerter 2009) is used for concert venue conversion of Hangar B, long-term direct benefits would be expected for both the historic district and the structure. If Hangar B is renovated in a way that would jeopardize its contributing status to the historic district, a direct adverse impact would occur. The impact would affect both the historic district and the hangar.

A variety of improved recreational elements would be developed at Jacob Riis Park Historic District under this alternative. These include parking lot redesign for new facilities/visitor services, development of sports fields, expansion of shade structures and picnic areas, and the use of portable and mobile facilities. The introduction of permanent new elements to the landscape would have the potential to impact the historic district adversely. At the same time, this alternative proposes the maintenance of the bathhouse, boardwalk, parking lot, and associated historic features. If management recommendations set forth in the *Jacob Riis Park Cultural Landscape Report* (Lane, Frenchman, and Associates 1992) are used to guide the provision of facilities and services, related impacts on the historic district would be expected to be long term, direct, and beneficial. Maintenance of the bathhouse, boardwalk, parking lot, and associated historic features would be expected to yield long-term direct benefits to the historic district.



Under alternative B, Hangar 38 and the Elm Street Light at the Miller Army Airfield Historic District would be stabilized. Along with the hangar apron, these constitute the three contributing resources to this historic district. All these actions would result in long-term direct benefits to Miller Army Airfield Historic District as well as to the individual historic structures.

The historic cabanas at the Breezy Point Surf Club Historic District and the Silver Gull Beach Club would be stabilized, a long-term direct benefit to the historic districts and to the individual structures.

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have resulted or could result in both adverse and beneficial cumulative impacts on Gateway's historic districts and historic structures, as described under alternative A (no action). It is believed that the proposed management actions under alternative B primarily related to unmanaged fundamental park resources located in the Ruins Subzone would contribute noticeable adverse increments to the cumulative impacts on these resources. Beneficial cumulative impacts on historic districts and historic structures under this alternative are believed to be imperceptible in scope.

Conclusion

Common to both action alternatives are proposals that could result in both beneficial and adverse consequences to historic districts and historic structures. Long-term, direct benefits are related to preservation, research, and interpretation of fundamental coastal defense and maritime resources proposed by the Fort Hancock 21st Century Advisory Committee, the removal of invasive vegetation threatening coastal batteries and other fundamental cultural resources, the stabilization of certain fundamental resources, the rehabilitation and reuse of historic structures (e.g., Fort Tilden, Floyd Bennett Field), the protection afforded by the designation of fundamental and other cultural resources as part of a Historic Zone, and the protection of select historic structures from threats of future storm surges and flooding. Permanent adverse impacts resulting from the designation of fundamental and other cultural resources as part of a Ruins Subzone (unmanaged, expected to deteriorate) are also expected for historic districts and structures under both action alternatives.

In addition to the impacts of actions common to both action alternatives, alternative B would offer a variety of beneficial impacts on historic districts and historic structures resulting primarily from the maintenance, stabilization, and preservation of historic districts' resources, the adaptive reuse of historic structures, and the preservation of cultural landscapes. Of the two action alternatives, alternative B would offer the widest variety of potential adaptive reuses of historic park structures in the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District. Actions under this alternative are particularly beneficial to fundamental resources located in Fort Wadsworth Historic District, Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, and Fort Tilden Historic District. Benefits in these historic districts would positively affect fundamental resources such as Battery Weed and Fort Tompkins, a number of coastal batteries, the Sandy Hook Lighthouse, the Spermaceti Cove Life Saving Station, the Fort Hancock parade ground, and the Fort Tilden parade ground. In addition, important resources at Miller Army Airfield Historic District, Breezy Point Surf Club Historic District, and Silver Gull Beach Club Historic District would be stabilized, a benefit to both the districts and the individual historic structures.

A number of widespread beneficial impacts would be expected for all historic districts (historic zoning, adaptive reuse of historic structures, maintenance/ preservation), although they are not believed sufficient to outweigh the substantial adverse impacts expected on fundamental resources in historic districts under this alternative.



At the same time, historic districts would potentially experience adverse impacts primarily related to the uncertainty of how conversions of historic structures to other uses will affect the historic district and landscape (Hangar B, Floyd Bennett Field Historic District), the potential to affect archeological resources through landscape modification to protect important historic structures, and the impact of portions of historic districts being included in the Ruins Subzone. In the latter situation, portions of historic districts would be unmanaged and resources (historic structures) allowed to decay naturally. The Ruins Subzone is defined similarly under alternative C. Some fundamental resources in the Fort Wadsworth Historic District, Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, and Fort Tilden Historic District are included in the Ruins Subzone. Fundamental resources of the park expected to be adversely impacted under this alternative are associated primarily with military history and the coastal defense of New York Harbor over the past 150 years. These include approximately 10 Endicott- and Taft-era batteries in the Ruins Subzone, affecting three historic districts (Fort Tilden, Fort Wadsworth, and the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District). These adversely affected resources are considered non-renewable and their loss will be permanent.

When the resource-specific criteria for assessing impacts on historic districts are applied to the actions proposed under alternative B, results similar to those under the no-action alternative are reached related to concurrence with section 110 of the National Historic Preservation Act, resulting in adverse, likely permanent, impacts on the park's historic districts. However, adverse impacts would be considerably fewer under both action alternatives than under alternative A (no action). Concurrence with the park's enabling legislation also falls short where preservation, restoration, and interpretation of historic properties is concerned, but to a smaller degree than under alternative A. When compared to the no-action alternative, fewer fundamental resources would be adversely impacted under alternative B, making the park's goal of conveying important events and themes of the park to its visitors more attainable. The loss of fundamental resources under alternative B would have the potential to affect the National Register listing (contributing properties, integrity, etc.) of historic districts of the park, but to a lesser degree than under alternative A. This situation would hamper the park's ability to maintain the integrity of historic districts in such a way as to convey the important events and themes of the park (military, maritime, aviation). The proposed lack of management of historic resources in the Ruins Subzone has the potential to set a precedent for the future management of NPS cultural resources. At the same time, climate change and its associated projected possible increases in destructive winds and storm surges have made it imperative for the park to reevaluate what resources can be reasonably protected and preserved over time.

Historic districts not containing resources considered fundamental are not expected to experience the same level of impacts, although some direct impacts could still be considered adverse. A number of widespread beneficial impacts would be expected for all historic districts (historic zoning, adaptive reuse of historic structures, maintenance/preservation), although they are not believed sufficient to outweigh the substantial adverse impacts expected on fundamental resources in historic districts under this alternative.

Adverse impacts related to the management of portions of historic districts under the Ruins Subzone are similar under alternatives B and C. Both action alternatives would result in fewer adverse impacts on fundamental resources than would the no-action

alternative. The provision of the widest variety of potential adaptive reuses for historic structures (a beneficial impact) under alternative B is not realized as fully under alternative C. When compared to alternative C, alternative B provides for less preservation treatment for historic districts, structures, and landscapes (e.g., Fort Hancock and Sandy Hook Proving Ground, Fort Wadsworth, Floyd Bennett Field, and Jacob Riis Park). However, Alternative B provides for more opportunities for rehabilitation and adaptive reuse of historic structures and landscapes.

The impact on historic districts anticipated under alternative B would be considered significant and adverse. The impacts of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable adverse cumulative impacts on historic districts.

The loss of fundamental historic structures under this alternative would be less than that expected under the no-action alternative and similar to that expected under alternative C. Impacts on historic structures anticipated under alternative B would not be considered a significant impact on historic structures. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable cumulative impacts on historic structures.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

The impacts of the implementation of alternative C on historic districts containing historic structures considered fundamental to the park's purpose and significance are discussed first, followed by a discussion of other historic districts and structures.

Historic Districts Containing Fundamental Resources

Under this alternative, the Nike Missile radar site at the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District would receive enhanced preservation efforts, a long-term direct benefit to the historic district and to the structures that contribute to its significance. When compared to alternative B, this alternative would provide for a greater degree of interior restoration.

Under this alternative, coastal defense structures at Fort Wadsworth Historic District would become a focal point for participatory stewardship, including hands-on historic preservation. Portions of Fort Tompkins would be rehabilitated as a visitor facility. Vegetation would be removed from some batteries and overlooks would be established. These efforts would result in long-term benefits both to the historic district and to the individual historic structures involved.

Under this alternative, Mont Sec and New York Avenues in the Fort Wadsworth Historic District would be preserved and restored. These two streets and their historic structures (Officers' Row, the entry gate and gatehouse, etc.) represent some of the core elements of past life at Fort Wadsworth. Although similar actions are proposed under alternative B, this alternative would provide more extensive preservation and restoration of the historic

character along the streets, resulting in a higher degree of landscape preservation. Both action alternatives would result in long-term benefits to the historic district and the historic structures, but benefits would be increased under alternative C.

Cultural resource preservation and stewardship projects are proposed for the Fort Tilden Historic District under this alternative. This includes the stabilization of Riis Landing buildings—some of which are located within the Far Rockaway Coast Guard Historic District—for leasing, adaptive reuse of the parade ground buildings, and the preservation of the cultural landscape of the Fort Tilden Historic District. Use of management recommendations put forth in the *Cultural Landscape Report for Fort Tilden* (Selvek 2005) would aid in the appropriate treatment of important landscape elements. These actions are expected to result in long-term direct benefits to the historic district, as well as to the historic structures involved.

Other Historic Districts

Under alternative C, the cultural landscape at Floyd Bennett Historic District would be preserved to a greater degree than under alternative B to reflect its significance as a municipal airport. Hangars, runways, the Ryan Visitor Center, observation tower, aircraft, and other character-defining features would be preserved/restored in the Aviation District. Under this alternative, more preservation, restoration, and interpretation of the cultural landscape is proposed. Adaptive reuses would be pursued for Hangar B. These actions would amount to a direct long-term benefit for the historic district, the historic structures involved, and the associated cultural landscape.

Under this alternative, additional facilities and recreational opportunities would be added at the Jacob Riis Park Historic District but to a lesser degree than that proposed under alternative B. Proposed improvements include trails, observation platforms, a picnic grove expansion, and additional shade and open space provided through the removal of impervious surfaces. The introduction of permanent new elements to the landscape has the potential to impact the historic district adversely. At the same time, this alternative proposes the preservation of the bathhouse for recreation, provision of services, and park operations, a long-term direct benefit to the historic district as well as to the historic structure. If management recommendations set forth in the *Jacob Riis Park Cultural Landscape Report* (Lane, Frenchman, and Associates 1992) guide the proposed improvements at the historic district, overall impacts to the resource would be expected to be long term, direct, and beneficial.

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have resulted or could result in both adverse and beneficial cumulative impacts on historic districts and historic structures, as described under alternative A (no action). It is believed that the proposed management actions under alternative C would contribute noticeable adverse increments to the cumulative impacts on these resources, primarily related to the resources that fall into the unmanaged Ruins Subzone. Beneficial cumulative impacts on historic districts and historic structures under this alternative are believed to be imperceptible in scope.

Conclusion

Impacts on historic districts and historic structures related to actions common to both action alternatives (B and C) include beneficial and adverse consequences. Long-term, direct beneficial impacts are related to preservation, research and interpretation of fundamental coastal defense and maritime resources proposed by the Fort Hancock 21st Century Advisory Committee, the removal of invasive vegetation threatening coastal batteries and other fundamental cultural resources, the stabilization of certain fundamental resources, the rehabilitation and reuse of historic structures (e.g., Fort Tilden, Floyd Bennett Field), the protection afforded by the designation of fundamental and other cultural resources as part of a Historic Zone, and the protection of select historic structures from the threat of future storm surges and flooding. Permanent adverse impacts resulting from the designation of fundamental and other cultural resources as part of a Ruins Subzone (unmanaged, expected to deteriorate) are also expected for historic districts and structures under both action alternatives.

In addition to the impacts of actions common to both action alternatives, alternative C would offer a variety of beneficial impacts for historic districts and historic structures resulting primarily from the stabilization, preservation, and restoration of elements of the historic districts, the adaptive reuse of rehabilitated historic structures, and preservation of cultural landscapes. These actions would be particularly beneficial to fundamental resources located in Fort Wadsworth Historic District, Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, and Fort Tilden Historic District. Benefits in these historic districts would positively affect fundamental resources such as Fort Tompkins, the Nike Missile Radar Site at Fort Hancock and Sandy Hook Proving Ground, a number of coastal batteries, the Sandy Hook Lighthouse, and the Spermaceti Cove Life Saving Station. Beneficial impacts on other historic districts would include the preservation of the cultural landscape at Floyd Bennett Field to reflect its significance as a municipal airport, the stabilization of Hangar 38 and the Elm Tree Light (Miller Field), and the stabilization of cabanas at Breezy Point Surf Club Historic District.

At the same time, adverse impacts would be expected for both historic districts and historic structures, primarily related to the impact of portions of historic districts being included in the Ruins Subzone. In this situation, portions of historic districts would be unmanaged and resources (historic structures) allowed to decay naturally. Some fundamental resources in the Fort Wadsworth Historic District, Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, and Fort Tilden Historic District would be included in the Ruins Subzone. The Ruins Subzone is defined similarly in both action alternatives. Fundamental resources of the park expected to be adversely impacted as a result of management zoning under this alternative are associated primarily with historic structures that reflect the military history and the coastal defense of New York Harbor over the past 150 years. As is true under alternative B, these would include approximately 10 Endicott- and Taft-era batteries in the Ruins Subzone, affecting three historic districts (Fort Tilden, Fort Wadsworth, and Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District). These adversely affected resources are considered non-renewable and their loss would be permanent.

When the resource-specific criteria for assessing impacts on historic districts are applied to the actions proposed under alternative C, results similar to those under the no-action alternative are reached related to concurrence with section 110 of the National Historic Preservation Act, resulting in adverse, likely permanent, impacts on the park's historic districts. However, adverse impacts would be considerably fewer under both action alternatives than under alternative A (no action). Concurrence with the park's enabling legislation also falls short where preservation, restoration, and interpretation of historic properties is concerned, but to a smaller degree than under alternative A. When compared to the no-action alternative, fewer fundamental resources would be adversely impacted under alternative C, making the park's goal of conveying important events and themes of the park to its visitors more attainable. This is similar to the impacts expected under alternative B. As is true under alternative B, the loss of fundamental resources under alternative C would have the potential to affect the National Register listing (contributing properties, integrity, etc.) of historic districts of the park, but to a lesser degree than under alternative A. This situation would hamper the park's ability to maintain the integrity of historic districts in such a way as to convey the important events and themes of the park (military, maritime, aviation). The proposed lack of management of historic resources in the Ruins Subzone would have the potential to set a precedent for the future management of NPS cultural resources. At the same time, climate change and its associated possible increases in destructive winds and storm surges have made it imperative for the park to reevaluate what resources can be reasonably protected and preserved over time.

Historic districts that do not include fundamental resources would not be expected to experience the same level of impacts, although some direct impacts could be considered adverse. A number of widespread beneficial impacts would be expected for all historic districts and structures (historic zoning, adaptive reuse of historic structures, maintenance/ preservation), but they are not believed sufficient to outweigh the substantial adverse impacts expected on fundamental resources in historic districts under this alternative (this is also true for alternative B).

Adverse impacts related to management of portions of historic districts under the Ruins Subzone would be similar under alternatives B and C. Both action alternatives would result in fewer adverse impacts on fundamental resources than would the no-action alternative. When compared to alternative B, alternative C would provide for additional and enhanced cultural resource preservation treatment for historic districts, structures, and landscapes (e.g., Fort Hancock and Sandy Hook Proving Ground, Fort Wadsworth, Floyd Bennett Field, and Jacob Riis Park).

Impacts on historic districts anticipated under alternative C would be considered a significant adverse impact on cultural resources. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable adverse cumulative impacts on historic districts.

The loss of fundamental historic structures under this alternative would be less than that expected under the no-action alternative and similar to that expected under alternative B. Impacts on historic structures anticipated under alternative C would not be considered

a significant impact on historic structures. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable cumulative impacts on historic structures.

Archeological Resources

Archeological resources are the remains of past human activity; they are typically buried, but may extend aboveground. These resources are commonly associated with pre-contact peoples but also may be products of more contemporary societies. At Gateway, many of the archeological resources fall into this latter category.

Laws and Policies

The primary NPS regulatory and policy framework for the management of archeological resources includes the following:

- Director's Order 28: *Cultural Resources Management Guidelines*
- Director's Order 28A: *Archeology*
- NPS *Management Policies* 2006
- The National Historic Preservation Act
- Executive Order 11593, "Protection and Enhancement of the Cultural Environment"
- Enabling Legislation, Gateway National Recreation Area
- Service-wide Programmatic Agreement

Methods

Information on archeological resources was obtained through background research which included review of existing reports provided by Gateway—archeological overviews and assessments, cultural landscape reports, management plans, various archeological reports related to development projects, National Register nomination forms, historic structures reports, and general historical background documents for the park.

Potential impacts on in situ archeological resources are assessed based on the amount of disturbance a resource has experienced and the level of remaining integrity of the resource. If identified or potential archeological resources fall within an existing historic district in the park, they are discussed in the "Historic Districts" section as part of the larger historic district context. Archeological resources analyzed in this section are those that exist, or for which there is the potential to exist, outside defined historic districts in the park.

The resource-specific context for assessing the significance of impacts under NEPA includes the following:

- The ability to provide meaningful information to the park's archeological record and provide opportunities for archeological research; the archeological record for Gateway is relatively incomplete—numerous archeological resources have been destroyed or covered over by historical landfilling, grading, and other land modifications

- The degree to which the management of archeological resources complies with the National Historic Preservation Act

- The degree to which the management of archeological resources complies with the park's enabling legislation by providing for appropriate programs for preservation, restoration, interpretation, and use of significant historical, cultural, or architectural resources

Alternative A: No Action

Impacts of Alternative A

Under this alternative, certain areas of the park would continue to be managed as natural areas, with visitor access permitted only along established trails. In general, off-trail use of park lands by visitors creates ground disturbance, which can potentially expose archeological resources. The restriction to trail-only use is a direct benefit to archeological resources.

Vegetation management—invasive species removal and native species reestablishment—would continue in the park when funding is available (e.g., in the coastal area of Fort Tilden). Removal and reestablishment activities would be expected to result in ground disturbance of less than 6 inches deep in targeted areas and could potentially disturb buried archeological resources. Although natural processes continue to modify park lands, and historical uses over the past several centuries have resulted in considerable ground disturbance, the potential still exists to discover archeological (both pre-contact and historic) resources in certain undisturbed areas (NPS 2009a, 2011a, 2011b, 2011c). The implementation of mitigation measures designed to address the direct adverse impacts on such yet-undiscovered archeological resources related to vegetation management activities would likely help in limiting the degree of impact.

The park would continue to work with New York City to reestablish native tree species at Floyd Bennett Field Historic District, a resource that has been well documented (Cody and Auwaerter 2009; NPS 1978, 2010c). The ground disturbance expected would be on average 1 to 2 feet deep and 2 to 3 feet in diameter. This activity would have the potential to disturb buried archeological resources. Long-term natural and human modifications to the Jamaica Bay area, including the Floyd Bennett Field area, have occurred over time. The Floyd Bennett Field area has been extensively altered by 20th century grading, filling, and bulkheading. It is estimated that the original land surface lies buried under an average depth of 9 feet of fill. It is not likely that intact pre-contact resources would be encountered. It is considered more likely that evidence of historic uses of the area could be encountered as a result of tree-planting activities. In those cases where archeological material is encountered, the implementation of mitigation measures designed to address such discoveries would result in direct but limited adverse impacts on the resource.

Under this alternative, Hoffman and Swinburne Islands would be managed as habitat and would remain off limits to visitors. These restrictions would be expected to result in long-term direct benefits to any potential archeological deposits from the islands' uses related to immigration (quarantine stations) (NPS n.d.j).

Saltmarsh restoration activities would continue in Jamaica Bay and the Jamaica Bay Wildlife Refuge. Ground-disturbing activities (grading, excavating, etc.) related to these efforts have the potential to affect archeological resources. The amount and depth of ground disturbance would be expected to vary by project. The potential for encountering archeological deposits would be dependent on the location of the activities (NPS 2011c). If archeological deposits are encountered, direct adverse impacts on the resources would be expected, which could be lessened with the implementation of mitigation measures.

The dune areas around Miller Army Airfield would continue to be accessed without designated trails, creating ground disturbance and the potential to disturb archeological deposits (NPS 2011b). If this occurs, direct adverse impacts on the resource would be expected.

Under this alternative, some historic structures would remain as they exist today with no additional maintenance/stabilization and are expected to deteriorate over time (see discussion in Historic Districts above). The gradual loss of these structures has the potential to directly and adversely affect associated archeological resources. If mitigation measures are not undertaken to recover at-risk archeological data, this loss would be permanent.

Cumulative Impacts

Past projects and actions have occurred, primarily since the 19th century, within the currently designated park boundaries and have resulted in a wide variety of impacts on the park's archeological resources. Historical grading and landfilling over the decades has almost certainly destroyed or buried resources. Infrastructure projects—roads, sewer/water facilities, utility transmission lines, general construction, etc.—have involved ground disturbance, which can permanently alter or destroy archeological resources. Park maintenance projects (e.g., vegetation management) have created (and will continue to create) impacts on archeological resources primarily through ground-disturbing activities, but cumulative adverse impacts are believed to be relatively small in scope.

Natural processes (erosion, wave action, wind, storm surges) have undoubtedly resulted in the loss of archeological resources in the park. These losses would have involved both surface and subsurface pre-contact and historic archeological resources, particularly along coastlines, which are subject to more destructive water and wind actions than are areas farther inland.

The effects of climate change on park lands are described in other sections of the EIS, and are a result of several factors including sea level rise and potential extreme precipitation events, heat waves, and increases in severe winds and other weather phenomena. A number of cultural resources have sustained damage over the past few decades because of extreme weather events (winds, storm surges, etc.). In the fall of 2012, Hurricane Sandy's winds and storm surge resulted in considerable damage to park resources, including archeological resources. Rising sea level can have considerable effects on archeological resources along coastlines. The effects of wind and ocean currents have resulted in the exposure of previously buried archeological resources along the coastline (battery structures, bulkhead) (Uschold, pers. comm. 2013). At the same time, sites can be protected when covered by sands

transported by wind and sea action during storm surges (NPS 2009a). Hurricane Sandy, along with many other storms in the past, is a reminder of the importance of considering such future events in the responsible planning for the management of cultural resources.

Other agency projects located in areas surrounding the park have been or will be completed in the future, potentially adding incremental impacts to archeological resources. This could occur if archeological resources associated with and/or complementary to the history and themes reflected by park resources are affected. For instance, a variety of recreation, environmental restoration/enhancement, and development projects proposed by New York City (Vision 2020 plan; New York City Waterfront Action Agenda) (NYCEDC n.d.; NYCDCP 2011) could potentially impact historic properties in areas surrounding park lands. Many of these development actions would result in some degree of ground disturbance, a potential impact on archeological resources. If potentially historic properties have been or will be damaged or lost through project construction, indirect adverse cumulative impacts on archeological resources are assumed. Conversely, if archeological resources have been or are preserved, long-term indirect benefits to the cultural resources of the park are expected. It is believed that the continuing management actions under alternative A (no action) would contribute imperceptible increments to cumulative impacts on archeological resources.

The action alternatives propose the potential development of operations and maintenance facilities consolidated in more optimal park locations to ensure resiliency, but specific locations are undetermined.

Conclusion

Under the no-action alternative, small direct adverse impacts (ground disturbance, deterioration of historic structures) and beneficial impacts (visitor restrictions) on archeological resources would be expected. Beneficial impacts, coupled with mitigation measures to lessen adverse impacts, would promote the park's ability to expand its knowledge of the archeological record for the area. Mitigation actions related to adverse impacts would ensure compliance with the National Historic Preservation Act, as well as helping to fulfill the park's enabling legislation calling for the preservation, restoration, and interpretation of cultural resources. Adverse impacts on archeological resources under the no-action alternative would be expected to be less than under either of the action alternatives. The impacts of the no-action alternative on archeological resources would not be considered significant. The effects of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in imperceptible cumulative impacts on archeological resources.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Under both action alternatives, wetlands center facilities (visitor facilities/education center/trails) are proposed for the Floyd Bennett Field area of the Jamaica Bay Unit of the park. This could be new construction or the facility could be housed in existing historic structures in the park (see the "Historic Structures" section). While facilities are proposed for both alternatives, alternative C would involve less facility development than alternative B. Regardless, new construction and its associated ground disturbance typically pose risks to intact buried archeological deposits. Past archeological investigations in the Jamaica Bay Unit of the park have resulted in the conclusion that much of the area holds a low potential for the presence of pre-contact and, in many case, historic resources. In addition to impacts

from natural processes, much of the area has been dredged, recontoured, filled, graded, and stabilized during historical development activities (Floyd Bennett Field, highway construction, construction of recreational homes/facilities). Although the potential for buried historic archeological resources may be slightly higher under alternative B than alternative C, the probability of encountering undisturbed sites is low (NPS 2011c). If archeological resources were encountered, small-scale direct adverse impacts would be expected, which could be lessened further by the implementation of mitigation measures.

Both action alternatives propose an extensive and comprehensive network of trails in the Floyd Bennett Field Historic District, actions that could result in the disturbance of archeological resources. Floyd Bennett Field has experienced a high degree of historic impact (see discussion immediately above), and the probability of encountering intact archeological resources is low. Any adverse impacts on these resources would be small in scale and would be lessened by the implementation of mitigation measures.

Shore Road (Fort Tilden) would be removed under both action alternatives. Under alternative B, it would be converted to a trail corridor; under alternative C, the area would be restored to its natural condition. Regardless of the alternative, ground disturbance would occur with road removal that could impact buried archeological resources. There is a reasonable expectation that archeological resources related to Fort Tilden (established in 1917) could be encountered (NPS 2011c). If so, direct adverse impacts would occur but would likely be limited in scope; mitigation measures would lessen the impact further.

Some landscape and topographic features may be modified to protect historic structures from future storm surges and flooding. This type of ground disturbance (grading, filling) has the potential to adversely affect archeological depending on locations. Direct adverse impacts are possible but would likely be limited in scope as implementation of mitigation measures would minimize negative effects.

The action alternatives propose the potential development of operations and maintenance facilities consolidated in more optimal park locations to ensure resiliency, but specific locations are undetermined. The development of an operations and maintenance facility within the Sandy Hook Unit would be likely because the damage to existing facilities and equipment from Hurricane Sandy was substantial. What is known of Sandy Hook's landform over the past few centuries is that it has undergone considerable modification related to natural and impeded sediment-transport processes. It has grown incrementally northward and has undergone periodic erosion "along most of its shoreline, including major losses during storm events" (NPS 2009a, 154). Erosion, wind, storm surge, and sand-trapping groins and jetties continue to reshape Sandy Hook. The park also transports sand from the north end of Sandy Hook back to the south and central narrower portion of the site via a sandy slurry pipeline as needed. Evidence of pre-contact archeological resources is present but scarce on Sandy Hook and is believed inadequate in providing a predictive model about potential site locations. Based on information related to sea-level change over the past 8,000 years, it has been suggested that there is the potential for the presence of archeological evidence dating back to the Archaic period. The evidence of historic land use is better documented and includes the existence of or potential for archeological sites related to maritime, burial, transportation, communications, and military/defensive resources (NPS 2009a). It is possible that archeological resources could be encountered during the

construction of new operations and maintenance facilities on the Sandy Hook Unit of the park. Although this would result in a direct adverse impact on archeological resources, the impact would be lessened by the implementation of mitigation measures.

The rebuilding of beach centers lost in Hurricane Sandy in the Sandy Hook Unit of the park could involve minor ground disturbance, a possible adverse impact on archeological resources, depending on the locations selected. With the implementation of mitigation measures, adverse direct impacts would be expected to be limited in scope.

The park's terrestrial and submerged archeological resources would remain intact and undisturbed, unless the removal of artifacts is justified for preservation treatment, protection, research, interpretation, or development requirements. This action would preserve most archeological resources in place in a stable, protected condition, considered a long-term direct benefit to the park's archeological resources.

Both action alternatives propose the designation of some historic structures in the Ruins Subzone where these resources would be essentially unmanaged and allowed to decay/ deteriorate over time. The gradual loss of these structures has the potential to directly and adversely affect associated archeological resources. If mitigative measures are not undertaken to recover at-risk archeological, this loss would be permanent.

A number of actions related to the maintenance and enhancement of the natural environment are proposed under both action alternatives. These include the removal of invasive species and reestablishment of native plants, tree planting, wetland creation/ enhancement, restoration of coastal habitats, maintenance of natural beach/dune habitats, and beach nourishment. These efforts would involve a variety of impacts that can affect archeological resources and are primarily related to ground disturbance (grading, excavating, hand digging) and filling (beach nourishment). Ground disturbance could vary from no greater than 6 inches below the surface in targeted areas (invasive species removal/ planting of native species; enhancement/restoration of coastal habitats) to several feet in depth (wetland creation). The potential for encountering archeological deposits would be dependent on the location of the activities (NPS 2009a, 2011a, 2011b, 2011c). If archeological deposits were encountered, direct adverse impacts on the resource would be expected, which could be lessened with the implementation of mitigation measures.

Beach nourishment would have the potential to affect offshore, submerged archeological sites. Changes in sea level through the millennia are believed to have made larger terrestrial areas available for pre-contact human occupation in the area, much of which is now submerged. During a past project, researchers reported finding over 200 pre-contact artifacts along a stretch of beach in Monmouth County, New Jersey, which had just been renourished by sand dredged offshore in an area east of Sandy Hook (Panamerican Consultants 2001). Depending on where sand is procured for beach nourishment (in park jurisdictional waters or not), there is the potential that the park's submerged archeological deposits may be directly and adversely impacted.

~~The development of new restroom facilities (Plumb Beach) and new picnic/open space and trail connections to New York City park lands (Bergen Beach) is unlikely to impact intact~~

~~archeological resources due to the disturbed nature of the area (which has been dredged and filled) (NPS 2011b). If archeological resources were encountered, impacts would be expected to be limited in scope.~~

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

Under alternative B, Hoffman and Swinburne Islands would be managed for their cultural and natural resources, continuing an existing long-term direct benefit to potential archeological resources on the islands. ~~Tours and limited visitor access to the islands would most likely be allowed along established trails only~~, If very occasional tours are provided, they would be in the company of NPS personnel and visitors would use established trails, a long-term benefit to archeological resources. Trail construction and visitor use on these islands would result in a minor amount of ground disturbance, which has the potential to impact archeological resources. The potential to adversely and directly impact these resources is believed to be small; with the implementation of mitigation measures, adverse impacts would be limited in scope.

A variety of recreational facilities would be developed at Fort Wadsworth, including multi-use trails with connections from the New York City Greenway and adjacent areas, lodging, and additional camping, all of which would result in a certain amount of ground disturbance. Some areas of Fort Wadsworth are believed to have the potential to include intact pre-contact and historic deposits (NPS 2011b). Although it is possible that buried archeological resources could be encountered during the development of these recreational facilities, with the implementation of mitigation measures, direct adverse impacts would be limited in scope.

Under this alternative, it is possible that a facility for a new cooperative stewardship program among the park, New York City and others, tentatively named the JBSRI, would be constructed in the Jamaica Bay Unit of the park. Although the potential for buried historic archeological resources may be slightly higher under this alternative, the probability of encountering undisturbed sites is low (NPS 2011c; see the "Historic Structures" section under "Common to Both Action Alternatives"), and likely to be no more than a small-scale adverse impact on archeological resources, lessened further by the implementation of mitigation measures.

A variety of recreational facilities would be removed (ball field complex), improved (bicycle infrastructure), or built (possible camping, trailhead at park entrance) in the Great Kills Park area. In addition, the removal of invasive species and tree planting is planned in this area. All these actions would involve some degree of ground disturbance, which has the potential to disturb buried archeological resources. Much of the Great Kills Park area was created in the early to mid-20th century by extensive dredging and landfilling operations that expanded the available land to accommodate its use as a public park. Land surfaces and shorelines predating the landfill are no longer apparent. Prior to landfilling, the area was a marshy area subject to considerable erosion and reshaping of the shoreline. The potential for

encountering intact archeological deposits during recreational facility development is very limited. Impacts on archeological resources related to this action are believed to be unlikely, but if they were encountered, direct adverse impacts would be very limited in scope.

New recreational facilities (picnic pavilion, trailhead/trails, community event space) would be developed at Miller Field. One area proposed for development is the site of a former hangar at Miller Field that is not considered part of the Miller Army Airfield Historic District. These facilities are to be developed in areas considered already developed/impacted and the likelihood of encountering intact archeological deposits is considered unlikely. Any adverse impact on discovered resources would be expected to be direct, adverse, and limited in scope.

New maintenance areas would be developed at Floyd Bennett Field to accommodate additional uses and sustainable operations. Development of a new maintenance area would likely involve ground disturbance that could impact archeological resources. However, this area of the park is believed to have sustained considerable historic impact (grading, landfilling) and the likelihood of encountering intact archeological resources would be low. If they were encountered, adverse impacts would be expected to be small in scope.

The creation of a network of trails and boardwalks and nature study facilities at the Jamaica Bay Wildlife Refuge would have the potential to impact intact archeological resources through ground disturbance. The likelihood of this would depend on the specific locations of the facilities. There are many areas of the refuge that have sustained considerable modifications related to past landfilling and dredging activities (NPS 2011c). If archeological resources are encountered, adverse impacts are likely to be limited in scope and lessened further through the implementation of mitigation measures.

At Jacob Riis Park, hard courts and other impervious surfaces on the west side of the park would be removed to soften the site and build resiliency to storm surges. The removal of these surfaces would cause ground disturbance, which can impact intact archeological resources. The park's west side has the potential of yielding evidence of an earlier children's hospital and the Rockaway Naval Air Station, both dating to the early 20th century (NPS 2011c). Should archeological resources be encountered, impacts would be direct and adverse; however, the implementation of mitigation measures would lessen the impact.

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have had or could have adverse cumulative impacts on archeological resources, as described under alternative A (no action). It is believed that the management actions proposed under alternative B would contribute imperceptible adverse cumulative increments to impacts on archeological resources.

Conclusion

Actions proposed under both action alternatives have the potential to result in adverse and beneficial impacts for archeological resources. Long-term beneficial impacts are expected from the proposal to allow terrestrial and submerged archeological resources to remain undisturbed and intact unless their removal is justified for preservation, protection, research, interpretation, or development requirements. Direct and permanent adverse impacts are possible under both action alternatives related to potential ground disturbance for new facility construction/development (e.g., Floyd Bennett Field, ~~Plumb Beach,~~ Bergen Beach), road removal (Fort Tilden), development of operations and maintenance facilities within the park, rebuilding of beach centers lost in Hurricane Sandy (Sandy Hook Unit), a variety of environmental restoration projects (e.g., wetland creation, beach nourishment, dune restoration) and landscape modifications to protect historic structures from future storm damage. Loss of archeological resources associated with deteriorating structures located within the Ruins Subzone could result in permanent, adverse loss of cultural resources. Beach nourishment activities also have the potential to adversely impact submerged archeological resources. Implementation of mitigation measures for actions that have the potential to cause adverse impacts would likely result in a lessening of the degree of impact on archeological resources.

In addition to the impacts of actions common to both action alternatives, alternative B would be expected to result in small and direct adverse impacts (ground disturbance) and beneficial impacts (visitor restrictions) on archeological resources. Adverse impacts would be related to facility development and removal of impervious surfaces. Beneficial impacts from the alternative, coupled with mitigation measures currently in place for adverse activities, would help promote the park's ability to expand its knowledge of the archeological record for the area. Mitigation actions related to adverse impacts would ensure compliance with the National Historic Preservation Act, as well as helping to fulfill the park's enabling legislation calling for the preservation, restoration, and interpretation of cultural resources. Potential impacts on archeological resources would be expected to be greater under this alternative than under the no-action alternative. The impacts of alternative B on archeological resources would not be considered significant. The impacts of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in imperceptible cumulative impacts on archeological resources.

A new "coastal defense trail" and other designated trails would be developed at Fort Wadsworth to provide interpretive experiences for visitors and access to the shoreline. Trail construction would involve ground disturbance, which has the potential to negatively impact archeological resources.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Under this alternative, Hoffman and Swinburne Islands would be managed for their cultural and natural resources with no visitor access. This is currently the case, so alternative C would continue the existing benefits of no action. Specifically, these restrictions would be expected to continue long-term direct benefits to any potential archeological deposits from the islands' uses related to immigration (quarantine stations) (NPS n.d.j).

A new "coastal defense trail" and other designated trails would be developed at Fort Wadsworth to provide interpretive experiences for visitors and access to the shoreline. Trail construction would involve ground disturbance, which has the potential to negatively impact archeological resources. Some areas of Fort Wadsworth are believed to have the potential to include intact pre-contact and historic deposits (NPS 2011b). Although it is possible that buried archeological resources could be encountered during trail construction, with the implementation of mitigation measures, direct adverse impacts would be limited in scope.

Small-scale camping areas would be developed at Floyd Bennett Field, an action that could result in ground disturbance and impacts on buried archeological resources. The Floyd Bennett Field area has experienced considerable historic impacts (see above discussion), and it is not likely that intact archeological resources remain in this area. Impacts on these resources would be direct and adverse and would be lessened by the implementation of mitigation measures.

Habitat enhancements would include the establishment of a habitat corridor in the Spring Creek area of the Jamaica Bay Unit. This would be designed to connect the park and New York City park lands and would include the removal of invasive species, an action that has the potential to disturb archeological resources. Ground disturbance would not be expected to be deeper than 6 inches in targeted areas if the plants are removed by hand. If archeological resources were encountered, the direct adverse impact would be small in scale and would be lessened by the implementation of mitigation measures.

This alternative proposes trails and an expanded picnic grove at Jacob Riis Park (Jacob Riis Historic District). It also proposes the removal of impervious surfaces where possible, to a greater degree than that proposed under alternative B. These actions would result in a certain amount of ground disturbance, which has the potential to impact archeological resources. In particular, the park's west side has the potential of yielding evidence of an earlier children's hospital and the Rockaway Naval Air Station, both dating to the early 20th century (NPS 2011c). Should archeological resources be encountered, impacts would be direct and adverse; however, the implementation of mitigation measures would lessen the impact.

Alternative C calls for the provision of limited camping opportunities and an improved trails system in the backcountry of Fort Tilden, both of which would have the potential to impact archeological resources through ground disturbance. As mentioned above, there is a reasonable expectation that archeological resources related to Fort Tilden (established in 1917) could be encountered (NPS 2011c). If so, direct adverse impacts would occur but would likely be limited in scope, and mitigation measures would lessen the impact further.

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have had or could have adverse cumulative adverse impacts on archeological resources, as described under alternative A (no action). It is believed that the proposed management actions under alternative C would contribute imperceptible adverse increments to the cumulative impacts on archeological resources.

Conclusion

Actions proposed under both action alternatives have the potential to result in adverse and beneficial impacts for archeological resources. Long-term benefits are expected from the proposal to allow terrestrial and submerged archeological resources to remain undisturbed and intact unless their removal is justified for preservation, protection, research, interpretation, or development requirements. Direct and permanent adverse impacts are possible under both action alternatives related to potential ground disturbance for new facility construction/development (e.g., Floyd Bennett Field, Plumb Beach, Bergen Beach), road removal (Fort Tilden), development of operations and maintenance facilities within the park, rebuilding of beach centers lost in Hurricane Sandy (Sandy Hook Unit), a variety of environmental restoration projects (e.g., wetland creation, beach nourishment, dune restoration) and landscape modifications to protect historic structures from future storm damage. Loss of archeological resources associated with deteriorating structures located within the Ruins Subzone could result in permanent, adverse loss of cultural resources. Beach nourishment activities also have the potential to adversely impact submerged archeological resources. Implementation of mitigation measures for actions that have the potential to cause adverse impacts would likely result in a lessening of the degree of impact on archeological resources.

In addition to the impacts of actions common to both action alternatives, alternative C would be expected to result in small and direct adverse impacts (from ground disturbance) and beneficial impacts (from visitor restrictions and buried resources remaining protected) on archeological resources. Adverse impacts would be related to facility development and removal of impervious surfaces. Beneficial impacts from the alternative, coupled with mitigation measures for adverse impacts, would help promote the park's ability to expand its knowledge of the archeological record for the area. Mitigation actions related to adverse impacts would ensure compliance with the National Historic Preservation Act, as well as helping to fulfill the park's enabling legislation calling for the preservation, restoration, and interpretation of cultural resources. The potential impacts on archeological resources would be expected to be greater under this alternative than under the no-action alternative, but similar to those expected under alternative B. The impacts of alternative C on archeological resources would not be considered significant. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in imperceptible cumulative impacts on archeological resources.

Museum Collections

Gateway's museum collections contain a significant number of objects, works of art, historical documents, and/or natural history specimens that have been collected/maintained for preservation, research, and public interpretation.

Laws and Policies

The primary NPS regulatory and policy framework for the management of museum collections includes the following (please refer to the "Guiding Regulations and Policies" section for more detail):

- Director's Order 28: *Management of Museum Objects*
- Director's Order 24: NPS Museum Collections Management
- NPS *Management Policies* 2006
- Enabling Legislation, Gateway National Recreation Area
- Final Collection Management Plan (CMP), Gateway National Recreation Area
- Scope of Collection Statement, Gateway National Recreation Area
- NPS Service-wide Storage Plan
- Department of Interior Museum Property Handbook
- NPS Museum Handbook

Methods

Under the no-action alternative, Fort Wadsworth would continue to be considered as a regional storage center for the park's museum collections

Information on Gateway's museum collections was obtained by a review of the CMP (NPS 2009b), the Scope of Collection Statement (NPS 2011d), and the Park Museum Collection Storage Plan (NPS 2006d).

Museum collections (objects, specimens, and archival and manuscript collections) are important park resources and are valuable for the information they provide about processes, events, and interactions among people and the environment (NPS 1998a). Gateway manages a variety of museum objects and archival materials. Museum holdings include significant cultural collections associated with local military, aviation, and maritime history; pre-contact artifacts dating back to the Woodland period; archive and manuscript collections (NPS management records, rare books); and natural history and geology collections (NPS 2011d). Potential impacts on museum collections are evaluated based on the effects on the overarching goal of appropriate planning, preservation, and protection of the park's museum holdings.

The resource-specific context for assessing the significance of impacts on museum collections includes the following:

- The degree to which the management of museum collections complies with the park's enabling legislation by providing for appropriate programs for preservation, restoration, interpretation, and use of significant historical, cultural, or architectural resources

- The degree to which the park's goal of providing adequate and appropriate collection storage areas in accordance with regulatory and policy guidance is promoted and achieved

Alternative A: No Action

Impacts of Alternative A

Under the no-action alternative, Fort Wadsworth would continue to be considered as a regional storage center for the park's museum collections (NPS 2009b). Park collections are currently housed in the administration building at Fort Wadsworth and, to a smaller degree, at Fort Hancock and Sandy Hook Proving Ground. Damage to structures at Fort Hancock caused by Hurricane Sandy required that some sensitive collections be moved to Fort Wadsworth, where they would remain for the foreseeable future (Mahan, pers. comm.

2013b). The Fort Wadsworth location is considered substandard because of its size and the absence of climate-controlled storage areas. "Substandard storage conditions—evaluated based upon Department of the Interior and National Park Service policy—represent some of the most significant threats to a museum collection" (NPS 2009b, 83). The provision of appropriate storage space as defined in the Department of the Interior Museum Property Handbook (USDOI 2004) and the NPS Museum Handbook (NPS 1990b) would substantially minimize existing risks to the park's museum collections. The continuing use of substandard storage facilities would be considered a substantial direct adverse impact on the park's museum collections.

Cumulative Impacts

Direct cumulative impacts would primarily be related to the lack of adequate and appropriate storage space for the park's museum collections. Indirect cumulative impacts would be related to natural forces, such as storms (e.g., Hurricane Sandy), which put the park's collections at greater risk. It is believed that the proposed management actions under the no-action alternative would contribute noticeable adverse increments to cumulative impacts on the museum collections.

Conclusion

Under the no-action alternative, ongoing deficiencies related to the physical condition of existing collection storage areas at both Fort Wadsworth and Fort Hancock (Fort Hancock and Sandy Hook Proving Ground) have resulted in adverse impacts on museum collections. Much of the collection at Fort Hancock was judged at risk during Hurricane Sandy and has been moved to Fort Wadsworth. The current situation does not further the goals of preservation, restoration, and interpretation of important park resources as defined under Gateway's enabling legislation, nor does it promote the goal set forth in the CMP (NPS 2009b) of identifying and providing adequate and appropriate collection storage areas for the park's collections. The NPS Museum Handbook explains that storage space should be both suitable (adequate for storing museum objects) and sufficient (expandable space for safe, uncrowded storage with room for future growth) (NPS 1990b). Neither the Fort Hancock nor Fort Wadsworth storage areas currently meet the definition of suitable and sufficient. Adverse impacts on museum collections under this alternative would not be considered significant at this time. However, if substandard conditions continue and deteriorate to the point where important cultural or historic collections associated with the park's National Register properties are lost, impacts considered to be significant on the park's museum collections are possible. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable adverse cumulative impacts on museum collections.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Under the action alternatives, the park's museum collections would be improved with upgraded and/or new archival facilities. The park's collections would be consolidated into suitable archival facilities that meet NPS standards and guidelines and would be

available for research, exhibits, and interpretive programs to better inform the public. The provision of these facilities would be a substantial long-term direct benefit to the park's museum collections.

Alternative B: Discovering Gateway – NPS Preferred Alternative

Impacts of Alternative B

No impacts would occur under alternative B that would not also occur under alternative C (see the "Common to Both Action Alternatives" section).

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have had or could have adverse cumulative adverse impacts on museum collections as described under alternative A (no action). It is believed that the proposed management actions under alternative B would contribute noticeable beneficial cumulative increments to museum collections.

Conclusion

Under alternative B, existing deficiencies related to the physical location and condition of existing collection storage areas at the park would be rectified through the provision of a suitable and sufficient archival facility that meets applicable guidelines and standards. This would further the goal of preservation, restoration, and interpretation of important park resources, as defined under Gateway's enabling legislation. At the same time, it would achieve the goal set forth in the CMP (NPS 2009b) of identifying and providing adequate and appropriate collection storage areas for the park's collections. The implementation of alternative B would result in potentially significant beneficial impacts for the park's museum collections similar to the impacts realized under alternative C, and would provide substantially more benefits to museum collections than the no-action alternative. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable beneficial cumulative impacts on museum collections.



Alternative C: Experiencing Preserved Places

Impacts of Alternative C

No impacts would occur under alternative C that would not also occur under alternative B (see the "Common to Both Action Alternatives" section).

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities have had or could have adverse cumulative impacts on museum collections, as described under alternative A (no action). It is believed that the proposed management actions under alternative C would contribute noticeable beneficial increments to the cumulative impacts on museum collections.

Conclusion

Like alternative B, alternative C would correct existing deficiencies related to the physical location and condition of existing collection storage areas at the park through the provision of a suitable and sufficient archival facility that meets applicable guidelines and standards. Actions under both action alternatives would result in identical impacts on museum collections: potentially significant and beneficial. Both action alternatives would provide substantially more benefits than those realized under the no-action alternative. The impact of activities under this alternative, coupled with the past, present, and future projects noted, would likely result in noticeable beneficial cumulative impacts on museum collections.

Visitor Use and Experience

The visitor uses analyzed in this section encompasses the totality of visitor experiences and visitor uses at Gateway and range widely from water-based recreation, such as swimming and fishing, to community-based recreation, including sports leagues and picnicking, to resource-based visitor experience tied to the exploration and enjoyment of the park's natural environments and historic settings.

Laws and Policies

NPS *Management Policies* 2006 (NPS 2006a) states that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the national parks. Because many forms of recreation may not be suitable for a national park setting, the NPS would therefore seek to do the following:

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

- Defer to local, state, and other federal agencies; private industry; and NGOs to meet the broader spectrum of recreational needs and demands that are not dependent on a national park setting

Unless mandated by statute, the NPS would not allow visitors to conduct activities that would have the following effects:

- Impairing park resources or values

- Creating an unsafe or unhealthful environment for other visitors or employees

- Being contrary to the purposes for which the park was established

- Unreasonably interfering with the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations in the park

Methods

Potential impacts on visitor use and experience are assessed based on the current description of visitor use and experience presented in chapter 3 of this document. Enjoyment of park resources and values by visitors is part of the fundamental purpose of all national parks.

Impacts on visitor use and experience were determined considering the best available information, and the following analysis is qualitative rather than quantitative due to the conceptual nature of the alternatives. Information on visitor use and opinions was taken from the public scoping information for this plan and surveys of visitors and nonvisitors conducted by various researchers and synthesized in *A Synthesis of Existing Visitor Data and Demographic Trends for the Gateway National Recreation Area* for the general management planning project by Pennsylvania State University (Mowen, Graefe, and Graefe 2009).

This impact analysis encompasses various aspects of visitor use and experience, including the effects on visitation levels; diversity of recreation opportunities and national park experiences; night skies and soundscapes; visual quality; visitor education, interpretation, and understanding; and visitor health and safety. For this visitor use and experience impact analysis, a short-term impact would be defined as lasting less than 1 year. A long-term impact would last 15 years or more and would be more permanent in nature. Adverse impacts are those that most visitors would perceive as undesirable. Beneficial impacts are those that most visitors would perceive as desirable.

The resource-specific context for determining the significance of the impacts of the alternatives on visitor use and experience includes the following, all of which are fundamental values for Gateway:

- The ability for visitors to enjoy the following recreation experiences, considered fundamental values by the park: nature observation; water-based activities, such as fishing and swimming; walking, biking, and horseback riding on trails; picnicking; and visiting historic sites

- Visitor understanding of the park's coastal defense and maritime history and its connection to national history

- The ability for visitors to experience feelings associated with open space in a high-density area; views of New York Harbor; direct sensory experiences with natural elements; and darkness and night skies.

- The provision of public access to the bay and ocean shorelines

Alternative A: No Action

Impacts of Alternative A

Under alternative A, existing visitor uses and experiences would be maintained and other than repairs and/or facilities required due to damage from Hurricane Sandy, no new visitor facilities would be constructed.

Visitor Use and Characteristics

Visitor use numbers and visitor characteristics would remain consistent with those of the past several years, with no increase in visitation expected. Visitation would continue to remain consistent with the 38-year average of 9 million annual visitors. Visitors would continue to have access to most of the sites in Gateway; only a few areas may restrict access to protect sensitive resources or visitor safety. Parkwide, people would continue to find many opportunities to "get away from it all" and experience the qualities of open spaces and natural areas. These sustained levels of visitation and access would have a long-term beneficial impact.

Due to a lack of signs, poor visibility of existing signs, and inadequate parkwide orientation and promotional information, visitors and potential visitors would remain under-informed about Gateway's extensive park lands. This lack of orientation, wayfinding, and publicity would restrict visitors' and potential visitors' ability to fully explore the park. This would result in a long-term adverse impact.

Visitor Experience: Recreation

Under alternative A, visitors would continue to access a diversity of recreational opportunities in a wide range of settings throughout Gateway. The park's trails, natural areas, ball fields, and picnic areas would be available for visitors and neighboring residents. Alternative A would maintain the existing 87 permanent campsites, in addition to programmatic camping. Additionally, wildlife viewing and nature study would remain important components of the visitor experience. Athletic fields at Fort Tilden and Miller Field would continue to be popular venues for community recreation and league play. Opportunities for both guided and self-guided exploration of the park's historic settings would continue.

Sustaining these recreational opportunities would result in a long-term beneficial impact.

Existing access to the bay, ocean, and beach, as well as water-based recreation opportunities, including fishing, surfing, swimming, kayaking, and enjoyment of Gateway's beaches and waters, would be maintained and continue to contribute beneficially to visitor experience at Gateway. Although some beaches were impacted severely by Hurricane Sandy, water-based and beach recreation facilities and opportunities would be restored throughout the park, including at Jacob Riis Park and Sandy Hook. On Sandy Hook, water-based recreation would

be maintained on both the Atlantic and Bayside of the peninsula. Hoffman and Swinburne Islands off Staten Island would remain closed to visitor access, adversely impacting visitors and boaters' interest in accessing those sites.

At Fort Tilden, Fort Wadsworth, and Sandy Hook, visitors would continue to have only limited access to the park's collection of military structures, because many of the fortifications remain closed to public access or are open only on a limited basis for guided tours or programs, resulting in a long-term adverse impact on visitor experience.

Under alternative A, the Pennsylvania Avenue and Fountain Avenue Parks would not serve as a recreational resource for park visitors because they would be managed as natural areas with only limited and controlled public access. Access to Spring Creek would not be improved. The limited access and recreation opportunities in these areas under alternative A would result in an adverse impact on visitor experience.

Visitor Experience: Night Sky

Visitor understanding of the extent of coastal defense structures and coastal defense history at Gateway would continue to be limited by lack of access to and interpretation of the system of fortifications at Fort Wadsworth, Fort Tilden, and Sandy Hook.

With only 87 campsites and periodic programmatic camping programs at Floyd Bennett Field's Ecology Village, opportunities to experience the night sky would remain limited, which would result in a long-term adverse effect because "direct sensory experiences with natural elements and darkness and night skies" is a fundamental park value. However, this impact would be balanced by the fact that no new development and associated sources of night lighting would adversely impact the current experience of night skies.

Visitor Experience: Soundscapes

Experience of the natural soundscapes would remain unchanged and adverse impacts on the soundscape would only be short term, resulting from maintenance operations and/or heavy equipment needed for Hurricane Sandy repairs, facility improvements, and/or rehabilitation or restoration projects.

Visitor Experience: Visual Quality

The existing overlook at Fort Wadsworth and other popular areas for taking in scenic vistas would be maintained throughout the park. However, the visual quality and experience of historic settings and vistas would continue to be adversely impacted by deteriorating historic structures, resulting in an adverse impact. Views of uncared-for, dilapidated buildings and structures would detract from the visual quality of historic settings and temper the experience of historic coastal defense structures and cultural landscapes at Fort Tilden, Fort Wadsworth, Fort Hancock, and Floyd Bennett Field.

Visitor Experience: Education, Interpretation, and Understanding

A variety of educational and interpretive programs would continue to be offered by the NPS and its partners throughout the park. At Fort Wadsworth and Sandy Hook, scheduled guided interpretive programs and ad hoc living history programs would continue. Interpretation of

Sandy Hook's significant maritime resources, including the Sandy Hook Lighthouse and the Spermaceti Cove Life Saving Station, would continue to benefit visitors' understanding of the park's maritime history.

Visitor understanding of the extent of coastal defense structures and coastal defense history at Gateway would continue to be limited by lack of access to and interpretation of the system of fortifications at Fort Wadsworth, Fort Tilden, and Sandy Hook. At Fort Tilden, for example, Batteries Kessler and Harris would continue to deteriorate, the Nike Missile launch site would continue to be used as a maintenance yard, and interpretation of the site's collection of coastal defense resources would be very limited. Also, under current management, access to park collections would not be expanded nor would more of the collection be integrated into interpretive and educational programming. Despite these limitations, continuing the current educational and interpretive programming and maintaining existing interpretive communication strategies (e.g., podcasts, websites, guided tours, print media, and signs) would have a long-term beneficial impact on the Gateway visitor experience and, specifically, visitor education, interpretation, and understanding.

Health and Safety

The park staff would continue to work to improve upon potentially dangerous situations and conditions associated with Gateway's waters, remote natural areas, trip-and-fall hazards, unauthorized building access, and user conflicts. The maintenance of existing visitor safety protocols and communication strategy would result in a beneficial impact on visitor safety in the park. Likewise, maintaining existing access to Gateway's park lands for fitness and wellness activities, such as walking, running, dog walking, and exercise routines (e.g., Tai-chi chuan, yoga), and encouraging recreational use of Gateway's park lands would result in a beneficial impact on community health and visitor physical fitness.

Cumulative Impacts

Cumulative impacts on visitor use and experience from past, present, and reasonably foreseeable projects would result from the park's urban context, regional population growth and residential development, recreation park improvements and natural habitat restoration projects, and climate change.

Urban Context

Located in the New York City metropolitan region, the Staten Island and Jamaica Bay Units are subject to impacts in their surrounding urban context. Noise from city streets, construction projects, and airplane and helicopter flyovers results in short-term adverse impacts on visitor experience. Additionally, operation of the facilities (e.g. compressor stations) associated with the Rockaway Project natural gas pipeline that will be located in Floyd Bennett Field would slightly increase noise levels for visitors in the near vicinity of the facilities. Viewing of the night sky is an important aspect of visitor experience in Gateway; however, the park's night sky visibility is affected by light pollution from the urban environment throughout the park, resulting in a long-term adverse impact on visitor experience. This light pollution, however, is dissipated in the more remote reaches, where

In 2011, New York City set the stage for expanded use of the city's waterfront for parks, housing, and economic development and its waterways for transportation, recreation, and natural habitats when it released the Vision 2020: New York City Waterfront Plan.



the overnight or evening visitor can experience relatively dark night skies in a natural setting with only dim and distant artificial lights. The environmental qualities of the urban context, including air pollution, crowding and congestion, stress, and water quality, would continue to have adverse cumulative impacts on public health and safety.

Park Recreational Improvements and Natural Habitat Restoration Projects

In 2011, New York City set the stage for expanded use of the city's waterfront for parks, housing, and economic development and its waterways for transportation, recreation, and natural habitats when it released the Vision 2020: New York City Waterfront Plan (NYCEDC 2011). The 10-year plan is accompanied by the New York City Waterfront Action Agenda (Waterfront Action Agenda) (NYCEDC n.d.), an outline of 130 high-priority projects that will catalyze waterfront investment, improve water quality, and expand public access. These projects, which include habitat restoration and shoreline stabilization, new and expanded parks, water quality improvements, and the transformation of vacant properties into waterfront destinations, as well as residential developments, will have both beneficial and adverse impacts on the Gateway visitor use and experience.

By drawing more attention to the waterfront and inviting more public use and enjoyment of the New York City shoreline, these projects will likely raise awareness of Gateway and build greater interest in opportunities for water-based and beach recreation and exploring coastal natural areas and open spaces, resulting in a cumulative beneficial impact on visitor use and visitor experience. Improving the condition of degraded habitat and investing in water quality will only make nature-based and water-based recreation in the region more appealing to visitors and groups and would result in long-term beneficial impacts on visitor experience, including health and safety. Cleaning the Jamaica Bay waters would result in a substantial benefit to visitor health and safety. A greater focus on the New York City waterfront and more appealing development along the coastline would make it likely that water-based tours in Jamaica Bay and New York Harbor led by tourism outfitters, nonprofits, and park partners would increase and create additional opportunities to learn about and see Gateway's historic and natural resources, resulting in a long-term beneficial impact on visitor and potential visitor understanding of the park's resources.

However, some of the new park development projects proposed in the Waterfront Action Agenda, like the Seaside Nature Park Playground and Fresh Kills Park on Staten Island, Ecology Park at Paerdegat Basin in Brooklyn, and the Rockaway Beach Park could draw potential visitors away from Gateway, resulting in a short-term adverse impact on visitor use.

Regional Population Growth and Residential Development

As articulated in the "Transportation" section of chapter 3, population growth in the New York City area has been substantial and rapid. If population growth combined with new and expanding residential developments near Gateway park lands, such as Edgemere in Queens, Avenue by the Sea on the Rockaways, and the Stapleton Homeport Development project on Staten Island, result in substantial increases in visitation numbers, crowding, and congestion in Gateway's park lands, these actions outside the park would result in long-term adverse impacts on visitor experience (NYCDCP 2011). Although regional population growth has not

yet resulted in increased park visitation, the trend in regional growth could still result in an adverse affect because many park facilities have not been sufficiently maintained and/or have not been updated sufficiently to accommodate existing levels of visitation.

Additionally, new and expanding residential development along the waterfront and in areas surrounding Gateway park lands would also result in adverse impacts due to increased night lighting, more noise, and obstructed views. Night lighting from adjacent residential and commercial development would have a cumulative adverse impact on the night sky inside the park boundaries. Similarly, road noise due to traffic and congestion and construction noise resulting from projects on near or adjacent lands would likely increase, resulting in adverse impacts on the park soundscape. With more development on the New York City waterfront, the visual quality of views of New York Harbor and vistas from Gateway's historic coastal defense settings would also be adversely impacted.

Climate Change

Sea-level rise, and possible projected extreme precipitation events, heat waves, and increases in severe winds or other phenomena related to climate change are likely to have substantial long-term adverse impacts on visitor experience at Gateway. As a result of damage sustained during Hurricane Sandy, the park was closed to visitation for three months. Plans are in place in Gateway and surrounding parks and communities to rebuild damaged visitor and recreation facilities and to make beaches and other areas safe for visitation for the summer 2013 season. The NPS and its NYC partners are focusing on rebuilding in a manner that would minimize impacts from future storms. This may include exploring temporary architectural solutions, relocating facilities and using natural buffers to increase resiliency to storm surges.



Taken together, these past, present, and reasonably foreseeable actions have resulted in primarily adverse impacts on the visitor experience of the area's park systems. Park infrastructure, including roads, parking, and circulation systems; facilities and buildings; and visitor amenities and concessions were all badly damaged by Hurricane Sandy, revealing the substantial adverse impacts storm surges and other environmental phenomena related to climate change can have on the park. Regional growth would have noticeable adverse impacts on visitor experience, including night skies and soundscapes, and diminished opportunities to find a sense of solitude and connection to natural resources amid an increasingly urbanized environment. However, New York City's concerted efforts to improve natural resource conditions and water quality at and around the city's waterfront would result in substantial long-term benefits to the visitor use and experience at Gateway. When the impacts on visitor use and experience under alternative A are combined with the impacts from other projects outside of Gateway's boundaries, alternative A would contribute imperceptible beneficial increments to the overall cumulative impact.

Conclusions

Alternative A would result in long-term beneficial impacts from continued opportunities to access resource-dependent visitor opportunities and experience the natural, historic, and scenic qualities of the park. Visitors would continue to have extensive recreation and beach



opportunities, which are some of the most valued activities in the park. Alternative A would contribute imperceptible beneficial increments to the overall cumulative impact.

Impacts of Alternatives B and C

Visitor Use and Characteristics

Under both alternatives, the NPS and its partners would significantly increase the promotion of the park's offerings and outreach to a variety of existing and potential visitors and user groups. Additionally, both alternatives would use orientation portals, new technologies, contact stations staffed by park rangers, and improved signs and wayfinding to better support access to diverse recreation opportunities, and to help connect visitors with the information and support services they need to plan and enjoy their visit to the park. These efforts to promote Gateway, make the park more welcoming, and improve visitor orientation would result in a long-term beneficial impact on experience at the park.

These outreach, wayfinding, and orientation improvements, along with more diverse recreation opportunities, activities, and park experiences under both alternatives, would likely increase visitation and encourage more repeat visits. Although increased visitation numbers and potentially more crowds and congestion may be construed as a negative impact, on balance, the provision of more and improved visitor uses and recreation opportunities would result in a substantial long-term beneficial impact. This long-term beneficial impact is especially likely given that both alternatives would include upgraded facilities and new facilities designed to accommodate larger visitor numbers, as well as improved systems for moving visitors to and through the park as articulated in the "Transportation" section of chapter 3.

Although public access to the vast majority of park lands would be maintained and enhanced through transportation improvements, public access would be restricted in the Sensitive Resources Subzones under both alternatives in order to reduce impacts on sensitive habitat. This may result in a short-term adverse impact on visitors currently using these areas; however, the new, more restrictive management would allow for enhanced opportunities for research, guided tours, and educational programming associated with these highly sensitive and exceptional resources. Therefore, the restricted access would provide a long-term beneficial impact on visitors who value nature study, solitude, and connecting with natural areas.

Visitor Experience: Recreation

In both action alternatives, rehabilitation, expansion, and upgrades to existing facilities, including trails, trailheads, campsites, and picnic areas, as well as improvements to visitor amenities, including building shade structures and upgrading restrooms, would better support visitor and recreation activities throughout the park. In particular, under both alternatives the following areas of the park would see identical improvements to recreation and visitor use facilities, all of which would result in long-term beneficial impacts on visitor experience: Canarsie Pier, Frank Charles Memorial and Hamilton Beach Parks, Breezy Point Tip, and Miller Field.

Canarsie Pier. At Canarsie Pier, the park would be improved to accommodate community events and offer more picnic and gathering space for local residents, and instructional programming would be expanded.

Frank Charles Memorial and Hamilton Beach Parks. At both parks, water access would be improved and current uses would be maintained.

Breezy Point Tip. At Breezy Point Tip, recreational opportunities for fishing, surfing, and other beach-based recreation would be maintained. At the two beach clubs, general visitor uses would be expanded to include more beach recreation opportunities, including watercraft launch sites and equipment rental facilities.

Miller Field. At Miller Field, the fields would be improved to better accommodate the intensive use they already receive. Other improvements at Miller Field would include trail system expansion and upgrades, new recreation facilities in the forest that would appeal to young people and their families, and more facilities to accommodate groups and water-based recreation. Hangar 38 would be stabilized in both alternatives and potentially developed as an indoor recreation facility. Under both alternatives, the existing ball field complex would be removed from Great Kills Park and this use would be consolidated on Staten Island at Miller Field.

Under both alternatives, the management of athletic fields and sports leagues at Miller Field and Frank Charles and Hamilton Beach Parks would be transferred to a third party. Given that the third party would be better versed in managing these recreation uses and facilities than the NPS, this shift in management would result in a beneficial impact on visitor experience under both alternatives.

Water-based recreation would also be enhanced under both alternatives with the development of additional kayak launch and landing sites and the designation of water trails. Opportunities for nature study and experiencing the outdoors and open spaces, including the park's coastlines, would be improved under both alternatives with the expansion of overnight experiences, the creation of more recreational spaces and facilities (such as at existing Pennsylvania Avenue and Fountain Avenue Parks and Spring Creek), and the expansion of trail systems throughout many of Gateway's park lands. The result of this expansion and improvement of recreation opportunities under both alternatives would be a long-term beneficial impact.

The following paragraphs present concise summaries of additional recreation-related proposals common to both action alternatives.

Wetlands Center. Although the scale of the facility development would vary in scale under alternatives B and C, the wetlands center at Floyd Bennett Field is a key new facility development under both alternatives that would result in a substantial long-term beneficial impact on visitor experience. In addition to creating expanded recreational opportunities by offering an extensive trail system and number of outdoor observation facilities, the wetlands center would result in a substantial beneficial impact on visitor understanding of coastal ecology, wetlands, and Jamaica Bay.

Camping. Under both alternatives, the visitor experience at Gateway would benefit substantially from the increase in the number campsites and the expansion of camping programs in the three park units.

Fort Tilden Athletic Fields. At Fort Tilden, sports fields would be removed and relocated to Jacob Riis Park, resulting in an adverse impact on visitors currently using these facilities; however, these uses would not be lost, simply relocated.

Great Kills Marina. Great Kills Marina would be rebuilt and enhanced to offer a variety of visitor services and recreational opportunities (e.g., kayak concessions, water trails, instruction boating zones, and sailing lessons) in addition to typical marina uses such as boat slips. With more uses and improved facilities, the new marina would result in long-term beneficial impacts.

Fort Hancock. Under both action alternatives, buildings at Fort Hancock would be rehabilitated to accommodate a wide variety of uses. By facilitating more and improved uses and experiences of the historic setting, including overnight use, the rehabilitation of Fort Hancock would result in substantial long-term beneficial impacts on visitor experience.

Jacob Riis Park. Following the repairs needed to address damage from Hurricane Sandy, the Jacob Riis bathhouse would be maintained and continue to accommodate park and beach users. Under both alternatives, hard courts on the western side of Jacob Riis Park would be removed in order to soften the site and build resiliency to storm surges. This reduction in court facilities would have an adverse impact on visitors who regularly use these facilities. However, efforts to soften the park by reducing impervious surfaces would potentially reduce the amount of damage from future storms, resulting in a beneficial impact.

Visitor Experience: Night Skies

Creating campgrounds and offering additional overnight experiences at the park under both alternatives may slightly increase night lighting. Camping in lighted structures, such as in established canvas tents and in RV parks, or even where electricity is not available, would result in light from fires, lanterns, and other camping-related equipment. This would increase lighting where it is currently dark, resulting in an adverse impact on visitor experience.

Additionally, reuse of historic buildings at Fort Hancock for overnight accommodations and other historic structures and cultural landscapes for programmatic camping (e.g., Mortar Battery, Battery Weed, and Fort Tompkins) may result in night lighting with adverse impacts on the night sky. However, these same proposed activities would provide unique opportunities to view a more natural night sky than most regional residents are able to see normally, which would be a substantial long-term beneficial impact.

The only substantial new facility development under both alternatives, the wetlands center at Floyd Bennett Field, would result in night lighting, with adverse impacts on the night sky experience at Floyd Bennett Field.

Visitor Experience: Soundscapes

Long-term and sustained adverse impacts on park soundscapes under both action alternatives would result from increased noise levels related to human activity and intensified recreational use at certain park sites, including Floyd Bennett Field, Great Kills Park, and Fort Wadsworth. The wetlands center, in particular, would attract many more visitors to Floyd Bennett Field and would result in adverse impacts on the natural soundscape from visitor transportation and human activity. Also, new or expanded picnic areas and/or community gathering spaces at park lands throughout Gateway would concentrate noise and affect the soundscape.

Although the number of visitors would likely increase under both alternatives, it is also expected that there would be fewer cars because of the availability of public or alternate transportation (which the park would encourage visitors to use), resulting in a beneficial impact on soundscapes.



Loud noises associated with heavy equipment used to remove degraded historic structures, repair Hurricane Sandy damage, create campgrounds, create wetlands, and build new facilities would occur under both alternatives and would result in short-term adverse impacts.

Visitor Experience: Visual Quality

Opportunities to experience scenic views of New York Harbor and other Gateway waters, historic settings, and natural areas would be maintained under both alternatives. Trail expansion and enhancement proposals at Great Kills Park, Fort Wadsworth, the Pennsylvania Avenue and Fountain Avenue Parks, Spring Creek, Fort Tilden, Floyd Bennett Field, and Sandy Hook that include the addition of overlooks, viewing platforms, interpretive signs, and scopes and/or blinds would improve opportunities for scenic viewing. Under both alternatives, rehabilitated historic structures and increased access to more batteries and fortifications would allow for more scenic viewing from the perspective of those who once defended New York Harbor. Finally, increased water-based recreation programming, including kayak instruction and tours as well as guided boat tours, would create additional opportunities to view the park's landscapes and structures form the water. Together, these proposals for facility improvements and expanded access and programming would result in substantial long-term benefits.

Visitor Experience: Education, Interpretation, and Understanding

Under both action alternatives, visitors would have new opportunities to understand the significance of the park's ecological resources as well as its historic structures. This would be accomplished through rehabilitation of historic structures, greater access to coastal defense resources, and/or expanded interpretation of the park's cultural landscapes, buildings, and significance in all three units. As noted above, a wetlands center and the creation of freshwater and saltmarsh wetlands on Floyd Bennett Field would serve as an additional environmental education resource for park staff and park partners. Visitor awareness of Floyd Bennett Field's aviation history would also be elevated under both alternatives

through expanded interpretation, airplane exhibits, and rehabilitated hangars. Representing greater access to historic structures, more interpretation of natural and cultural resources, and expanded programming, these proposed actions would result in substantial long-term beneficial impacts.

Further, while the JBSRI would cater to academics and researchers, and not the general visitor, it is likely that research findings from studies conducted at the JBSRI would be translated into interpretive media and/or incorporated into environmental education programming at the park, resulting in an additional beneficial impact.

Health and Safety

Neither action alternative would be expected to increase threats to visitor safety and both include measures that would help ensure safe visitor enjoyment of Gateway's park lands; therefore, impacts on visitor safety would be long term and beneficial. By removing and or stabilizing deteriorating structures throughout the park, the NPS would eliminate potential visitor hazards associated with unauthorized access. Additionally, increased ranger presence throughout the park lands under both alternatives would improve response capabilities for park staff and lend reassurance to visitors. Carefully controlling construction sites and natural resource restoration/construction sites with fencing and monitoring would prevent short-term adverse impacts on visitor safety related to new facility and habitat construction projects.

Reusing former landfill areas for visitors could be dangerous if methane gases and slumping were not managed properly; however, the NPS would ensure that the Pennsylvania Avenue and Fountain Avenue Parks would pass all necessary safety inspections before the public uses them. Similar precautions would be taken before opening the areas of Great Kills Park that have been closed due to radiation, resulting in no additional impacts on visitor health and safety.

Both alternatives would provide increased opportunities for physical activity aimed at improving physical health. The addition of bike lanes, bike and other recreation equipment rentals, campgrounds, trails, and greenways, as well as zoning to increase recreational uses in some areas, would result in more physical activity within and between the park sites and improve physical health. The neighborhoods surrounding Jamaica Bay have some of the highest obesity rates in the city (NYCDOHMH 2011), therefore, by making the Gateway park units more visible and more convenient to access, both alternatives have the potential to have a beneficial impact on the physical health of local residents. Opportunities for solitude, natural immersion experiences, and overnight camping could increase mental health as well. Throughout the park, shade structures would be constructed in order to enhance visitor comfort. This shade would also contribute beneficially to visitor health by providing shelter and alternatives to excessive exposure to the sun while enjoying Gateway's beaches and open spaces.

Finally, NPS' and its partners efforts to restore and/or reconstruct wetlands and improve water quality in Jamaica Bay and would benefit community health.

In summary, more convenient access to the park sites combined with more recreational facilities and programming and habitat restoration would result in long-term beneficial impacts on visitor health and safety under both alternatives.

Alternative B: Discovering Gateway - NPS Preferred Alternative

Impacts of Alternative B

Visitor Use and Characteristics

Alternative B would greatly increase the diversity of recreational opportunities offered throughout the park and encourage wider visitation and participation by the local and regional population, including those that are not traditional park visitors. Under alternative B, park management would focus on developing a wide range of recreational programming, offered year-round, that would cater to a variety of visitors and skill levels. This wider range of activities, settings, and services would likely appeal to a wider range of participants and would also likely encourage an increase in both new and repeat visitation. In combination with expanded park outreach and publicity and improved access, this expansion in recreation and visitor use opportunities would be expected to result in a 5–10 percent increase in annual visitation over the course of 15 years. This could mean 450,000 to 900,000 more visitors a year. The wetlands center alone is projected to bring in approximately 250,000 a year.

As stated in the "Impacts Common to Both Action Alternatives" section, this increase in visitation and potentially more crowds and congestion may be construed as a negative impact, but on balance the provision of more and improved visitor uses and recreation opportunities would result in a substantial long-term beneficial impact.

Visitor Experience: Recreation

A number of new recreation facilities and opportunities beyond those mentioned in the "Impacts Common to Both Action Alternatives" section are proposed under alternative B. The impacts associated with these new types of recreation development are summarized in the paragraphs below.

Overnight Accommodations. Alternative B ~~would provide~~ proposes the greatest amount of camping experiences and the greatest variety of camping types, with approximately 465–700 permanent campsites, in addition to programmatic camping. This option would offer the greatest distribution of camping, with camping opportunities widely dispersed across multiple sites at each unit. Where appropriate, the NPS would explore opportunities for camping near access points for local communities, adjacent to activities, neighborhoods, shuttle stops, etc. Additionally, buildings at Fort Hancock and the post area ~~parade ground~~ at Fort Tilden would be rehabilitated to accommodate lodging. Expanding opportunities for overnight use of the park and adding considerably more camping opportunities would result in a substantial long-term beneficial impact on visitor experience.

New Areas for Recreation. Under alternative B, the Pennsylvania Avenue and Fountain Avenue Parks would be opened for recreational uses, including trails and boat launches, observation facilities to take in the views of the bay, a community gathering place, and activities and programming. The parking lot and cricket field at Jacob Riis Park would be reduced in size and transformed into a recreation area that could accommodate sports fields, courts, entertainment venues, and community gathering spaces. The former ball field complex and model airplane field at Great Kills Park would be rehabilitated for new recreational uses, including trails, discovery zones for kids, and camping. At Sandy Hook, recreation would be expanded along the Bayside, including the development of Batteries Kingman and Mills as an activity node for camping, trails, and water-based recreation. In combination, these new areas for recreation would have a long-term beneficial impact on visitor experience by expanding recreation opportunities, creating more opportunities for physical activity, and expanding experiences of Gateway's natural areas and historic setting as well as creating more scenic vistas.

Trails. More miles of trails, including new and expanded trail systems at Floyd Bennett Field, Bergen Beach, Pennsylvania Avenue and Fountain Avenue Parks, Spring Creek, and Fort Tilden in the Jamaica Bay Unit; all parks in the Staten Island Unit; and in the Sandy Hook Unit would result in long-term beneficial impacts. Under alternative B, the expansion of the park's system of trails to include additional miles would be beneficial because the trails provide access to many different types of habitats and historic settings and accommodate a variety of uses, from nature study to equestrian use to mountain biking and walking. Although opening more trails to more uses may impact visitors who prefer to have the trails restricted to walking only, overall, this action would invite more use and expand the enjoyment of Gateway's natural areas and historic settings, resulting in a substantial long-term beneficial impact.

Equestrian Use and Bergen Beach. Equestrian use would be maintained at Bergen Beach, and although facilities there would be improved, the recreational use would not be expanded to other parts of the park. At Bergen Beach, additional types of recreation would be introduced, including programmatic camping, a nature trail to the bay to facilitate fishing and walking, and picnic and open spaces. This proposal would result in a long-term benefit to the majority of visitors and potential visitors who would enjoy expanded access and new facilities at Bergen Beach.

Open Spaces for Gatherings, Picnic Areas, and Outdoor Events. Compared to alternative C, alternative B would include more development of flexible open spaces and community activity areas that could accommodate outdoor play, picnic facilities, group gatherings, and outdoor concerts and performances. This type of development would occur at Floyd Bennett Field, Bergen Beach, Fort Tilden, Jacob Riis Park, Fort Hancock, and Sandy Hook beaches and would have a beneficial impact on visitors looking for spaces outdoors to convene and recreate with their family, friends, and community.

Skill Building Programming. Expanded instructional programming for recreational uses, including equipment rentals and beginner-level facilities, would be provided at Fort Tilden, Floyd Bennett Field, and Fort Hancock. At Jacob Riis Park, a splash park and instructional programming would facilitate water-based recreation skill building. By creating

opportunities to introduce visitors to new recreational activities and to build their comfort with these new endeavors and skill level, this proposal would have a substantial long-term beneficial impact. Additionally, it would create ample opportunities in all three units for visitors to progress from beginner-level recreationists to more experienced recreation users.

Water-based Recreation. Under alternative B, opportunities for water-based recreation would be substantially expanded, including enhanced marinas at Great Kills Park and Floyd Bennett Field with more instructional programming and equipment rentals. Additionally, new water-based recreation areas with improved fishing access, water trails, equipment rentals, and landing/launch sites would be established at Bergen Beach, Jamaica Bay Wildlife Refuge ~~(including limited access to select islands),~~ and Fort Wadsworth. At Sandy Hook, a water trail and mooring field would be developed for water-based recreation, and the North Beach facilities would be improved to accommodate more use that would result from the Fort Hancock development under this alternative. Guided tours would provide opportunities to circumnavigate Hoffman and Swinburne Islands. ~~and would allow limited access to the islands for wildlife observation, exploration of the historic structures, and programmatic camping~~. Expanded access to and enjoyment of Gateway's waters, beaches, and coastal environments would result in a substantial long-term beneficial impact.

Visitor Experience: Night Skies

Because alternative B would include the greatest amount of camping and, in particular, the most high-intensity camping facilities, it would result in a greater impact on night skies. New and/or expanded high-intensity camping facilities such as RV campgrounds, structural camping, and drive-in campgrounds proposed for Sandy Hook, Floyd Bennett Field, Jacob Riis Park, Fort Tilden, Great Kills Park, and Fort Wadsworth would introduce new sources of light in areas where there is currently little night lighting from park sources. Although not significant, these sources of night lighting from camping and from overnight use of rehabilitated buildings at Fort Tilden and Fort Hancock would have a long-term adverse local impact on the visitor experience of night skies.

Visitor Experience: Soundscapes

Given the increase in visitor use under alternative B, impacts on the natural soundscape from visitor activity and human voices would be more substantial than under alternatives A and C. Additionally, because this alternative opens new areas to visitor use, including occasional, NPS led tours and educational activities, Batteries Kingman and Mills ~~Swinburne and Hoffman Islands, Canarsie Pol and Ruffle Bar, Batteries Kingman and Mills~~ at Sandy Hook, and Pennsylvania Avenue and Fountain Avenue Parks, alternative B would introduce new noises associated with visitor use and recreation to these currently unused and quiet areas. Entertainment venues and/or outdoor spaces for events and performances proposed at Floyd Bennett Field, the Pennsylvania Avenue and Fountain Avenue Parks, and Fort Wadsworth would create additional sources of noise and impact the natural soundscape in their vicinity. Do to an increase in the number of recreation facilities and types of uses, noise from park operations and maintenance activities would be increased. Although not significant, noise associated with human voices and park operations and maintenance would have a long-term adverse local impact on the visitor experience of quiet soundscapes.

Visitor Experience: Visual Quality

With the construction of both the wetlands center and a viewing tower, scenic viewing would be substantially improved at Floyd Bennett Field. Additionally, trail expansions and upgrades incorporating overlooks, boardwalks, and viewing platforms would increase opportunities for taking in views of New York Harbor and other scenic vistas including varied natural environments as well as historic settings. For example, expanded trail systems at Fort Tilden, Fort Wadsworth, and Sandy Hook would afford visitors new opportunities to experience and view coastal defense resources well as natural vistas by recreating among them. Also, the proposal to build a community gathering space and overlook at the Pennsylvania Avenue and Fountain Avenue Parks would take advantage of the site's elevation and provide excellent views of Jamaica Bay and its surroundings. Together, these developments would result in long-term beneficial impacts.

Visitor Experience: Education, Interpretation, and Understanding

Under alternative B, educational and interpretive programming and media developed by park staff and partners would be purposively aimed at engaging a wider audience while also enhancing individual understanding of Gateway's resources and values. This would include different content, translation into different languages, targeting different audiences, and more robust development and communication of interpretive media. Coupled with increased outreach and higher visitation levels, this targeted delivery of media to engage new audiences would lead to an expanded awareness of Gateway and inform more visitors and area residents about its resources and recreation opportunities, resulting in a substantial long-term beneficial impact.

Specifically, the following proposals for expanded interpretive and educational programming and facilities beyond those mentioned in the "Impacts Common to Both Action Alternatives" section would increase visitor understanding of the park's resources and significance and result in beneficial impacts.

Jamaica Bay Wildlife Refuge. Big Egg would be used as an interpretive area. NPS led tours or educational activities could take place ~~programmatic camping would be introduced at Canarsie Pol,~~ and educational and interpretive programmatic links would be made with the wetlands center, Sunset Cove Park, and other New York City Department of Parks and Recreation (NYCDPR) parks.

Batteries Kingman and Mills and Nike Missile Site at Sandy Hook. The conversion of Batteries Kingman and Mills into a recreation hub would present additional opportunities to expose more Sandy Hook visitors to the park's coastal defense history and significance. In addition, the Nike Missile site would be interpreted and open for self-guided exploration.

Health and Safety

As addressed in the "Impacts Common to Both Action Alternatives" section, alternative B would not be expected to increase threats to visitor safety and would include measures that

would help ensure safe visitor enjoyment of Gateway's park lands, resulting in long-term beneficial impacts on visitor safety.

With even greater recreational opportunities and an emphasis on offering entry-level and instructional programming along with providing equipment rentals, alternative B would attract more people and groups to participate in physical activity and would therefore make a larger contribution to community wellness. For example, parks like Fort Wadsworth would be promoted more widely and visibly as a destination for recreation. This increased publicity, in combination with improved connections to the NYC Greenway, an expanded trail system, and more flexible spaces for outdoor recreation and gatherings, would make it more likely for the space to be used more by local residents. This pattern would be repeated across the park, resulting in a substantial long-term beneficial impact.

Cumulative Impacts

Cumulative impacts on visitor use and experience from past, present, and reasonably foreseeable projects would remain the same as described above for alternative A (no action). Collectively, these cumulative actions have contributed or would contribute adverse and beneficial impacts on visitor use and experience. When the impacts on visitor use and experience as a result of alternative B are combined with these other projects in the study area, an overall beneficial cumulative impact would be expected. With a substantial increase in recreational uses, facilities, and enriched and expanded visitor experiences, alternative B would contribute an appreciable beneficial impact, as well as an imperceptible adverse impact.

Conclusions

The variety of recreational opportunities proposed under alternative B, along with new and enhanced recreation facilities and visitor spaces and the purposeful effort to engage a more diverse audience, would have a positive and important impact on visitor experience at Gateway. With a substantial increase in recreational uses, including introducing new uses and instructional programming throughout the park and using media, access, and facility upgrades to enrich and expand visitor understanding of Gateway's resources and significance, alternative B would contribute an appreciable beneficial increment and an imperceptible adverse increment to the cumulative impacts. The beneficial impacts of Alternative B on visitor experience would be significant.

The clustering and limited size of recreational development would result in a beneficial impact because it would leave large expanse of undeveloped open space that would still provide many opportunities for visitors seeking solitude, natural quiet, dark night skies, and other connections with the natural world, which can be challenging to find in Gateway's urban context.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Visitor Use and Characteristics

Under alternative C, visitor use opportunities and recreation facilities would be concentrated and smaller in scale than under alternative B to reduce the footprint of development on park lands and create a more sustainable system of recreation facilities. This clustering of

activity nodes and recreational activities would affect visitor use patterns. For example, campgrounds would be smaller and clustered in order to ensure that visitors would have quieter, more secluded nature and overnight experiences. The clustering and limited size of recreational development would result in a beneficial impact because it would leave large expanse of undeveloped open space that would still provide many opportunities for visitors seeking solitude, natural quiet, dark night skies, and other connections with the natural world, which can be challenging to find in Gateway's urban context.

Like alternative B, this alternative would result in an increase in visitation. With the wetlands center drawing approximately 250,000 visitors, expanded park outreach and publicity, improved access, and an increase in recreational opportunities, as well as a considerable increase in volunteer stewardship programs and interpretive and educational programming, it is expected that alternative C would result in a 2–5 percent increase in annual visitation over the course of 15 years. This could mean 180,000 to 450,000 more visitors a year. Similar to alternative B, the wider range of activities and the opportunity to make more and closer connections with the park's resources and unique settings would likely encourage an increase in both new and repeat visitation.

As stated in the "Impacts Common to Both Action Alternatives" section, this increase in visitation and potentially more crowds and congestion may be construed as a negative impact, but on balance, the provision of more and improved visitor uses and recreation opportunities would result in a substantial long-term beneficial impact.

Visitor Experience: Recreation

Most of the existing recreational activities in the park would continue and be better supported through the facilities and access improvements already mentioned in the "Impacts Common to Both Action Alternatives" section. A number of new recreational facilities and opportunities beyond those mentioned in the "Impacts Common to Both Action Alternatives" section are proposed under alternative C. The impacts associated with these new types of recreation development are summarized in the paragraphs below.

Overnight Accommodations. Alternative C would represent a significant increase in camping opportunities, with approximately 215–320 permanent campsites, in addition to programmatic camping. Through an emphasis on programmatic camping, this option would enable visitors to immerse in Gateway's preserved natural and cultural resources through interpretive and low-impact camping opportunities. Camping would be provided in each of the three units but would be concentrated in fewer locations than under alternative B to minimize the development footprint. Buildings at Fort Hancock and the parade ground at Fort Tilden would be rehabilitated to accommodate lodging. Expanding opportunities for overnight use of the park and adding considerably more camping opportunities would result in a substantial long-term beneficial impact on visitor experience.

New Areas for Recreation. Under alternative C, the Pennsylvania Avenue and Fountain Avenue Parks would be open for recreational uses including a coastal trail, a boat launch, and educational and interpretive facilities that would interpret ecosystem recovery and

sustainability. Equestrian use would be introduced to Fort Tilden. The former ball field complex and model airplane field at Great Kills Park would be converted into a natural area with trails and other opportunities to experience and explore the restored natural environment. Nature play areas for young people and skill zones would be established at some park sites, including a dune playscape at Jacob Riis Park and a nature play area at the Education Field Center at Great Kills Park. In combination, these new areas for recreation and new uses would have a long-term beneficial impact on visitor experience by expanding recreation opportunities, creating more opportunities for physical activity, and expanding experiences of Gateway's natural areas and historic setting as well as creating more scenic vistas.

Trails. Trail systems would be expanded at Jamaica Bay Wildlife Refuge's East Pond and Sandy Hook's Bayside to increase wildlife observation and nature study opportunities. At Fort Wadsworth, a "Coastal Defense Trail" would be developed, and a similar trail system would be developed at Fort Hancock among the batteries to allow for more guided and self-guided exploration and interpretation of the coastal defense resources. These trail system expansions and the development emphasis on improving nature study and interpretive opportunities along trails would expand the enjoyment and understanding of Gateway's natural areas and historic settings, resulting in a substantial long-term beneficial impact.

Equestrian Use and Bergen Beach. Equestrian facilities at Bergen Beach would be removed and the use relocated to Floyd Bennett Field and/or Fort Tilden. The removal of these facilities could have a short-term adverse impact on their experience of the park for some visitors who have relied on the facilities. However, it could also be beneficial for many more visitors, who would be invited to enjoy Bergen Beach as a natural area where they would find opportunities for both recreation and quiet sensory connections with the natural environment.

Water-based Recreation. Additional improvements to water-based recreation could ~~would~~ include limited guided boat access to Canarsie Pol ~~and Ruffle Bar~~ for wildlife observation, as well as water trail connections and/or launch areas at Jacob Riis Park, Fort Tilden, and Fort Wadsworth. These expanded opportunities to experience Gateway's waters, beaches, and coastal environments would result in a long-term beneficial impact.

Most of the park's current recreational activities would be maintained; however, there would be more regulations and restrictions on access to better protect resources under alternative C than under alternatives A and B. Sensitive Resources Subzones on the ocean and Bayside of the Sandy Hook Unit; at Floyd Bennett Field, Bergen Beach, and Fort Tilden in the Jamaica Bay Unit; and at Great Kills Park would require limitations on visitor access to those areas. These restrictions and regulations could have an adverse impact on some visitors in terms of visitor opportunities, with the greatest effect on local visitors who use these areas on a regular basis. However, these restrictions would also create enhanced opportunities for research, nature study guided tours, and volunteer stewardship and environmental education programs in some of the park's most significant natural habitats, which would result in a beneficial impact.



Visitor Experience: Night Skies

As in alternative B, the expansion of camping would result in an adverse impact on the park's natural night skies. However, compared to alternative B, the emphasis in alternative C would be on lower-intensity forms of camping (e.g., programmatic and backcountry camping), which have fewer associated sources of night lighting than RV parks and drive-in campgrounds. Although not significant, night lighting from camping and from overnight use of rehabilitated buildings at Fort Tilden and Fort Hancock would have a long-term adverse local impact on the visitor experience of night skies.

Visitor Experience: Soundscapes

As in alternative B, the increase in visitor use under alternative C in areas where recreation and visitor use is concentrated, such as Floyd Bennett Field, Fort Tilden, Jacob Riis Park, and Fort Wadsworth, would result in impacts on the natural soundscape from visitor activity and human voices. However, because alternative C would include more expansive Sensitive Resources Subzones where visitor access is restricted, noise in these areas associated with human voices would be decreased. The development of a recycling facility and waste generator at Floyd Bennett Field would introduce another source of noise from both the facility itself and trucks. However, the facility would be sited in the park's operations zone, where visitor use is limited. On balance, noise associated with human voices and park operations and maintenance would increase imperceptibly, having only a long-term adverse local impact on the visitor experience of quiet soundscapes.

Visitor Experience: Visual Quality

Scenic viewing would be enhanced under this alternative through improvements to cultural landscapes and the preservation of their character-defining features to create a more authentic historic setting. Maintaining low levels of development, removing some facilities, and restoring landscapes would provide more opportunities for people to retreat from the urban environment of New York City and take in quiet natural environments and historic settings. At Fort Wadsworth, open vistas to the water would be maintained by keeping the forest thinned. At Fort Hancock and Fort Wadsworth, trails would be designated among the fortifications that would highlight views of park's historic resources as well as its natural resources and views of the harbor. At Fort Hancock, stabilization of additional batteries would also include clearing in order to establish water vistas. This clearing would improve viewing opportunities for visitors as well as helping them understand how the fortifications operated in defense of New York Harbor. Together, these developments would result in long-term beneficial impacts.

Visitor Experience: Education, Interpretation, and Understanding

Under alternative C, the park's natural and cultural resources would be preserved to their highest level of quality, providing the best opportunity for visitors to understand and forge a connection with the resources and values of the park as well as the larger national park system, resulting in a substantial long-term beneficial impact.

Under alternative C, the visitor experience would be expanded to include substantially more stewardship and volunteer activities, and there would be an increase in opportunities for hands-on involvement in natural resource protection, monitoring, and restoration projects as well as historic preservation projects. These activities would allow the park staff to engage a wider audience and better demonstrate the park's fundamental resources and values, particularly its coastal military defense structures and stories. New stewardship and educational and training facilities as well as stewardship projects are proposed at Floyd Bennett Field, Jamaica Bay Wildlife Refuge, and Fort Hancock. For example, Jamaica Bay Wildlife Refuge, in conjunction with the wetlands center at Floyd Bennett Field, would serve as the primary venue for stewardship and participatory science activities with access to programs throughout the park, allowing these opportunities to be better marketed, coordinated, and facilitated.

Specifically, the following proposals for expanded interpretive and educational programming and facilities beyond those mentioned in the "Impacts Common to Both Action Alternatives" section would increase visitor understanding of the park's resources and significance and result in a substantial long-term beneficial impact.

Sustainability. Under this alternative, there would be a greater emphasis on interpreting the park's sustainability practices. The development of a large and innovative composting facility that includes an anaerobic digester at Floyd Bennett Field would create new opportunities to interpret the park's sustainability practices. Ecosystem recovery and resiliency and sustainability practices would also be highlighted under alternative C at the landfill and at Sandy Hook and on the Rockaways. Additionally, the Wetlands Center at Floyd Bennett Field as well as the JBSRI would present interpretive and educational media related to sustainability within Gateway and New York City.

Jamaica Bay Wildlife Refuge. The Jamaica Bay Wildlife Refuge would serve as an educational field station for natural resource protection and restoration training, where a number of research projects would be ongoing and invite visitor participation. Wildlife observation and nature study opportunities would be expanded at the refuge to encourage more self-guided exploration and learning about the area's habitats and wildlife.

Fort Tilden. Expanded education and interpretive programming would be offered at Fort Tilden, including historic preservation and natural resource programming, as well as expanded interpretation along trails and parade ground interpretation.

Fort Wadsworth. Increased interpretive and educational programming and expanded interpretive media would be provided at Fort Wadsworth. Portions of Fort Tompkins would be rehabilitated as a visitor facility with exhibits and spaces for education and interpretive programming.

Great Kills Park Education Field Center. The Education Field Center would be enhanced to include trails and a trailhead, a nature playground, and programmatic camping.

Fort Hancock. Additional tours and educational programming related to Fort Hancock's military history would be provided, as well as increased opportunities for volunteer historic preservation projects and natural resource stewardship activities. The Nike Missile radar site and structures would be converted into an interpreted, visitor-ready site.

Health and Safety

As addressed in the "Impacts Common to Both Action Alternatives" section, alternative C would not be expected to increase threats to visitor safety and would include measures that would help ensure safe visitor enjoyment of Gateway's park lands, resulting in long-term beneficial impacts on visitor safety.

In addition to inviting more recreational use and promoting the park's opportunities for recreation and physical activity, alternative C would encourage and invite volunteer stewardship and active participation in the care of the park's resources. Similarly, under alternative C, the park would promote and facilitate opportunities to recreate in Gateway's natural setting and partake in expanded nature study and environmental education programming. As a result, alternative C would offer expanded opportunities for physical activity and have a beneficial impact on physical health.

Cumulative Impacts

Cumulative impacts on visitor use and experience from past, present, and reasonably foreseeable projects would remain the same as described for alternative A.

Collectively, these cumulative actions have contributed or would contribute adverse and beneficial impacts on visitor use and experience. When the impacts on visitor use and experience from alternative C are combined with these other projects in the study area, an overall beneficial cumulative impact would be expected. With more in-depth interpretive and educational programming and expanded opportunities for enjoyment of the park's natural environments and historic settings, alternative C would contribute a noticeable beneficial impact.

Conclusions

Under alternative C, the Gateway visitor experience would be improved regarding the depth and content of educational programming, interpretation, and resource stewardship, along with the preservation and promotion of visitor activities focused on immersion in the natural and cultural settings unique to the park. Visitors would gain a better understanding of park's coastal defense and maritime history and its connection to national history and find ample opportunities to experience open space and nature. Considering all of these factors in the context of the park's fundamental values, alternative C would contribute a noticeable beneficial increment to the cumulative impacts. While the alternative's more limited recreational facility development and reduced variety of recreational activities might not encourage as much connection to the diverse local and regional population, the beneficial impacts of Alternative C on visitor experience would still be significant.

Social and Economic Environment

The potential social and economic impacts of the GMP/EIS are of importance to the communities surrounding Gateway. Social impacts typically include effects on population growth, housing, and community facilities and services. Economic impacts are often expressed in terms of the number and types of jobs supported by the park, park spending, visitor use at the park, and the associated changes in the surrounding community in the form of visitor spending.

Laws and Policies

The NPS NEPA Handbook (Director's Order 12) notes that while NEPA is only triggered when there is a physical impact on the environment, social and economic impacts are to be included in an analysis (section 1.3). Although the socioeconomic environment receives less emphasis than the physical or natural environment in the CEQ NEPA regulations, the NPS considers it an "integral part of the human environment" (section 9.1).

NPS *Management Policies 2006* (NPS 2006a) states under section 1.6, "Cooperative Conservation beyond Park Boundaries," "Cooperative conservation beyond park boundaries is necessary as the National Park Service strives to fulfill its mandate to preserve the natural and cultural resources of parks unimpaired for future generations." Included under this policy guidance is the recognition that "NPS activities may have impacts outside park boundaries. Recognizing that parks are integral parts of larger regional environments, and to support its primary concern of protecting park resources and values, the Service will work cooperatively with others to:

- Anticipate, avoid, and resolve potential conflicts;
- Protect park resources and values;
- Provide for visitor enjoyment; and
- Address mutual interests in the quality of life of community residents, including matters such as compatible economic development and resource and environmental protection."

This overall policy guidance provides a foundation for assessing social and economic impacts.

Methods

Potential impacts on Gateway's social and economic environment are assessed based on the current description of Gateway's context presented in this GMP/EIS. They are directly related to the proposed levels of visitor use that are anticipated under each alternative. The resource-specific context for assessing the significance of impacts of the alternatives to the surrounding communities includes the following:

- The effect of visitor use and experience improvements on population and housing in the surrounding communities

- The effect of visitor use and experience and partners' programming improvements on the community facilities and services in the surrounding populations

- The effect of changes in park staffing and spending to operate the park

- The effect of changes in the level of visitor use at the park, which contributes to visitor spending in the surrounding communities



Alternative A: No Action

Impacts of Alternative A

Under alternative A, existing visitor uses and experiences would be maintained and other than repairs and/or facilities required due to damage from Hurricane Sandy, no new visitor facilities would be constructed. Implementing the no-action alternative would occur against a backdrop of other economic, demographic, and social changes in the region as outlined in the "Social and Economic Environment" section in chapter 3.

Population and Housing

Under this alternative, it is anticipated that visitation would continue to remain consistent with the 38-year average of 9 million annual visitors. Visitors would continue to have access to most of the sites in Gateway; only a few areas may restrict access to protect sensitive resources or visitor safety. Parkwide, people would continue to find many opportunities to get away from it all and experience the qualities of open spaces and natural areas.

Anticipated annual population increases ranging from 0.3 to 0.81 percent per year have been identified in the communities surrounding each management unit (Jamaica Bay, Staten Island, and Sandy Hook); these increases are not driven directly by the existence of Gateway. The largest increase was anticipated for Staten Island. The Jamaica Bay unit population forecasts were estimated prior to Hurricane Sandy; as such, they may be adjusted downward. Despite the surrounding resident population changes, park visitation has remained somewhat stable (see the "Visitor Use and Experience" sections of the GMP/EIS for more information). As such, it would appear that even with forecasts of minor population growth, the visitation at Gateway is forecasted to remain consistent with historical trends.

Gateway currently provides open space preservation and recreation opportunities for visitors. Continuing current management would also continue to contribute to a desirable residential housing environment because of these factors. The exact nature of the benefit is not quantifiable, in part because the housing inventory is currently in a state of flux in communities surrounding Jamaica Bay due to the impact of Hurricane Sandy.

Community Facilities and Services

Implementing alternative A, the no-action alternative, would have no impact on local community services and facilities beyond what is the case now. The current visitation and

traffic would not impact surrounding the community's services (e.g., utilities, roads, public transportation) beyond current levels and no additional community facilities would be anticipated to be needed.

Park Employment and Spending

Under alternative A, as long as there are no changes in the funding levels contributing to the park operating budget from both the NPS and its other operating partners (e.g., concessioners, cooperating associations) it is anticipated that the park employment levels would remain the same. Additionally, assuming that the current allocation of operating budgets between employment and other operating expenses is maintained, the impact of park spending should not change from what is now the case. Sustaining the park staffing levels and park operating budget at current levels would continue a long-term beneficial impact.

Visitor Use Spending

Visitor use and the accompanying visitor spending would be anticipated to remain at historical levels. Overall, median household income is anticipated to grow at approximately the rate of inflation in the surrounding communities. If it is assumed that the park visitors maintain their household income distribution similarly for recreational and leisure activities, including expenditures at and around Gateway, visitor use spending would continue to provide a long-term beneficial impact.

Cumulative Impacts

Cumulative impacts on the social and economic environment from past, present, and reasonably foreseeable projects would result from park recreation, park improvements, and natural habitats as well as employment shifts.

Park Recreational Improvements and Natural Habitat Restoration Projects

The *Vision 2020: New York City Comprehensive Waterfront Plan* (NYCDCP 2011) and its contribution to the cumulative impacts on visitor use and experience were outlined in the analysis of cumulative impacts under alternative A in the "Visitor Use and Experience" section in this chapter. The existence of these projects outside of Gateway will have a short- and long-term beneficial impact on the local population and housing market because they contribute to the array of community residential amenities. However, as noted in the "Visitor Use and Experience" section, the potential for short-term adverse impacts on visitor use also exists. If it were assumed that there would be a change in expenditures as a result of implementing the Vision 2020 plan, which is undetermined at this point, then the community would also experience a short-term adverse impact in visitor spending. However, if visitors would simply be exchanging their expenditures, overall impacts would be neutral. Alternative A would contribute an imperceptible beneficial increment to the cumulative impact of Vision 2020 plan park recreational improvements and natural habitat restoration projects in an urban context.

Employment Shifts

The Vision 2020 plan (NYCDCP 2011) discusses the opportunity for economic development across the waterfront, particularly in the vicinity of Jamaica Bay and portions of Staten Island. A primary focus of this plan is ensuring that the facilities at the Port of New York and New Jersey are expanded. As outlined in Goal #3, "Support the Working Waterfront," the priorities of Vision 2020 and the Action Agenda items focus on investments that can catalyze investment in waterfront enhancement. For example, a priority project covers evaluating the potential of expanding the container handling capacity at the New York Container Terminal, Staten Island. It is estimated that if this project is completed there could be an additional 300 jobs generated. Within the communities surrounding Gateway, employment in the transportation and warehousing industries represents 5 to 8 percent. Therefore, increases in these employment sectors could have a beneficial short- and long-term impact on employment in the area and would potentially contribute positively to the household income in the surrounding communities. This income would be available for spending on recreational and leisure activities. Continuing current management practices under alternative A would contribute an imperceptible beneficial increment to these cumulative impacts of employment shifts on the social and economic environment.

Conclusion

Alternative A would result in long-term beneficial impacts from continued opportunities to access resource-dependent visitor opportunities and experience the natural, historic, and scenic qualities of the park. These impacts, however, would not be significant. Social and economic effects of the above actions include potential inconsequential adverse impacts from shifts in visitor expenditures resulting from changes in recreational use patterns. The impacts from potential employment changes would have short- and long-term beneficial impacts due to increases in household income available to spend on recreational and leisure activities. Overall, the no-action alternative would result in minor short- and long-term beneficial effects, but they would not be significant. It would contribute imperceptibly to cumulative adverse and beneficial impacts from implementing the NYC Vision 2020 Plan.

Common to Both Action Alternatives

Under both action alternatives, the NPS and its partners would greatly increase the promotion of the park's offerings; rehabilitate, expand and upgrade existing facilities, including trails, trailheads, campsites, and picnic areas; and support additional new improvements. Additionally, access and transportation options to park amenities would be improved and expanded. Overall, both options would result in increases in visitation ranging from an estimated 2 to 10 percent.

Impacts of Alternatives B and C

Population and Housing

Implementing both alternatives would occur against the same backdrop of economic and demographic conditions in the surrounding communities described in the no-action alternative. The effects of both alternatives would add another set of factors providing support for the surrounding communities' overall quality of life. However, it is anticipated that the alternatives would not directly affect the population and housing inventory.

Community Facilities and Services

Under both action alternatives, it is estimated there would be an increase in visitation as well as overall activity in and around the communities of Gateway. Specifically, recommendations for improvements to transportation infrastructure are contemplated. A focus on affordable transportation options and linkages with public transportation is included in both alternatives and is described in more detail in the "Transportation" sections of the GMP/EIS. The variety and quality of recreational facilities and visitor services would also be enhanced and improved under both alternatives, actions that are likely to increase visitor use and demand for and impact on available transportation facilities and systems. Additionally, for those services that are envisioned for joint management and maintenance between the NPS and New York City, there would be resultant increases in public service costs. Absent understanding the fees and charges for transportation systems and visitor activities, the cost offsets for the benefits provided cannot be determined. As a result, the economic impact is unknown, although the social impact would be beneficial because of the increased availability of community facilities and services.

Park Employment and Spending

Both alternatives would include expansion of operations; however, management strategies for elements of the alternatives to accommodate the expansion are yet to be confirmed. Management options presently identified include the NPS, private sector partners/ concessioners, nonprofit partners, and joint management with New York City. As such, it is difficult to quantify the overall impact on park employment at this point in the analysis, although it is likely to be beneficial as expansion would be needed to manage increases in visitor use, new or restored facilities, and increased programming. Park spending for improvements and operations would also be anticipated to increase under both alternatives, even though the funding could come from any of the management entities. Overall construction, development, and expanded operations would have a long-term beneficial impact on park spending.

Visitor Use Spending

Under both action alternatives, there would be an increase in annual visitor use at the park over the long term, resulting in a long-term benefit for visitor use spending. The rate of increase would be commensurate with the timing of proposed improvements and expansion. At this time, it is difficult to gauge what percentage of visitors would come from the local area and what percentage would come from outside the area, although several of the improvements (e.g., the wetlands center, expanded and unique campground offerings) would attract additional nonresident visitors. Regardless of whether it is from

local or nonresident visitors, the additional recreational visitor use would undoubtedly result in additional retail and recreational expenditures. Depending on the demand profile of visitors drawn by the wetlands center, there may also be additional lodging expenditures. Economic benefits of additional visitor use spending include the potential for additional jobs as compared to the no-action alternative. These jobs may result from increased business opportunities created in the park by concessioners and nonprofit partners, as well as outside the park, to service the increased level of visitation. State and local governments would collect additional sales tax from increased visitor spending, a beneficial impact for these agencies' budgets.

Alternative B: Discovering Gateway - NPS Preferred Alternative

Impacts of Alternative B

Alternative B would greatly increase the diversity of recreational opportunities offered throughout the park and encourage wider visitation and participation by the local and regional population, including those that are not traditional park visitors. The expansion in recreation and visitor use opportunities would be expected to result in an estimated 5 to 10 percent increase in annual visitation over the course of 15 years. This could mean 450,000 to 900,000 more visitors a year.

Population and Housing

Implementing alternative B would provide the surrounding communities an array of recreational and leisure activities, which are considered to enhance the quality of life in the community. However, this alternative occurs against the same backdrop of economic and demographic conditions in the surrounding communities described in the no-action alternative. Therefore, it is anticipated that this alternative would not directly affect the population and housing inventory.

Community Facilities and Services

Alternative B includes the greatest level of development and improvements, and resulting anticipated increases in visitor use, of all the alternatives. The visitor uses identified relate to recreation, community activities, and environmental education, and visitation levels would be highest under this alternative. As such, the impact on the community facilities and services would be greater under alternative B than under alternative C. Transportation improvements would be relatively similar under both alternatives, including affordable transportation options and linkages with public transportation. Like alternative C, the variety, quality, and quantity of recreational facilities and visitor services would be enhanced and improved under alternative B. This would potentially alleviate community expenditures on similar facilities. The impact of additional nonresident visitors in local accommodations would marginally affect water and wastewater treatment plants if there were incremental demand for the local area hotels. However, the distribution of these visitors across the surrounding communities would probably keep any impact from becoming more than

negligible, although it would be a long-term impact. Tax revenues generated by visitor spending would help to provide resources to meet these future needs. Overall, there would be long-term beneficial impacts on community facilities and services.

Park Employment and Spending

Alternative B would provide the greatest opportunity for increased park employment overall. This includes employment by all the management entities envisioned (i.e., the NPS, private sector partners/concessioners, nonprofit partners, and joint management with New York City). The distribution of employment increases between the management entities cannot be estimated at this time. As such, the employment dollar impact cannot be quantified but would be beneficial. There is a likelihood, however, that many of the new jobs may be of a seasonal nature (as opposed to year-round), based on the types of activities envisioned and potential management structures and seasonal visitation patterns. Park spending for improvements and operations is likewise difficult to assess at this time. Although the volume of new development under alternative B would be greater than under alternative C, the types of proposed expenditures vary. Additionally, depending on which party is responsible for development and the process for procurement, the levels of expenditures will vary. The beneficial impact on park spending would be anticipated to be higher for alternative B because the amount of activities envisioned would require a higher level of staffing support and accompanying supplies and materials.

Visitor Use Spending

Alternative B would provide the highest estimated visitor use, with an estimated increase of approximately 450,000 to 900,000 over the next 15 years. It would appear that the nature, diversity, and capacity of development under alternative B would also result in higher nonresident visitor numbers. As a result, alternative B is also likely to bring additional retail and recreational expenditures as well as the potential for lodging expenditures. The economic benefits of additional visitor use spending include the potential for additional jobs as compared to the no-action alternative. These jobs may result from increased business opportunities created in the park by concessioners and nonprofit partners, as well as outside the park, to service the increase level of visitation. State and local governments would collect additional sales tax from increased visitor spending. Overall, the increased visitor use would result in a long-term beneficial impact on visitor use spending.

Cumulative Impacts

Cumulative impacts on the social and economic environment from past, present, and reasonably foreseeable projects would remain the same as described for alternative A (no action).

Collectively, these actions have contributed or would contribute noticeable short- and long-term beneficial effects. When the beneficial impacts on the social and economic environment as a result of alternative B are combined with these other projects in the study area, alternative B would contribute an appreciable long-term beneficial impact.

Conclusion

The increased variety and number of recreational activities and opportunities for community events and environmental education under alternative B would support an increase in anticipated visitor use. Overall, impacts of this alternative on the social and economic environment would be beneficial, due primarily to the increased visitation expected under this alternative. Short- and long-term benefits include potential increases in employment and visitor use spending. Additionally, the alternative would result in long-term benefits for community facilities and services. Overall, alternative B would result in a significant beneficial impact. Actions in alternative B would also contribute appreciable long-term beneficial cumulative impacts when combined with other projects in the study area.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

Under alternative C, visitor use opportunities and recreation facilities would be concentrated and smaller in scale than under alternative B to reduce the footprint of development on park lands and create a more sustainable, clustered system of recreation facilities. This alternative would result in an estimated 2 to 5 percent increase in annual visitation.

Population and Housing

Implementing alternative C would provide the surrounding communities a more concentrated and smaller scale of development, including more clustering of recreational and leisure activities than alternative B, although it would still be substantially greater than alternative A. Additionally, many of the proposed improvements are focused on preserving historical and cultural activities, which provide settings that are considered to enhance the quality of life in the community. However, this alternative occurs against the same backdrop of economic and demographic conditions in the surrounding communities described in the no-action alternative. Therefore, it is anticipated that this alternative would not directly affect the population and housing inventory.

Community Facilities and Services

Alternative C would include a moderate level of concentrated development of recreational activities. Additionally, the focus on experiencing preserved places would potentially result in less resident visitation and greater nonresident visitation. However, because increases in visitation compared to the no-action alternative are anticipated, there would be some positive impact on community facilities and services. Transportation improvements would be relatively similar under both action alternatives, including affordable transportation options and linkages with public transportation. The impacts on transportation infrastructure would be less under this alternative than under alternative B. The impact of additional nonresident visitors in local accommodations would marginally affect water and wastewater treatment plants if there were incremental demand for the local area hotels. However, the distribution

of these visitors across the surrounding communities would probably keep the impacts from becoming any greater than negligible. Tax revenues generated by visitor spending would help to provide resources to meet these future needs. Overall, there would be potentially long-term beneficial impacts on community facilities and services.

Park Employment and Spending

Alternative C would provide an opportunity for increases in employment for park purposes by all management entities envisioned (e.g., the NPS, private sector partners/concessioners, nonprofit partners, and joint management with New York City). However, it is anticipated that the employment levels would be lower because the number of private sector business opportunities would be smaller under this alternative. Because the distribution of employment increases between the management entities cannot be estimated at this time, the employment dollar impact cannot be quantified but would be beneficial. As was the case with alternative B, the employment under this alternative would be more of a seasonal nature (as opposed to year-round), based on the types of activities envisioned and potential management structures and seasonal visitation patterns.

Park spending for improvements and operations is similarly difficult to assess at this time. Although the volume of new development under alternative C would be less than under alternative B, the types of proposed expenditures vary. For example, historic preservation expenditures may be higher than new construction. Overall, park spending for improvements would be considered to provide moderate short- and long-term beneficial impacts on the construction and trade industry, based primarily on the development timeline of projects. Park spending on operations would be anticipated to be lower under alternative C than under alternative B, based on the fact that there would be a smaller number of business opportunities; therefore, employment and accompanying supplies and materials would be less. Overall, the impact on park employment and spending would still be long term and beneficial.

Visitor Use Spending

Alternative C would provide an estimated increase in visitor use of 180,000 to 450,000 over the next 15 years, resulting in a long-term beneficial impact on visitor spending. Overall, the historical and cultural preservation included in alternative C may attract a larger nonresident population. However, the scale and type of development outside this use may not attract as many nonresident visitors (e.g., size of campground, other overnight accommodations) as alternative B. This alternative would result in additional retail and recreational expenditures and a potentially a slightly smaller portion of lodging expenditures. The economic benefits of additional visitor use spending include a potential for additional jobs that is estimated to be less than under alternative B. These jobs may result from increased business opportunities created in the park by concessioners and nonprofit partners, as well as outside the park, to service the increased level of visitation. State and local governments would collect additional sales tax from increased visitor spending.

Cumulative Impacts

Cumulative impacts on the social and economic environment from past, present, and reasonably foreseeable projects would remain the same as described for alternative A (no action).

When the beneficial impacts on the social and economic environment from alternative C are combined with these other projects in the study area, alternative C would contribute an appreciable beneficial increment to the cumulative impacts.

Conclusion

The preservation of historical and cultural resources, improvement and concentration of recreational activities, and increase in open space under alternative C would support an increase in anticipated visitor use. Overall, impacts of this alternative would be beneficial, due primarily to increased visitation expected under this alternative. Short- and long-term consequences include potential increases in employment and visitor use spending as well as a beneficial short- and long-term impact on community facilities and services. Overall, alternative C would result in a significant beneficial impact. Actions in alternative C would also contribute an appreciable benefit to cumulative impacts when combined with other projects in the study area.

Transportation

Transportation is intricately tied to the varied visitor activities provided at each of Gateway's units. During public scoping meetings conducted in 2009, the public emphasized that transportation improvements should focus on convenience, affordability, and accessibility for all. Specifically, the public expressed support for alternative transportation approaches. Some people also noted that good public transportation connections currently exist for bringing visitors to park unit entrances, but not necessarily into and through the unit areas. This section describes the impacts of the proposed alternatives on transportation access and circulation elements used by visitors to travel both to and through the park units.

Both action alternatives also call for substantial improvements to transportation infrastructure which would result in beneficial impacts. While this section analyzes the impacts of proposed development for the alternatives, it is important to note that the more detailed Level I (trip generation) and Level II (trip assignment) screening assessments would be presented with specific future development proposals to determine the need for a transportation analysis. Future park development proposals would provide daily and temporal distribution of existing and projected park users by mode of travel for weekdays and weekend days. In addition, the base and future years of the future transportation improvement would be identified.

Laws and Policies

The NPS *Management Policies 2006* acknowledge that "the location, type, and design of transportation systems and their components, and the use of alternative transportation systems, all strongly influence the quality of the visitor experience" (NPS 2006a). As mentioned in chapter 1, the recreation experience provided by Gateway is identified as the park's primary fundamental value, and the park's transportation system is an integral component of upholding that value. Additional guidance provided in NPS *Management Policies 2006,* "Transportation Systems and Alternative Transportation" (NPS 2006a, section 9.2), was incorporated into the methodology and used to help determine the degree of effect of the proposed actions, including how well the alternatives would do the following:

- Meet park management needs and provide for visitor use and enjoyment
- Be designed with extreme care and sensitivity to the landscape through which it passes
- Not cause unacceptable impacts on natural and cultural resources and would minimize or mitigate impacts that cannot be avoided
- Emphasize and encourage alternative transportation systems
- Reduce traffic congestion, noise, air pollution, and adverse effects on park resources and values
- Not cause use in the areas served by proposed changes to exceed the area's visitor carrying capacities
- Incorporate the principles of energy conservation and sustainability
- Provide accessibility for all people, including those with disabilities
- Enhance visitor experience by offering new or improved recreational opportunities, simplifying travel in the park, or making it easier or safer to see park features

Section 9.2 of the NPS *Management Policies* 2006 (NPS 2006a) notes that trails and walkways provide the only means of access into many areas in NPS parks. Regarding these resources, guidance from section 9.2 was also used to determine how well the alternatives would achieve the following:

- Reduce conflicts with automobiles and incompatible uses
- Allow for accessibility by the greatest number of people

Methods

Impacts on transportation were qualitatively assessed by comparing expected changes in visitation patterns and traffic congestion under each alternative for the following:

- Roads and parking facilities in the park
- Public transportation services to and through the park
- Waterborne transportation options
- Bike paths, greenways, blueways, hiking trails, and pedestrian routes that provide access to and through the park

Resource-specific context considerations help determine whether substantial impacts are also significant. There are four resource-specific context factors for assessing impacts of the alternatives to transportation:

- Transportation facilitates visitor access and improves recreation experience, which is a stated fundamental value of Gateway.
- Public access to the bay and ocean shorelines is a named fundamental resource of the park.
- Increasing access by providing bike, water, and pedestrian trails could be the beginning of a different way of moving between park sites.
- Very little public transportation is available to move between park sites; this prevents visitors without cars from fully experiencing the park.

A primary assumption used in this analysis is that the amount of multimodal traffic generated under each alternative would be based on the size, type, and location of proposed Recreation Zones in each. In addition, alternatives allowing for a greater degree of development would be expected to have a greater potential to cause increased local and regional transportation effects. It was also assumed that alternatives providing a greater amount of development and accessibility would attract more visitors, as well as influence length of stay.

Alternative A: No Action

Impacts of Alternative A

Alternative A represents a continuation of current management practices. The NPS would continue to manage the park as it does today, including rehabilitation efforts resulting from

Hurricane Sandy. For purposes of analysis, it is assumed that the park's rehabilitation efforts would return the park's transportation facilities to pre-storm conditions to the greatest extent possible.

As noted in the "Visitor Use and Experience" section, substantial increases and a few intermittent decreases in visitor use have occurred since 1974 (the first year that the park reported visitation), but annual visitation has remained around 9 million total visitors over the past 10 years (NPS 2013i). The population of New York City is expected to increase by 1 million by 2030. Therefore, this analysis of the no-action alternative assumes that visitation would increase proportionately.

Visitor experience would remain segmented, with each individual park unit serving local residents and visitors at specific locations. The visitor centers at Sandy Hook, Jamaica Bay Wildlife Refuge, and Floyd Bennett Field would continue to serve as destinations and points of departure for day visitors, tours, and school groups. Improvements and expansions to trails systems would continue under existing management guidelines, and funded projects for additional planning or trails would continue. Most visitors would continue to be dependent on automobiles, and people without cars would remain reliant on limited bus and ferry service.

Parkwide Public Transportation Services

No changes are expected under the no-action alternative that would affect use of public transportation services to access any of the park units. As mentioned above, some visitors believe that good public transportation connections currently exist for bringing visitors to park unit entrances, but not necessarily into and through the unit areas. Under the no-action alternative, no additional services would be offered to bring visitors into and through Gateway using public transportation. Because the dominant mode of visitor access would remain private automobiles, the no-action alternative would not achieve the directives defined in the NPS *Management Policies 2006* (NPS 2006a) for transportation systems, such as emphasizing and encouraging alternative transportation systems, reducing traffic congestion, and providing accessibility for all people. The no-action alternative would continue to prevent visitors without cars from fully experiencing the park, resulting in a long-term adverse impact.

Specific impacts for each unit are described in more detail below.

Jamaica Bay Unit

Overall, the issues identified in the Jamaica Bay Greenway Missing Links Study (NPS 2010g), listed in the "Affected Environment" chapter, would continue to adversely affect pedestrian and bicyclist safety. The lack of direct access to this park unit, restricted pedestrian and bicycle access, inadequate public transportation connections, and inadequate connections to adjacent neighborhoods would continue to result in long-term adverse impacts overall. A lack of wayfinding and confusing travel patterns, as well as high traffic volumes, high

speeds, and complex traffic weaving, would also result in long-term adverse impacts. These effects would not support Gateway's fundamental value, provide access to the park's fundamental resources, or support the NPS *Management Policies* 2006 (NPS 2006a) direction to simplify travel in the park and make it safer to see park features.

Floyd Bennett Field

Private Vehicle and Waterborne Transportation Parking Facilities

As noted in the "Affected Environment" chapter, 95 percent of Floyd Bennett Field visitors access the park by private vehicle (NPS 2003d), indicating a high demand for parking. Because Floyd Bennett Field is currently underused by visitors, the existing parking supply would be adequate to meet demand. Aviator Sports has adequate parking for its visitation levels. As mentioned in the "Affected Environment" chapter, several thousand cars could be parked on runways and tarmac areas. These areas could be used to serve as overflow parking areas for camping parking, which reaches capacity during the high season. Maintaining Floyd Bennett Field in its current condition would continue this beneficial impact on parking facilities.

Public Transportation Services

Walking distance from the stop for bus route Q35 in Floyd Bennett Field to visitor destinations is 1 mile or more, which reduces the convenience and therefore the use of public transportation to access this area. Limited public transportation options would prevent visitors without cars from fully experiencing the park and would result in long-term adverse impacts.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Although a multi-use greenway parallels the Belt Parkway adjacent to Floyd Bennett Field, pedestrian and bicycle access from adjacent communities to the park is restricted by the Belt Parkway and other major roads. No actions would be implemented to address this issue, and this alternative would not provide a different way of moving between park sites. The result would be the long-term continuation of an adverse impact.

Once inside the park, visitors would use existing bike paths, greenways, and pedestrian routes to further explore Floyd Bennett Field. Floyd Bennett Field can also be accessed by boat via the marina and/or by self-propelled watercraft. Visitors can travel from Floyd Bennett Field to other Gateway sites via both motorized and non-motorized waterborne transportation. Continued use and maintenance of these facilities would continue a beneficial impact, but the effect would be localized in each site. This alternative would not provide an alternative mode of moving between park sites.

Plumb Beach

This alternative includes no changes to private vehicle and waterborne transportation parking facilities or public transportation services. ~~Beneficial impacts would occur at Plumb~~

~~Beach because of the kayak and bike rentals that would go into effect in the summer of 2013.~~ The NPS is working with the USACE to repair erosion of the Jamaica Bay Greenway at Plumb Beach, and this repair will be result in a beneficial impact on the continued stability of the Belt Parkway, which is currently threatened by erosion related to sand transport and wave energy dynamics. However, the continued lack of public transportation services described above for the park overall, as well as inadequate parking, would continue a long-term adverse impact.

Bergen Beach

Under the no-action alternative, Bergen Beach would remain exclusively for equestrian use. Therefore, there would be no change to transportation services.

Canarsie Pier

Private Vehicle and Waterborne Transportation Parking Facilities

Although no changes would occur to parking at Canarsie Pier, parking for fishing and hand-propelled watercraft would continue to be sufficient, including during demonstration programs.

Public Transportation Services

Impacts on public transportation services would be as described for the park overall.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Canarsie Pier would continue to be a popular stop for cyclists using the Jamaica Bay Greenway and a launch site for kayakers. No changes are proposed under this alternative that would affect users of these facilities.

Pennsylvania Avenue and Fountain Avenue Parks

Limited public access to these former landfill sites would continue under the no-action alternative. The park would continue to work with New York City on the transfer of these parcels, in which case future potential transportation issues would be evaluated by the city at a later date. Therefore, there would be no change to transportation services at these locations.

Spring Creek, Frank Charles Memorial Park, and Hamilton Beach Park

There would be no change to transportation services under the no-action alternative for these areas.

Jamaica Bay Wildlife Refuge

Private Vehicle and Waterborne Transportation Parking Facilities

Parking availability at this park site is strained. This alternative includes no actions to provide overflow parking when the main visitor parking lot is full. Assuming that existing parking facilities match the carrying capacity of the visitor contact station and the recreational amenities provided nearby, redirecting traffic elsewhere would avoid exceeding the site's carrying capacity, as directed by NPS *Management Policies* 2006 (NPS 2006a). Although some visitors would be turned away, the long-term impact would be beneficial because the visitor capacity of the site would not be exceeded, thus enhancing the visitor experience at that location.

Public Transportation Services

The refuge is the only site in Jamaica Bay that is accessible by subway, although the line's Broad Channel Station is far enough from the park entrance to discourage access by foot. Lack of transportation options that could take advantage of the subway station, such as a park shuttle taking visitors to other park sites, would be a long-term adverse impact, particularly because providing such a connection could help alleviate parking issues described above.

The Q52 and Q53 bus routes provide direct access to the refuge, with a bus stop immediately adjacent to the visitor center. The continued accessibility provided by this route would be a long-term beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Multi-use pathways parallel to Cross Bay Boulevard and the boardwalk adjacent to East Pond offer alternatives for access these park sites. Continued use and maintenance of these facilities would achieve NPS policy guidance to encourage alternative transportation systems and would incorporate the principles of energy conservation and sustainability, resulting in long-term beneficial impacts. These impacts would be limited because there would still be difficulty in moving between park sites by bicycle or on foot.

Jacob Riis Park / Fort Tilden / Breezy Point

Private Vehicle and Waterborne Transportation Parking Facilities

The parking lot at Jacob Riis Park was used for hurricane debris storage. A portion of the parking lot will be open for the summer 2013 season and extensive repairs will take place in the fall of 2013 to repair damage sustained from the debris storage. This damage from storage use will adversely affect access to the park and the recreation experience in the short term.

Public Transportation Services

Impacts on public transportation services would be as described for the park overall. In addition, an internal NPS shuttle bus from Jacob Riis Park to Riis Landing planned for the 2013 summer season would provide a beneficial long-term impact in a very localized area.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

In the long term, there would be no change to the north side of the overpass over Beach Channel Drive. Pedestrians and cyclists would continue to be left on an island patch of land without safe means of further travel. This lack of a safe connection would not facilitate visitor access or encourage the use of alternative transportation options such as bikes for travel through the park.

Riis Landing

Private Vehicle and Waterborne Transportation Parking Facilities

Prior to the storm, the parking lot at Riis Landing (Fort Tilden) was not heavily used. However, when the lot was full, Fort Tilden provided overflow parking, which would continue under this alternative. The pedestrian crossing from the Fort Tilden lot to the ferry landing is dangerous because of fast-moving traffic and poor sight lines. No change would be implemented to improve this situation, resulting in the continuation of a long-term adverse impact.

Public Transportation Services

Impacts on public transportation services would be as described for the park overall.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Impacts would be similar to those described for Jacob Riis Park / Fort Tilden / Breezy Point.

Staten Island Unit

Fort Wadsworth

No management actions are planned under this alternative that would change existing parking facilities or public transportation services.

Miller Field

Private Vehicle and Waterborne Transportation Parking Facilities

Traffic congestion resulting from parking lot turnover at Miller Field resulted in a line of cars forming to enter and exit the park. Assuming that existing parking facilities match the carrying capacity of the site, the area's visitor carrying capacity would not be exceeded, as called for by the NPS *Management Policies* 2006 (NPS 2006a), thus enhancing the visitor experience at the site. If the parking facilities do not match the carrying capacity, redirecting traffic elsewhere would diminish visitors' recreation experience (against Gateway's fundamental value) and would not facilitate visitor access or provide accessibility for all people, resulting in a significant adverse impact.

Public Transportation Services

Impacts would be as described for the park overall.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The New York City Greenway, which provides a connection to Fort Wadsworth, and access paths to designated fishing areas were damaged by Hurricane Sandy but have been restored. Short-term adverse impacts would occur while access is restricted. No other actions are proposed under this alternative that would affect the use of bike paths, greenways, blueways, hiking trails, and pedestrian routes at Miller Field.

Great Kills Park

Private Vehicle and Waterborne Transportation Parking Facilities

The parking lot and road to Nichols Marina, as well as the marina itself, were heavily damaged by Hurricane Sandy. Efforts are currently (as of May 2013) underway to repair the damage, and the park is offering limited three-year leases available until more permanent changes that may result from selecting an action alternative can be implemented. Until then, access to the park is severely restricted, resulting in adverse short-term impacts. Two parking lots at Great Kills are closed due to the presence of radium, affecting visitor access to the model airplane flying field and restricting visitors' ability to use boat trailer overflow parking when the primary lot is full. These long-term impacts would affect the park's ability to uphold its primary fundamental value and to facilitate visitor access and provide accessibility to all people, including those with disabilities. The result would be long-term adverse impacts.

Because of the extensive damage to the park, short-term commuter use of the temporary ferry service did not measurably affect park visitors. The heavy damage to the marina and the boats themselves preclude use by private boaters, which constitute a minority of park visitors. This alternative includes no plans to reinstate the use of Great Kills parking for commuters or the temporary boat landing installed for the short-term ferry service, which is consistent with the park's purpose. No other measurable impacts from the no-action alternative would be expected.

Public Transportation Services

Impacts on public transportation services would be as described for the park overall.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

No actions are proposed under this alternative that would affect these facilities.

Sandy Hook Unit

Private Vehicle and Waterborne Transportation Parking Facilities

Adverse impacts related to the inability of existing supply to meet demand at beach parking lots during peak use would continue as described in the "Affected Environment" chapter because this alternative includes no actions to address this issue. These local and regional impacts would affect public health and safety as vehicles attempt to turn around and leave the entrance area when the park closes after reaching capacity and as idling cars caught in congestion elevate air pollution levels. Any decrease in the parking capacity at Sandy Hook associated with Hurricane Sandy repairs and damage would exacerbate the issues associated with closing the park entrance when capacity is reached. As the "Affected Environment" section on transportation indicates, vehicles back up beyond the park entrance, creating congestion, safety, noise, and pollution problems l. Sandy Hook's visitor carrying capacity is altered by the lack of parking supply, particularly because no other options for accessing the park's recreational facilities, such as a shuttle from the entrance, are provided.

In the park, Parking Lot D (which provides spaces for 802 motor vehicles) is particularly problematic during high-use days. These problems are expected to continue, creating congestion and long lines of cars, and requiring traffic management by park staff. Traffic-related incidents would affect public safety, particularly in the evenings as visitors leave for the day.

For these reasons, the no-action alternative would not uphold the park's recreation experience (a fundamental value) at Sandy Hook. Insufficient parking, which in turn would lead to entrance gate closures, would not facilitate visitor access and improve the recreation experience, and would not provide access to the bay and ocean shorelines, which are fundamental park resources. In addition, it would not reduce traffic congestion, noise, and air pollution, and would increase these impacts depending on the degree to which parking can be restored. The result would be a substantial adverse impact at Sandy Hook.

Public Transportation Services

Public transportation services are available to bring visitors to Sandy Hook's entrance, but this alternative provides no services to transport visitors from the entrance to destinations in the park. The result would continue to be heavy reliance on private automobiles to access the park's recreational facilities.

Hartshorne Drive becomes congested during the evenings of peak use days as visitors leave the park for the day. This alternative includes no actions to address this congestion and therefore would not address the NPS *Management Policies 2006* (NPS 2006a) directive to reduce traffic congestion, noise, and air pollution. In addition, NPS *Management Policies 2006* states that alternative destination points or transportation systems or limitations on use must be considered before roads are chronically at or near capacity. This alternative would not incorporate such actions.

Hurricane damage to the ferry dock at Fort Hancock would have no short-term effect on visitors because the ferry is seasonal, operating only during peak visitor use months. Because this alternative includes no provisions to extend the shuttle service from the ferry terminal to the park's entrance, it would not help alleviate congestion issues at that location.

The no-action alternative would not facilitate visitor access and would continue to prevent visitors without cars and visitors who are turned away from the closed entrance gate from accessing Sandy Hook. It would not provide a means of remedying the gate closures. In addition, it would not encourage alternative transportation systems, incorporate principles of energy efficiency and sustainability, simplify travel in the park, or make it easier or safer to see park features. For these reasons, long-term impacts related to public transportation services would be substantial.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The hurricane interrupted the planned expansion of the multi-use path, delaying the delivery of this recreational and transportation opportunity and the ability to encourage alternative transportation or make it easier or safer to see park features. No other actions are proposed under this alternative that would result in measurable impacts.

Cumulative Impacts

Jamaica Bay Unit

Substantial and rapid growth has occurred in the New York City area, including Queens and Brooklyn, throughout the years, putting intense pressure on transportation systems. The city's population reached 1 million by 1880; that number nearly tripled by 1900. Approximately 1 million more people were added to the city's population each decade for the next 30 years. By 1940, the population was approximately 7.5 million. This explosive growth created a demand for transportation. New York City estimates its current population of 8.2 million in 2010 will reach 9.1 million by 2030. Brooklyn's population is expected to grow from 2.5 million in 2010 to 2.72 million in 2030, and Queens from 2.2 million in 2010 to 2.57 million in 2030 (NYCDCP 2006, 2013). Growth in the Rockaway Beach area of Queens is also expected to continue, such as the Edgemere Urban Renewal Area. This local and regional growth will put more pressure on the area's transportation system and will adversely affect access to the park.

For the past hundred years, New York City's transportation networks have dictated its centers of population growth, guided its industries and businesses, and shaped the city. Shipping built early New York, and turn-of-the-century ferry service along the Hudson and East Rivers fed and was fed by development in Downtown Brooklyn, Lower Manhattan, and New Jersey. In the early 1900s, subway construction spurred residential development in the farmlands of Queens, Brooklyn, and the Bronx (NYCDCP 2008).

New York City has not been able to grow its transportation to match the city's changing demographics. The city's financial crisis in the 1970s accelerated the decline of its transportation infrastructure. In response, a major infrastructure rehabilitation program was

started in 1988 that has been funded by every administration since that time. Although the condition of New York City roads, rails, highways, and bridges has improved dramatically, the city's rapidly growing population poses a new set of challenges. Particularly in Brooklyn and Queens, existing transportation infrastructure is insufficient to meet upcoming demand (NYCDCP 2008). Improvements to John F. Kennedy International Airport may result in more people traveling to the city and putting stress on transportation systems.

People living in New York City and surrounding counties face longer commute times than most of the country. The residents of Queens County have, on average, the longest commute times of residents of any U.S. county with populations greater than 250,000 people. The city's subways run at 85 percent capacity during their busiest hour, which causes delays on all lines. The number of hours of heavy congestion on the city's bridges and tunnels has almost doubled since 1990. In addition, the rush hour peaks have expanded dramatically. In 1990, the hours of heavy congestion were between 7:00 a.m. and 9:00 a.m. and again between 3:00 p.m. and 7:00 p.m. Today, heavy congestion during rush hour starts at 6:00 a.m. and goes until 10:00 a.m. and then starts back up again at 2:00 p.m. and continues until 8:00 p.m. Buses get stuck in traffic, dramatically reducing their appeal and viability as real transit options. In 2005, bus ridership fell by 55 percent, or close to 4 million riders. Congestion is expected to worsen as the population continues to grow. The projected population growth will increase the strain on transportation services, many of which are already at or nearing capacity (NYCDCP 2008).

The elevated or depressed highways built between the 1940s and 1960s to increase New York City's transportation capacity often isolated communities. Many of these highways cut off access to the city's waterways, reducing options for water transportation. Access to the city's waterways, which are largely untapped potential transportation resources, is particularly challenging. For years, city planning practice turned away from New York's rivers, separating them from the city with highways and train tracks. As a result, potentially congestion-reducing transportation systems like ferries are difficult to realize because the waterfront is remote and hard to reach (NYCDCP 2008).

About 9 percent of the city's population has a physical disability that could impair movement. The number of wheelchair-accessible stations limits access in many areas. In 2008, 53 New York City subway stations were wheelchair accessible; that number is expected to increase to 100 by 2020 (NYCDCP 2008).

The New York City Department of Transportation (NYCDOT) has been aggressive about creating more safe bicycle routes and facilities, and built over 60 miles of bike lanes in 2007 alone. NYCDOT is partnering with other agencies such as MTA to encourage multimodal commuting (NYCDCP 2008). Other recent actions have added alternative transportation options in the form of greenways and multi-use paths. Improvements to ferry structures, parking facilities, and bridges, as well as access to NPS sites, are continuing. These improvements are expected to continue in the reasonably foreseeable future, including access improvements to the park districts, marina redevelopment, parkway rehabilitation, and construction of bike and pedestrian paths. The Jamaica Bay Transportation Hub will rehabilitate the Jacob Riis Park boardwalk and change the ferry service to Manhattan.

The National Parks of New York Harbor Conservancy embarked on an initiative focused on improving access through a waterborne transportation system to Gateway's park units (NPNYHC 2010). The organization created harbor transportation strategies that include Jamaica Bay. The purpose of the Inner-Outer Harbor Transportation Strategy is to "identify a series of implementable projects to link harbor-wide destinations through physical improvements and the enhancement or creation of projects and programs" (NPNYHC n.d.), offering a beneficial transportation impact.

Taken together, these past, present, and reasonably foreseeable actions would result in primarily adverse impacts on the area's transportation system because of explosive growth. Development of mass transit eased this impact to a certain degree, but increasing congestion and the addition of another 1 million people by 2030 will put appreciable strains on the city's transportation system. When combined with the beneficial and adverse impacts expected under this plan's no-action alternative, cumulative impacts would remain primarily adverse because any beneficial contributions from the no-action alternative would be imperceptible and would not measurably affect the adverse impacts related to regional growth and congestion.

Staten Island Unit

Staten Island's growth followed a trend similar to that of New York City (NYC Public Information Office 2000). Staten Island's current population is approximately 470,000; that number is expected to reach 552,000 by 2030, the highest growth rate predicted for any New York City borough (NYCDCP 2006). The residents of Richmond County (Staten Island) are, on average, second to Queens County for having the longest commute times of residents of any U.S. county with populations greater than 250,000. Along with Brooklyn and Queens, Staten Island's existing transportation infrastructure is insufficient to meet upcoming demand (NYCDCP 2008).

As the population grew, development of the Staten Island Ferry, the Saint George Ferry Terminal, and the Verrazano-Narrows Bridge provided connections from this New York City borough to Brooklyn and Manhattan. Bus and train service provide transportation options in and beyond Staten Island. More recent development of bike and pedestrian routes provides alternative transportation modes. The National Parks of New York Harbor Conservancy's Inner-Outer Harbor Transportation Strategy would also apply to Fort Wadsworth. Present and reasonably foreseeable actions include rehabilitation of and improvements to these transportation facilities. Overall, these actions are beneficial.

Several additional bike lanes or routes exist and are proposed near park sites in the Staten Island Unit. A proposed route would connect the Class 3 route on Bay Street in Fort Wadsworth with the New York City Greenway. This proposed connection would provide a route for cyclists to continue riding from the greenway through the park and northward on an existing Class 3 bike route. A bicycle path is proposed that would continue south through Miller Field to the beaches just north of Great Kills Park. A bicycle route is also proposed along New Dorp Lane, paralleling Miller Field's southwestern boundary, leading to an existing Class 3 bike route along North and South Railroad Avenue, where a Staten Island

Railway stop exists. Other proposed routes would access Miller Field along roads from the south. A new bicycle path is proposed in Great Kills Park following the length of Wetland Road, which would connect with a proposed bike route along Mansion Avenue on leaving the park. Another bike route is proposed along Hylan Boulevard outside the park, which would parallel the park's northwestern boundary and connect to an existing Class 3 bike route on Guyon Avenue.

Similar to the Jamaica Bay Unit, when taken together, these past, present, and reasonably foreseeable actions would result in primarily adverse impacts on the area's transportation system because of growth. When combined with the beneficial and adverse impacts expected under this plan's no-action alternative, cumulative impacts would remain adverse because any beneficial contributions from the no-action alternative would be imperceptible and would not measurably affect the adverse impacts related to growth.

Sandy Hook Unit

The construction of parkways and bridges in the area of Sandy Hook and the development of bus and rail routes created local and regional transportation connections. As part of Route 36, construction of the Highlands–Sea Bright Bridge connected the town of Highlands to Sea Bright across the Shrewsbury River; the eastern terminus of the bridge is at the entrance to Sandy Hook. This greatly increased access to the park and affected visitation levels. Although this bridge was replaced in 2010, there was no expansion to motor vehicle capacity with additional vehicular traffic lanes. The replacement bridge was intended to maintain traffic flow and minimize seasonal impacts and the diversion of traffic to local streets. A notable difference to the replacement bridge is its vertical clearance: the fixed-span bridge provides a 65-foot vertical clearance over the Shrewsbury River channel to eliminate the conflicts between highway and marine traffic and the delays caused by bridge openings. In addition, the new bridge also features two new 8-foot-wide pedestrian sidewalks and two 8-foot-wide bicycle lanes to provide safe crossings from the bridge. The south pedestrian bridge links the sidewalk on the south side of the mainline bridge to the existing multi-use trail along the seawall in Sea Bright. The north pedestrian bridge links the sidewalk on the north side to the new extension of the multi-use trail in Gateway. The bicycle and pedestrian improvements offer visitors the option of traveling by bike or on foot to the park.

New Jersey's Monmouth County Planning Board identified and classified certain roads in the county with a rating of good, fair, and poor for cycling. The resulting bicycling map shows a multi-use trail starting near the town of Sea Bright, south of Sandy Hook, continuing northward to the park's entrance. The map also identifies Highway 36 from Monmouth Beach north to the park entrance and into Highlands as offering poor cycling conditions due to high traffic volumes and speeds, as well as insufficient road width and other bicycling obstacles. Two roads through Highlands to the Highlands–Sea Bright Bridge are identified as fair condition for cyclists, with heavier traffic and side streets. As mentioned previously, a new bike path connection has been incorporated into the reconstruction of the Sea Bright Bridge (Monmouth County 2011), which should measurably improve the poor condition of that bike travel segment.

Monmouth County developed a plan to manage summer traffic on Route 36 that identifies an "enhanced closure plan" to help address traffic congestion issues when Sandy Hook closes after reaching capacity during peak visitation. This framework was developed to improve road safety, operations, and access along the Highway 36 and Route 520 corridors. The plan was based on a series of alert condition levels, in response to traffic and/or parking monitoring criteria administered by the NPS at Sandy Hook. The majority of the plan's elements consist of signs, including variable message signs. The plan also identified long-range traffic management components, including pedestrian/bicycle linkages and access; dedicated U-turn capabilities at the Sandy Hook access ramp during park closures; enhanced traffic management options for transit shuttles; reversible lanes or movable barriers to increase directional capacity; and traffic management measures to facilitate storm evacuation (Monmouth County 2001).

A summer jitney bus service was implemented in 1999 between Highlands and the Sandy Hook Visitor Center near Parking Lot E. This Bayshore Bus Shuttle route provided basic loop service between the beaches at Sandy Hook and the downtown business district in Highlands, with limited service to Keansburg Amusement Park. The service provided access to Sandy Hook beaches even under full closure conditions when auto access was restricted (Monmouth County 2001). "Park and sail" service between the park and the Belford Ferry Terminal was offered for the summer of 2003, but it is no longer operating (NPS 2003d). However, the National Parks of New York Harbor Conservancy's Inner-Outer Harbor Transportation Strategy would also apply to Fort Wadsworth (NPNYHC n.d.), providing potential beneficial transportation impacts if implemented. Otherwise, lack of consistent shuttle bus or ferry service to the park from New Jersey would be an adverse impact.

Hurricane Sandy destroyed much of the public infrastructure in the community of Highlands, located southwest of Sandy Hook Park. The repair or replacement of the damaged public infrastructure will commence after May 1, 2013. The County is expected to perform in-kind repair or in-kind replacement of certain public infrastructure, including public roads, railroads, culverts, bridges, and shoreline stabilization structures (NJDEP 2012). Because these actions would restore the infrastructure that previously existed (and not improve on it), they would have no effect on accessing the park.

As mentioned above, counties surrounding New York City face longer commute times than most of the country, including those in northern New Jersey. Ranked at number 14, Monmouth County has one of the top 25 worst commute times in the nation (NYCDCP 2008). As the county's population increases, so will commute times. Monmouth County's population was 630,380 in 2010, an increase from 615,301 in 2000. The county's population is expected to reach approximately 670,000 in 2018 (NJDLWD 2012). This population increase will put an additional strain on existing transportation services in the Sandy Hook area.

Because nearly all the storm repair actions for the Highlands area are restorative, not expansionary, these actions, along with the mobility issues presented by County Route 520 across the Shrewsbury River Bridge (for which there are no plans for improvement), would not contribute to cumulative impacts.

For the park overall, impacts from these other past, present, and reasonably foreseeable actions would be both beneficial and adverse. When combined with the appreciable adverse impact related to congestion at the Sandy Hook entrance when the park closes after reaching capacity, these impacts would have various effects. Although closing the park entrance would continue to have appreciable adverse effects on traffic congestion, the implementation of the variable messages signs, alerts, and other warning devices has alleviated what was worse congestion before the bridge rebuild was in place. Because the bridge replacement did not increase capacity, alleviating congestion that had been caused by raising the bridge and adding bike capacity (where connections on either side of the bridge are classified as in fair and poor condition) contributed noticeable beneficial impacts by reducing congestion. Similarly, Monmouth County's plan to manage summer traffic at Sandy Hook's entrance provided noticeable beneficial impacts for congested bridge traffic. Discontinuation of ferry service from New Jersey to Sandy Hook, a noticeable contribution, would combine with the no-action alternative to further increase adverse impacts. Inadequate parking and closure to park visitors, coupled with a lack of public transportation to Sandy Hook, would result in a substantial and widespread adverse effect that would be only partially and imperceptibly offset by benefits from other actions. Overall, the contribution of these other actions to the no-action alternative would be imperceptible and would not be sufficient to lessen the significant adverse effect expected under this alternative. Therefore, cumulative impacts would be adverse.

Conclusion

Damage to the park's transportation infrastructure from Hurricane Sandy had a substantial impact on the ability of visitors to access all of Gateway's units, and repair may have caused some increase in congestion or closures with adverse impacts to transportation.

Impacts of continuing the current management at Gateway would be primarily adverse because no improvements would be made to the transportation infrastructure to address transportation issues or apply the directives of the NPS *Management Policies 2006.* As a result, the adverse impacts on transportation from Alternative A would be significant. This alternative would not facilitate visitor access, provide public access to the park's fundamental resources, provide a different way of moving through park sites, or provide car-free options for accessing the park. It also would not meet several of the directives provided in section 9.2 of the NPS *Management Policies 2006*, particularly emphasizing and encouraging alternative transportation systems; reducing traffic congestion, noise, and air pollution; not causing the area's visitor carrying capacity to be exceeded; incorporating the principles of energy conservation and sustainability; providing accessibility for all people; offering new or improved recreational opportunities; simplifying travel in the park; or making it easier or safer to see park features. Cumulative impacts of alternative A would be adverse primarily due to extensive growth in the region.

At Sandy Hook, impacts would affect public safety from congestion and unsafe maneuvers as visitors are turned away from the entrance when the unit reaches capacity, and as visitors leave the park at the end of the day. In addition, the recreation experience, which is the

park's fundamental value, would not be supported by the transportation actions in this alternative. The traffic congestion and associated impacts that occur during peak visitation would not be addressed when the unit is reopened for visitors. The results from insufficient parking capacity at Sandy Hook would be an adverse impact on transportation in the park unit, particularly if Parking Lots C, D, and E, which provide 1,916 of the unit's approximately 4,000 parking spaces, cannot be fully restored. These impacts would affect the local area and communities adjacent to the park entrance, and would have regional effects along Highway 36.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Under both alternatives, Gateway would continue to support and plan enhanced regional trail linkages to improve access to the park. This would include filling gaps in current facilities and expanding connectivity to New York City greenways. In addition, wayfinding from local transit stops to parks would be improved to and throughout Gateway. Transportation information would be incorporated into outreach materials to make reaching the park clearer and more convenient. Bike infrastructure, including bike rentals, bike parking, and bike route mapping, would also be included in all action alternatives. Different types of facilities and media (e.g., kiosks, social media, signs, contact stations) would be employed to create a more welcoming sense of arrival, orient visitors, and increase the visibility of NPS and Gateway resources and recreational opportunities. Both alternatives emphasize using alternative modes of transportation to access Gateway, including bikes, public transit, waterborne transportation, and shuttles.

Development of facilities called for under the action alternatives would also result in short-term adverse impacts during construction. For example, as new recreational facilities are constructed, traffic may need to be rerouted and parking supply may be temporarily diminished. These short-term impacts would not have a significant impact on the park's transportation systems.

Alternative B: Discovering Gateway - NPS Preferred Alternative

The focus of alternative B is on Gateway becoming a popular destination for recreation, education, and interpretive experiences, which would increase the importance of the transportation system to efficiently and effectively bring people to a variety of places. Under alternative B, the NPS is focused on expanding outreach to neighboring communities and improving direct and safe access to park units from the surrounding neighborhoods.

Impacts of Alternative B

Jamaica Bay Unit

Recreational developments would attract substantially more visitors to Jamaica Bay, including national and international visitors (particularly given the unit's proximity to John F. Kennedy International Airport), and local residents from nearby neighborhoods. Access to and through the unit would be more affordable and convenient through improved bike infrastructure, public transportation, ferry service, and park shuttles, thus facilitating visitor access. An internal NPS shuttle (originating) at Floyd Bennett Field would link Gateway and other New York City park lands. All these improvements would support the park's recreation experience (a fundamental value) and the NPS *Management Policies* 2006 regarding transportation systems, resulting in a long-term beneficial impact.

Floyd Bennett Field

As the primary location for orientation and information about the Jamaica Bay Unit, Floyd Bennett Field would also be the most accessible district in the unit. Floyd Bennett Field would be established as a multimodal transportation hub where visitors could embark via waterborne transportation, shuttles, greenways, and public transit to access other Gateway parks and other nearby destinations. With a marina as well as launch sites, Floyd Bennett Field would support waterborne access and transportation. This expanded variety of access and transportation opportunities would provide extensive benefits to visitors traveling to and through Jamaica Bay.

Private Vehicle and Waterborne Transportation Parking Facilities

Floyd Bennett Field includes the vast majority of Jamaica Bay's non-permit public parking. However, the additional recreational options that would be offered under this alternative would increase use of these facilities. Many visitors are expected to use the alternative transportation connections and hubs, thus reducing the demand for private motor vehicle access and parking at Floyd Bennett Field. The extensive network of trails from adjacent parks and neighborhoods into Floyd Bennett Field would also reduce reliance on private vehicles to access the area, thus reducing the demand on parking facilities. New parking facilities would be created to accommodate the additional campsites and cabins, the converted hotel, and the JBSRI. Current parking facilities for camping and for water-based activities would be augmented to accommodate more visitors and increased camping and boating uses. These impacts would support the park's recreation experience (a fundamental value), facilitate visitor access, and support NPS *Management Policies* 2006 regarding transportation systems, resulting in a long-term beneficial impact.

Public Transportation Services

The multimodal transportation hub at Floyd Bennett Field would enhance use of public transit to access the park and reduce reliance on private vehicles, particularly MTA's Q35

bus route, which provides access from Brooklyn College, and two subway routes to Floyd Bennett Field, Fort Tilden, Jacob Riis Park, and the Rockaway Park Beach 116 Street Station. In addition, locating a central multimodal connection that includes public transit in the park would improve the ability of visitors to not only reach the park but also travel within it, which was an issue identified by the public. This would support the park's recreation experience (a fundamental value), facilitate visitor access for all people (particularly those without cars), and incorporate energy conservation and sustainability. The result would be a beneficial impact.

An internal NPS shuttle originating at Floyd Bennett Field and looping through the Jamaica Bay Unit would link Gateway and other New York City park lands and result in a long-term beneficial impact on visitor access and transportation.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

This alternative would include new trails and boardwalks, as well as an extensive trail network connecting to adjacent parks and neighborhoods. These facilities would increase pedestrian access to and through not only Floyd Bennett Field but also other areas of Jamaica Bay. The enhanced marina would provide a portal to increase water-based transportation. New transportation connections would include the marina and greenway, enhancing their use and the extent of their transportation service. Increasing bike and pedestrian access from Flatbush Avenue into the park would provide another alternative transportation method of accessing the park. All these actions would result in long-term beneficial impacts and would support the park's recreation experience (a fundamental value), incorporate energy conservation and sustainability, reduce conflicts with automobiles and incompatible uses, and provide accessibility for all people.

Plumb Beach

Private Vehicle and Waterborne Transportation Parking Facilities

The parking lot at Plumb Beach would be improved, which would help accommodate the increased visitation expected to result from the use of this site as an information portal to the park ~~new visitor amenities that would be provided~~, resulting in a long-term beneficial impact.

Public Transportation Services

Although Plumb Beach is located immediately adjacent to the Belt Parkway, no public transit services access the park. The NPS shuttle proposed in alternative B, however, would provide convenient access to Plumb Beach, resulting in a beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The Jamaica Bay Greenway parallels the Belt Parkway and provides direct access to Plumb Beach. This alternative would improve the greenway, as well as improving connections to it from the parking lot and the park trails. Connections from Marine Park and the

adjacent neighborhood would also be improved, including a new water trail. The improved connections from neighborhoods and city parks to Plumb Beach, as well as Floyd Bennett Field and Dead Horse Bay, would be a long-term beneficial impact that would uphold the park's fundamental value, facilitate visitor access, encourage alternative modes of moving between park sites, and meet the directives of NPS *Management Policies* 2006. These actions would improve access both to and through the park.

Bergen Beach

Private Vehicle and Waterborne Transportation Parking Facilities

Although access from the Belt Parkway would be improved, no changes to parking facilities are planned under alternative B at Bergen Beach, resulting in no impacts.

Public Transportation Services

There would be no change to public transportation services to Bergen Beach. However, Bergen Beach would be accessible by the NPS shuttle, resulting in a beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

New physical connections to New York City parks and adjacent neighborhoods would be developed, including a new water trail to Paerdegat and Mill Basin Inlet. A new nature trail would also be established. These facilities would improve access to the park through alternative travel modes, resulting in long-term beneficial transportation impacts.

Canarsie Pier

Private Vehicle and Waterborne Transportation Parking Facilities

This alternative would increase visitation and provide expanded recreational amenities. No changes are planned for the existing parking lot, which can accommodate 230 motor vehicles. If this number were insufficient to handle increased visitation, the NPS would work with Canarsie Pier to mitigate this issue.

Public Transportation Services

The NPS would work with NYCDPR to manage public transportation. Teaming with partner agencies to broaden the range of transportation services provided would be a beneficial impact. Additionally, Canarsie Pier would be accessible by the NPS shuttle, resulting in a beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Under this alternative, the NPS would actively recruit local visitors from adjacent communities. Dense housing is located adjacent to Canarsie Pier, providing an opportunity for neighbors to walk to the park. Canarsie Pier would include a hub for waterborne

transportation and would continue to provide water trail connections to other areas of Jamaica Bay. Enhancing water-based transportation in Jamaica Bay from a central location would be a long-term beneficial impact by facilitating visitor access and providing different modes of travel between park sites.

Pennsylvania Avenue and Fountain Avenue Parks

Private Vehicle and Waterborne Transportation Parking Facilities

No changes to parking facilities have been identified under this alternative, resulting in no impacts. The park would consider potential ferry parking demand and supply in conjunction with exploring the possibility of a ferry connection at a later date.

Public Transportation Services

Several bus routes currently provide direct access to the Pennsylvania Avenue and Fountain Avenue Parks. This service would continue under this alternative, providing a long-term beneficial impact. Physical connections with neighborhoods would be improved, thus enhancing the public's ability to access these park areas. A ferry connection would be explored, with potential to further improve public access. These improved connections along with the NPS shuttle access would be a long-term beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Under this alternative, the new hiking trail system that would be developed on roads traversing the Pennsylvania Avenue and Fountain Avenue Parks would provide a long-term beneficial impact. This trail system would take advantage of the existing Jamaica Bay ~~Rockaway–Gateway~~ Greenway, which currently provides bicycle access to the Jamaica Bay shoreline, increasing park access.

Spring Creek

Private Vehicle and Waterborne Transportation Parking Facilities

Substantially more visitor use would occur at Spring Creek, which would act as a gateway to Jamaica Bay for adjacent communities and would provide access to the water. No parking facilities have been identified for this alternative because it is anticipated that most visitors would access the park via other alternative modes from adjacent neighborhoods. Therefore, there would be no impact.

Public Transportation Services

The Q41 bus route currently provides access to Spring Creek. This service would continue under this alternative, providing a long-term beneficial impact. Physical connections with neighborhoods would be improved, thus enhancing the public's ability to access these

park areas. A ferry connection would be explored, with the potential to further improve public access. These improved connections along with the NPS shuttle would be a long-term beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

New greenway and trail connections to Spring Creek would provide additional ccess both through and to this district, taking advantage of existing bike routes in the area. Accommodating alternative modes of transportation would be a long-term beneficial impact.

Frank Charles Memorial Park and Hamilton Beach Park

Private Vehicle and Waterborne Transportation Parking Facilities

New boat launching sites would be developed under this alternative, and associated parking would be designed to meet demand, resulting in a long-term beneficial impact.

Public Transportation Services

Several bus routes currently provide direct access to the Pennsylvania Avenue and Fountain Avenue Parks. This service would continue under this alternative, providing a long-term beneficial impact. Physical connections with neighborhoods would be improved, thus enhancing the public's ability to access these park areas. A ferry connection would be explored, with potential to further improve public access. These improved connections plus the NPS shuttle would be a long-term beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Water access would be improved with trails and boat launching/landing sites at each park. These actions would provide new methods of accessing the park, resulting in long-term beneficial impacts.

Jamaica Bay Wildlife Refuge

Private Vehicle and Waterborne Transportation Parking Facilities

As mentioned in the "Affected Environment" chapter, there is no overflow parking for visitors to use when the main visitor parking lot is full at the wildlife refuge, and none is planned under this alternative. Active recreation opportunities would be expanded at the refuge, such as a network of trails and more water-based recreation, drawing more visitors and placing additional demand on already limited parking facilities. However, the NPS would improve multimodal transportation to and from the refuge, linking it to other park lands by additional bike connections and public transportation. Physical connections to the refuge would be provided in the form of boat and water-based shuttles. Use of these facilities to

access the refuge would ease the demand for parking, potentially offsetting adverse impacts on parking facilities that would occur from increased visitation, resulting in a long-term beneficial impact.

Public Transportation Services

As mentioned above, multimodal connections to and from the refuge would be improved, linking it to nearby areas through public transportation. Doing so would take advantage of the two bus routes that travel Cross Bay Boulevard, as well as the train routes that parallel it. One bus route and both train routes terminate at Rockaway Park Beach 116 Street Station, which provides connections to buses to several other sites in the Jamaica Bay Unit, including Floyd Bennett Field. An internal NPS shuttle originating at Floyd Bennett Field and looping through the Jamaica Bay Unit would further improve access to the refuge. These long-term beneficial actions would support the park's recreation experience (a fundamental value), provide access to all people (particularly those without cars), and support NPS *Management Policies* 2006 guidance.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

This alternative includes a network of trails and boardwalks, as well as water trails, offshore docks, and additional watercraft landing and launch sites. These facilities would provide long-term beneficial impacts on the park's transportation system through the provisions of additional alternative transportation modes, thus supporting the park's fundamental value and NPS *Management Policies* 2006 guidance, and encouraging a different way of moving between park sites.

Jacob Riis Park / Fort Tilden / Breezy Point

Private Vehicle and Waterborne Transportation Parking Facilities

Under this alternative, Jacob Riis Park would become a center for recreation and would draw visitors through new recreation facilities and visitor services. The existing 5,000-space parking lot at Jacob Riis Park would be redesigned to include sports fields. Sufficient parking supplies would remain to accommodate the new recreational facilities.
Depending on the degree of adaptive reuse of structures in the eastern area of Fort Tilden, additional parking may be required to meet the needs arising from greater use and more overnight stays. New parking for the new backcountry trail system would also be developed on the west side of Fort Tilden to accommodate trail and camping uses. These changes would be sized to meet the expected demand, resulting in long-term beneficial impacts.
All seven of the parking lots in this area of the park require permits. Under this alternative, fewer parking lots would require permits (with the exception of Breezy Point Tip), removing an obstacle to use. Opening these facilities to more use would improve transportation efficiency and parking distribution, resulting in a long-term beneficial impact.

Public Transportation Services

New links to public transportation would be provided, making it easier to access MTA routes Q35 and Q22. This would improve travel both to and through the park.

An internal NPS shuttle originating at Floyd Bennett Field and looping through the Jamaica Bay Unit would further improve access to the Rockaways and create convenient connections between Fort Tilden, Jacob Riis Park, Riis Landing, and Breezy Point Tip. The result would facilitate access for all visitors. All these improvements would be a long-term beneficial impact.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Bike infrastructure at Jacob Riis Park would be improved by adding bike parking, bike rentals, and/or a bike sharing station. Improving the Jamaica Bay Greenway would improve access for local residents, who use it as a bicycle commuter path. Although Shore Road would no longer be used for motor vehicle transportation, its conversion to a trail corridor would be a long-term beneficial impact by providing a new means of alternative transportation.

Riis Landing

Private Vehicle and Waterborne Transportation Parking Facilities

The 84-space parking lot at Riis Landing is not heavily used, although when it does fill because of ferry use, visitors park at the Fort Tilden lots. The buildings at Riis Landing would be used for several purposes, including ferry services, which would continue. Ferry use would also increase, leading to more use of the Fort Tilden parking. Circulation between Riis Landing and Fort Tilden would be improved and made safer for visitors walking to and from the ferry, resulting in a beneficial effect.

Public Transportation Services

No changes to public transportation services are planned for Riis Landing under this alternative.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Redesigning Riis Landing would be considered in order to improve safety and pedestrian access.

Staten Island Unit

The park sites in the Staten Island Unit would become more connected through shuttle systems and more bike and pedestrian trails and blueways. Alternative transportation modes would be stressed for potential park visitors, and more recreational opportunities would be provided. All these improvements would support the park's recreation experience (a

fundamental value) and NPS *Management Policies* 2006 regarding transportation systems, resulting in a long-term beneficial impact overall.

Fort Wadsworth

Private Vehicle and Waterborne Transportation Parking Facilities

Fort Wadsworth would be promoted as a recreation destination and would provide additional camping facilities to encourage overnight stays. The parking lot on New York Avenue is the largest lot at the site, and can accommodate 190 vehicles. There is ample parking at Fort Wadsworth and increased uses would not impact parking facilities.

Public Transportation Services

Multimodal transportation connections would provide transit linkages to other parks, as well as the Staten Island Ferry. Such linkages would take advantage of the existing transit routes that skirt Fort Wadsworth's north and west boundaries, providing a long-term beneficial impact by offering more ways to get to and through the park.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A coastal water trail would be developed to connect to Great Kills and nearby islands and other launch sites, providing a new transportation option to reach Fort Wadsworth. The East Shore and New York City Greenways would provide improved access to the park from adjacent neighborhoods. These actions would provide a long-term beneficial impact by improving transportation access to the park and providing a different way of moving between park sites on Staten Island.

Substantial improvements to bike facilities under this alternative would increase transportation benefits to park users. The multi-use trail system would be designed to cater to different physical abilities, supporting the NPS *Management Policies 2006* directive to provide accessibility for all people. Multimodal transportation connections would provide bike linkages to other parks and the Staten Island Ferry. The NPS would work with partners to build a bike route closer to the water rather than on Bay Street (where a Class 3 bicycle route currently exists) to connect Fort Wadsworth to the Staten Island Ferry terminal north of the park. Providing an alternative route to Bay Street would increase safety for cyclists and would reduce conflicts with automobiles and incompatible uses. Closing USS North Carolina Road to convert it to a bike route would also provide a safer route for cyclists through Fort Wadsworth. These actions would improve transportation both to and through the park. Long-term beneficial impacts would result from improvements to these human-powered transportation modes, which would uphold the park's fundamental value, as well as several NPS *Management Policies 2006* directives. These actions would also encourage use of alternative modes of traveling through the park.

Miller Field

Private Vehicle and Waterborne Transportation Parking Facilities

A new parking area would be provided near the water that would address increased visitation under this alternative, particularly the new kayak launch site, resulting in a long-term beneficial impact.

Public Transportation Services

No changes to public transportation services are planned for Miller Field under this alternative.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A new kayak launch site would provide a new transportation option for reaching Miller Field. Expanded trails and roads, with clearly delineated signs, would improve use of hiking trails and pedestrian routes. These improvements would be a long-term beneficial impact, because they would provide a different way of moving in and between park sites.

Great Kills Park

Private Vehicle and Waterborne Transportation Parking Facilities

This alternative includes several new recreational amenities that would draw substantially more visitors to Great Kills. A secondary access road off Hylan Boulevard and new parking at the new marina location would accommodate this increase in use and compensate for those lots that are currently closed due to radiation. The marina and parking facilities would be designed to accommodate visitation, including the possibility of a future ferry operation. Improving parking and access would be a long-term beneficial impact.

Public Transportation Services

Under this alternative, the NPS and New York City would advocate for improved public transit connections to make accessing the park more convenient and less dependent on cars.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

On implementation of this alternative, the rebuilt Nichols Marina would be open to the public and would include a water-based recreational facility that provides additional transportation options in the form of water trails.

Bike infrastructure would be improved to encourage more bike use both to and through the park. Expanding the multi-use pathway to include a system of looped routes and to connect to outlying greenways and bike routes would also promote their use as a transportation option to the park. New trails in the park, particularly at the park entrance, would encourage neighbors to walk to the park and hike these routes. All these actions would promote

different modes of moving in and between park sites. They would also support the park's fundamental value and would meet many of the directives of the NPS *Management Policies 2006,* resulting in long-term beneficial impacts.

Sandy Hook Unit

As with the other Gateway units, new recreational opportunities would be provided that would increase visitation to the site. Under this alternative, a variety of transportation modes would provide access to Sandy Hook, including expanded ferry service and a shuttle system, resulting in long-term beneficial impacts.

Private Vehicle and Waterborne Transportation Parking Facilities

Visitation would increase with the new recreational opportunities provided under this alternative, and parking supply would be redesigned to handle this capacity. New recreational destinations would be created, such as areas for concerts and festivals, and duration of stay would be changed through provision of additional overnight accommodations, such as expanded camping opportunities and lodging at Fort Hancock's repurposed buildings. These actions would redistribute visitor use geographically and temporally, and parking would be designed to accommodate these changes.

Some of the significant parking issues identified under the no-action alternative would be addressed by providing new or expanded methods of accessing the park. Expanded ferry and water taxi use, combined with an internal shuttle, would provide visitors with a car-free option for both getting to and through the park. A shuttle would also bring visitors to and through the park, and would be designed to address congestion issues at a regional and local level, which would also ease demand on parking. Development of a marina on the bay side of the park, in conjunction with a walkway or trail to the beaches on the ocean side, would have a similar effect on parking demand. These distinct changes in recreational amenities would provide the NPS with an opportunity to design parking to meet visitor capacity, thus reducing or eliminating the significant parking impacts that currently exist. The park would uphold its fundamental value and would reduce traffic congestion as directed by NPS *Management Policies* 2006, thus facilitating visitor access. This would be a long-term significant beneficial impact.

Public Transportation Services

As mentioned above, several alternative public transportation options would be provided to reduce reliance on private vehicle access to the park. These include expanded ferry and water taxi use, a new shuttle system, and a new marina on the bay side. Even if parking is designed to meet the carrying capacity identified for a site, a sudden influx of visitors arriving by boat or bus could overwhelm the site and exceed its capacity. Therefore, when planning the operation of these transportation modes, the NPS would consider visitation surges at particular sites in order to avoid exceeding the area's carrying capacity. Providing a variety of alternative methods to access and travel through the park would address the public's concern about this issue, and would uphold the park's fundamental

value. This alternative would also emphasize and encourage alternative transportation systems; reduce traffic congestion, noise, and air pollution; would not cause carrying capacity to be exceeded; would incorporate the principles of energy conservation and sustainability; would provide accessibility for all people; and make it easier and safer to see park features. In addition, this alternative would meet the NPS *Management Policies* 2006 directive to consider alternative destination points or transportation systems to address roads that are at or near capacity. This alternative would also facilitate visitor access, particularly for visitors with disabilities and those without cars. Long-term significant beneficial impacts would result.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

This alternative includes enhancements to expand the existing trail network and development of a water trail network. These actions would provide additional transportation options in the park. The trail connection from Fort Hancock to North Beach would be improved and would help disperse visitor use by encouraging more use at Fort Hancock. These actions would also enhance the visitor experience and thus uphold the park's fundamental value. Long-term impacts would be beneficial.

Cumulative Impacts

The same past, present, and reasonable foreseeable actions that would occur outside the scope of this plan would apply to this alternative as well. However, when combined with the impacts expected under alternative B, they would yield different results, as described below.

Jamaica Bay Unit

Beneficial impacts would occur throughout the Jamaica Bay Unit under alternative B from improvements to parking, public transportation (including ferry service and multimodal hubs), and alternative human-powered transportation modes (such as bike paths and water trails). These impacts would be combined with the improvements to ferry structures, parking facilities, and bridges outside the park, and with the existing public bus, subway, and ferry services offered outside the park, including any plans for future improvements. The result would be a beneficial effect. Although the contribution of alternative B would be a noticeable effect on access to and through the park, it would be imperceptible in proportion to the adverse impact of regional population growth, which is expected to continue. Therefore, cumulative impacts would be adverse.

Staten Island Unit

Beneficial impacts would occur throughout the Staten Island Unit under alternative B from improvements to parking, public transportation, and alternative transportation modes. In particular, expanded bike and water route options would be a focus at this unit. These impacts would be combined with the existing and proposed bike routes outside the park, as well as the existing public bus and train services offered outside the park. The result would be a beneficial effect. Although the contribution of alternative B would be a noticeable

effect on access to and through the park, it would be imperceptible in proportion to the adverse impact of regional population growth, which is expected to continue. Therefore, cumulative impacts would be adverse.

Sandy Hook Unit

The new alternative transportation systems proposed for Sandy Hook under this alternative would reduce reliance on private vehicle access to the park. These beneficial actions would be combined with the other efforts outside the park to address these issues, including the replaced Highlands–Sea Bright Bridge, which was designed to minimize seasonal traffic impacts and would also provide bike access to the park's entrance. The impacts of alternative B would also combine with the effects of the county's summer traffic plan to help ease congestion at Sandy Hook. The incremental effect contributed by the alternative to these other past, present, and reasonably foreseeable actions would constitute an appreciable portion of the overall cumulative impact. Therefore, cumulative impacts would be beneficial.

Conclusion

The actions called for under this alternative would increase visitor use throughout Gateway. New and redesigned parking areas would help alleviate congestion and address visitor capacity issues. New public transportation options and new and improved bike paths, greenways, blueways, hiking trails, and pedestrian routes would provide additional modes of travel to and through the park. These transportation options would also help concentrate and distribute use where needed in order to protect park resources and values. The wayfinding actions that are common to all action alternatives would also provide a beneficial impact by improving how visitors access and travel through the park. Overall impacts would be beneficial compared to existing conditions, particularly at Sandy Hook, where public health and safety issues resulting from severe congestion would be addressed at both a local and regional level. The beneficial impacts expected would uphold the park's fundamental value and abide by the guidance in the NPS *Management Policies* 2006 at all park units. These beneficial impacts would offset adverse cumulative impacts resulting from future regional growth outside the park boundaries. For these reasons, beneficial impacts would be significant.

Alternative C: Experiencing Preserved Places

The focus of alternative C on high levels of natural and historic resource preservation and restoration would increase the importance of integrating Gateway's transportation system into the park as unobtrusively as possible.

Impacts of Alternative C

Jamaica Bay Unit

A transportation hub would be created at Floyd Bennett Field to improve access and provide more multimodal options throughout the unit. More water-based transportation options would be provided throughout Jamaica Bay.

Floyd Bennett Field

Private Vehicle and Waterborne Transportation Parking Facilities

Under this alternative, limited facilities would be developed. Attention would be paid to carrying capacity, and visitor facilities would be concentrated in specific areas to allow for more undeveloped landscapes. A comprehensive trail system would provide access for a variety of visitor interests and transportation modes (hiking, running, biking, and horseback riding). Trailhead parking would be designed to accommodate the modes allowed (e.g., horse trailers), support the carrying capacity at each developed site, and fit in the footprint of the concentrated developed areas. Through these improvements, alternative C would uphold the park's visitor experience (a fundamental value) and facilitate visitor access. This alternative would not cause visitor use to exceed an area's carrying capacity. Parking for this alternative would also be designed with extreme care and sensitivity to the landscape and would not cause unacceptable impacts on natural and cultural resources, thus meeting the directives of the NPS *Management Policies* 2006. Long-term impacts would be beneficial.

Public Transportation Services

Public comments note that it is relatively easy to get to the park, but it is challenging to get through the park. No internal public transportation services would be provided under this alternative to facilitate such movement at Floyd Bennett Field, which would not support the NPS *Management Policies* 2006 guidance to emphasize and encourage alternative transportation systems regarding public transportation. Long-term impacts would be adverse.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

As mentioned above, a comprehensive trail system would provide access for a variety of visitor interests and transportation modes. Bike infrastructure, including wayfinding, maps, and bike rentals, would facilitate use of the trails and greenways. The expanded trail system would provide a new human-powered transportation option for visitors to travel through the park, supporting NPS *Management Policies* 2006 guidance to emphasize and encourage alternative transportation systems, reduce conflicts with automobiles and incompatible uses, and provide accessibility for all people. It would also provide a different way of moving in and between park sites at Jamaica Bay, resulting in a long-term beneficial impact.

Plumb Beach

The same actions described for alternative B would apply to alternative C for Plumb Beach, with the same long-term beneficial impacts.

Bergen Beach

Private Vehicle and Waterborne Transportation Parking Facilities

No changes to parking facilities are planned under alternative C at Bergen Beach, resulting in no impacts.

Public Transportation Services

There would be no change to public transportation services to Bergen Beach.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Equestrian uses would be relocated and Bergen Beach would become accessible to all visitors. More visitors would make use of the Rockaway–Gateway Greenway to reach this natural area, resulting in a long-term beneficial impact.

Canarsie Pier

Alternative C would be the same as alternative B for Canarsie Pier, with the same overall long-term beneficial impacts.

Pennsylvania Avenue and Fountain Avenue Parks

Private Vehicle and Waterborne Transportation Parking Facilities

Impacts would be the same as alternative B.

Public Transportation Services

Impacts would be the same as alternative B.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A new coastal trail would be developed along the water's edge, and launch areas and a water trail to Spring Creek would be developed, as well as a trailhead. These facilities would improve transportation at the Pennsylvania Avenue and Fountain Avenue Parks, resulting in a long-term beneficial impact.

Spring Creek, Frank Charles Memorial Park, and Hamilton Beach Park

Impacts would be the same as alternative B.

Jamaica Bay Wildlife Refuge

The same actions to provide access to the refuge described for alternative B would apply to this alternative. Due to the greater emphasis on research, parking demand may be lower, and the overflow parking issues that currently exist may no longer occur. The result would be decreased congestion and an appropriate correlation between parking and carrying capacity, as called for by NPS *Management Policies 2006,* thus facilitating visitor access. Parking supplies would be designed with sensitivity to the landscape and would not

cause unacceptable impacts on the natural resources at the refuge, thus supporting the natural resource restoration and training focus for the refuge under this alternative—a long-term beneficial impact. Other impacts would be as described for alternative B: long term and beneficial.

Jacob Riis Park / Fort Tilden / Breezy Point Tip

Transportation access to and through these areas would be similar to alternative B. However, the expansion of visitor uses and recreational amenities would be substantially less intensive, requiring less expansion of parking. As with the other areas of Jamaica Bay mentioned above, parking would be designed to correspond to planned use areas and would incorporate carrying capacity and landscape sensitivity considerations, resulting in long-term beneficial impacts. Other impacts would be as described for alternative B: long term and beneficial.

Riis Landing

Transportation access to and through these areas would be similar to alternative B and impacts would be as described for Jacob Riis Park / Fort Tilden / Breezy Point Tip.

Staten Island Unit

Although alternative C places more importance on nature-oriented recreation and historic interpretive experiences than alternative B, the sites in the Staten Island Unit would become more connected through shuttle systems and more bike and pedestrian trails and blueways, similar to alternative B.

Fort Wadsworth

Private Vehicle and Waterborne Transportation Parking Facilities

New recreational opportunities would be provided, some similar to alternative B, but on a smaller scale overall. This alternative includes a transportation hub at Fort Wadsworth that would provide connections via shuttle to other Staten Island and Gateway park sites. Therefore, larger parking supplies would be required to accommodate visitors leaving vehicles at Fort Wadsworth while they use the alternative transportation services provided at the hub. The parking lot off New York Avenue, the largest at Fort Wadsworth, can accommodate 190 vehicles. This lot would be evaluated to determine its ability to provide parking for the transportation hub and other new visitor facilities at Fort Wadsworth in order to facilitate visitor access. Any redesign of parking facilities would be conducted to uphold the park's recreation experience (a fundamental value) and would be in accordance with NPS *Management Policies* 2006, particularly the directive to design with extreme care and sensitivity to the landscape, resulting in long-term beneficial impacts.

Public Transportation Services

The transportation hub that would be located at Fort Wadsworth would provide visitors with an alternate means of accessing the other Gateway sites in the Staten Island Unit, providing connectivity between them and a new transportation option. Locating the hub at Fort Wadsworth would take advantage of its proximity to three public bus routes, including two from Brooklyn via the Verrazano-Narrows Bridge. The hub would provide a car-free option for visitors to access not only Fort Wadsworth but also other Staten Island Unit destinations as well. This long-term beneficial impact would encourage alternative transportation systems by providing different modes of access between sites and would uphold the park's recreation experience (a fundamental value).

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Like under alternative B, the NPS would work with partners to develop a bike route closer to the water, providing an alternative to Bay Street for connecting Fort Wadsworth to the Staten Island Ferry terminal. Similar to alternative B, a water trail would provide connections to Miller Field and Great Kills Park. The new Coastal Defense Trail would provide a new hiking route, potentially increasing access in the park. These facilities would result in long-term beneficial impacts by providing new transportation options to visitors.

Miller Field

Alternative C would be similar to alternative B for Miller Field for all transportation categories. The transportation hub described for Fort Wadsworth would provide access to Miller Field from Fort Wadsworth and would also connect visitors to Great Kills Park, providing an additional long-term beneficial impact compared to those expected under alternative B.

Great Kills Park

Private Vehicle and Waterborne Transportation Parking Facilities

New parking facilities would be developed to accommodate the relocated marina (which would be developed as described for alternative B) to compensate for those lots that are currently closed due to radiation. Like under alternative B, a new access would be opened off Hylan Boulevard. New parking facilities would be designed to accommodate redistributed visitation, including the enhanced education field center. Improving parking and a secondary access would be a long-term beneficial impact.

Public Transportation Services

The transportation hub described for Fort Wadsworth would provide access to Great Kills Park from Fort Wadsworth and would also connect visitors to Miller Field, resulting in long-term beneficial impacts.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

As with alternative B, new water trails would be developed in conjunction with the rebuilt marina, and bike infrastructure would be improved to encourage more bike use both to and through the park. These actions would encourage use of alternative transportation systems, a long-term beneficial impact.

Sandy Hook Unit

As with the other Gateway units, the emphasis under this alternative would be on preserving natural resources at Sandy Hook. Like alternative B, a variety of transportation modes would provide access to Sandy Hook, including expanded ferry service and a shuttle system.

Private Vehicle and Waterborne Transportation Parking Facilities

This alternative includes the same shuttle and alternative transportation system included with alternative B, which would address some of the significant parking issues identified under the no-action alternative. Overall impacts on parking would be beneficial in the long term.

Public Transportation Services

The same shuttle and alternative transportation system included with alternative B would apply to alternative C, resulting in the same long-term beneficial impacts as described for alternative B.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A hub for waterborne transportation and water trail connections would be developed, which would incorporate the expanded ferry and water taxis use described for alternative B. The existing trail system would be improved. All these improvements would encourage the use of alternative transportation systems, resulting in a long-term beneficial impact.

Cumulative Impacts

Although the specific transportation actions called for under alternative C would differ from alternative B, the impacts from both would be beneficial overall for all park units. These impacts would combine with the other past, present, and reasonably foreseeable actions in similar ways. At the Jamaica Bay Unit and the Staten Island Unit, any differences would not affect the contribution of alternative C, which would be imperceptible compared to the effects of regional growth. Resulting cumulative impacts would be adverse. Because the same alternative transportation system described under alternative B for Sandy Hook would be also incorporated in alternative C, cumulative impacts for Sandy Hook would be beneficial.

Conclusion

The actions called for under this alternative would refocus visitor use, resulting in an emphasis on natural resource education and preservation. Like alternative B, this alternative would result in similar beneficial impacts resulting from new and redesigned parking areas, new public transportation options, and new and improved bike paths, greenways, blueways, hiking trails, and pedestrian routes, although to a lesser degree. These transportation options would help concentrate and distribute use where needed in order to protect park resources and values. The wayfinding actions that are common to all action alternatives would also provide a beneficial impact by improving how visitors access and travel through the park. Like in alternative B, the beneficial impacts from Alternative C on transportation would offset adverse cumulative impacts resulting from future regional growth outside the park boundaries. In sum, beneficial impacts from Alternative C on transportation would be significant.

Park Management, Operations, and Facilities

Laws and Policies

NPS *Management Policies 2006* (NPS 2006a) includes sections on park and facilities management. Section 9.1.1, for example, instructs parks to avoid the future operations and maintenance cost of unnecessary or ineffective facilities, and to be able to sustain ongoing operations and maintenance costs of its facilities. When structures are no longer functional, they are to be removed. Many other sections provide guidance on energy sources, infrastructure, design, integration into the park landscape, and the preference of adaptive use of historic (and non-historic) buildings over new construction. Other sections (notably 1.9) direct park and staff management, including recruiting and using volunteers.

Methods

Impact analyses are based on the current description of park operations and park facilities presented in the "Affected Environment" chapter of this GMP/EIS. Park operations and park facilities includes both the quality and effectiveness of the infrastructure and the park's ability to maintain the infrastructure used in the operation of the park in order to adequately protect and preserve vital resources and provide for an effective and safe employee and visitor experience.

The resource-specific context for assessing impacts of the alternatives on park operations and park facilities includes the following:

- Parks must operate within the constraints of the unit-specific budget and number of staff positions that have been allocated by Congress and the NPS Director's Office.

- Park staff members are not only responsible for activities within their own unit but must also provide for an effective and safe visitor experience and protect resources in the entire park.

- The effects of Hurricane Sandy cleanup, temporary construction, and/or demolition affect the ability of park staff to complete maintenance activities and ensure a safe environment.

- The 2012 NPS Green Parks Plan articulates a vision for reducing the NPS's carbon footprint and outlines approaches for sustainable park management. All three GMP/EIS alternatives are strongly focused on making Gateway a model of sustainability within the New York Metropolitan Area and within the national park system. The NPS envisions future efforts to integrate comprehensive energy savings and green business practices into all aspects of park operations, management, transportation, waste management, and visitor behavior.

Alternative A: No Action

Across the park, the NPS would continue to maintain occupied buildings that are currently used for visitor, administrative and/or operational uses. Below is a summary of actions involved in continuing the current management of park assets and the associated impacts on park operations.

Impacts of Alternative A

Under alternative A, the park would continue to maintain or secure all structures in shared-use areas and seek occupancy for adaptive reuse of selected historic or other prioritized structures. Non-historic structures, such as the Education Field Center at Great Kills and the Visitor Center at Jamaica Bay National Wildlife Refuge, would remain in operation and existing levels of maintenance and staffing would remain consistent across the park. For example, buildings within the cantonment area of Fort Tilden would continue to be adaptively reused to house community organizations while the fortifications would continue as unmaintained assets. Generally, historic assets such as Battery Weed and Battery Tompkins at Fort Wadsworth would continue to be managed by stabilizing and preserving the structures only as funding is available. Over the term of the GMP, the slow deterioration of unmaintained historic buildings parkwide would continue, resulting in long-term or permanent adverse impacts (see the "Cultural Resources" section of this chapter under "Historic Districts and Historic Structures" for more information).

Staffing and Funding

Staffing levels would remain the same for all park units under alternative A. Although Hurricane Sandy recovery money will continue to be used to repair damage from the storm, the park's annual operating budget would likely remain the same and would continue to be inadequate to conduct all needed repair and rehabilitation efforts on park buildings and facilities. Once Hurricane Sandy restoration and improvement actions are completed,

the operational capability of park facilities to accommodate visitors would be reestablished under existing staffing levels. Overall, the impact of Hurricane Sandy restoration funding on deferred maintenance would be beneficial because it would reduce funding demands for building maintenance. However, the benefit would be short lived as ongoing demand for maintenance would continue after all hurricane-related funding has been used.

The overall ability of park staff and funding to meet the continued demands of alternative A would be minimal over the short term, with adverse impacts on park operations increasing gradually over the long term.

Sustainability

In 2013, the Gateway Criteria Air Pollutant and Greenhouse Gas (GHG) Emissions Inventory was produced. The report inventoried the park's greenhouse gas emissions from various sources and established a baseline for monitoring GHG and measuring the park's sustainability initiatives. In 2012, the NPS released the Green Parks Plan, which articulates a vision for reducing the agency's carbon footprint and outlines approaches for sustainable park management. The plan applies to all units of the NPS and calls for a reduction in energy consumption of 35 percent per square foot of building space by 2016. To accomplish this objective, Gateway would conduct energy assessments on the most energy-consuming facilities every four years, improve energy use tracking, maximize efficiency in new construction, and prioritize the use of energy sources that are renewable and appropriate. These mandates come from both the Energy Independence and Security Act and Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance."

Under alternative A, the park would continue to incorporate new sustainable business practices and technologies into park operations, facilities management, and park development to the extent that existing budgetary resources allow and as opportunities for integrating new technologies and practices emerge. Adoption of the Green Energy Plan for Gateway would result in appreciable beneficial impacts on the park's operations and maintenance budgets and staffing requirements.

Cumulative Impacts

Maintenance activities would have a greater impact on allocation of limited staff resources. To the extent that Hurricane Sandy funding reduces maintenance backlog, this funding would relieve the demand on staffing to address other park operational needs. However, the extensive backlog of repairs, although reduced by Hurricane Sandy funding, would continue to impact staffing and funding and would continue to grow over the long term under the no-action alternative.

Although climate change is not the result of an agency or single person undertaking an action, it is a powerful force with substantial additive effects on most or all of the resources at Gateway. Sea-level rise as well as other potential changes from climate change including extreme precipitation events, heat waves, and increases in severe winds or other phenomena related are likely to continue to have substantial long-term adverse impacts on park assets and operations.

In 2012, the NPS and New York City entered into an innovative agreement to collaborate on many aspects of park and recreation operations, especially because the two have overlapping and adjacent facilities across the metropolitan area. As a result of these initiatives, Gateway has been in the process of implementing and integrating numerous greening and energy conservation actions into its daily operations that will produce noticeable beneficial impacts by making park operations more sustainable over time. The long-term environmental and greenhouse gas reduction impacts for the environment of the park and the New York metropolitan area would be substantial, but not to the extent of the more comprehensive sustainability programs envisioned for Gateway in alternatives B and C.

Taken together, these past, present, and reasonably foreseeable actions would increasingly result in a primarily adverse impact on park operations. The effect of continuing current management of the deferred maintenance problem and not proactively addressing the potential impacts of climate change would contribute noticeable adverse increments to the cumulative impact on park operations.

Conclusion

Under alternative A, park operations and management would continue under existing funding and staffing levels. Except to the extent that Congressionally appropriated funds for Hurricane Sandy restoration are used to repair specific structures and landscapes, maintenance needs and associated maintenance backlog issues will continue to increase over the term of the GMP.

Continuing existing efforts to enable alternative modes of transportation for visitors, adopt Leadership in Energy and Environmental Design (LEED) standards for new building projects, adaptively reuse existing structures, and increase the fuel efficiency of park fleet vehicles would have a noticeably beneficial impact on park operations.

Overall, the lack of funding, continued deferred maintenance, and constant deterioration of these unrestored, unrepaired park assets would result in a significant adverse impact on park operations.

Common to Both Action Alternatives

Impacts of Alternatives B and C

Alternatives B and C differ from the no-action alternative in that the park would focus its staff and budget on the highest-priority buildings for maintenance and rehabilitation, and would allow other structures to deteriorate. Although this means the loss of several buildings, among them historic structures, it would also result in substantially more effective preservation of the remaining buildings.

Across the park, the same number of structures would be preserved under alternatives B and C. Differences, if any, would be in the extent of adaptive reuse, degree of interior building restoration, amount of interpretive exhibits and activities, and level of cultural landscape treatments. Through a parkwide prioritization and preservation effort, the alternatives would create more usable spaces for administrative and visitor uses, preserve remaining

structures, and reduce maintenance backlog through reuse. By designating certain assets as "managed ruins" and either letting them deteriorate naturally or documenting and removing them, the deferred maintenance backlog would be decreased substantially and park maintenance staff would be able to focus their time and resources on a smaller number of assets. The removal of facilities not contributing to the mission of the park and the intentional neglect of facilities whose condition is beyond repair would have a significant, beneficial effect on park operations and result in cost savings. While documentation, removal, and/or fencing off of these assets would require additional staff time initially, the long-term effect would be a reduced need for maintenance and other staff attention. The benefits of this approach to park management and operations would be substantial.

Both alternatives also include additional development for visitor facilities and amenities, which would bring additional visitor use. Without adequate funding or staff, the impact of additional visitor management would be adverse. This impact is described in more detail under alternative B and alternative C.
In both alternatives, the consolidation and relocation of Gateway maintenance areas would improve operational efficiency. For example, moving the maintenance operations at Sandy Hook from Fort Hancock to a new facility would reduce site impacts on the historic setting and benefit park operations by providing for a more modern facility from which to base maintenance activities at Sandy Hook.

In both alternatives, park operations would benefit from a strengthened partnership with New York City and other partners. The NPS's commitment to working with partners would have a continued positive impact on the park's ability to complete projects and programs in all areas of park operations. Across all three units of the park, partners would play an increasing role in supporting park cultural and natural resources and occupying, maintaining, and preserving some buildings. Facility rehabilitation and restoration, and even maintenance, could not be accomplished at the levels proposed in alternative B or alternative C without partner funding and volunteer efforts. Because partnerships and the resulting co-management of programming and facilities would eliminate duplicative use of personnel and equipment, it would benefit park operations by allowing for the redistribution of staff and greater operational efficiency. For example, as a result of partner involvement in building preservation, park management would be able to reallocate staff and budget resources to the preservation and maintenance of fewer buildings, improving the management of maintenance backlog issues and assets.

Sustainability

Actions common to both action alternatives would improve energy efficiency or conservation practices or reduce greenhouse gases. In accordance with the Green Parks Plan, both alternatives would adopt the following objectives and strategies for reducing greenhouse gas emissions and integrating sustainable practices into park operations: improve environmental performance to meet and exceed requirements of all applicable laws, reduce greenhouse gas emissions, improve facility energy performance, increase reliance on renewable energy, improve facility water use efficiency, adopt greener transportation methods and greening the fleet, purchase environmentally friendly products, decrease waste diversion and recycling, and adopt sustainable best practices in facility

operations (NPS 2012d). Implementing these strategies through park practices and through the NPS's expanded partnership with the New York City Office of Long-term Planning and Sustainability and NYCDPR would offer several opportunities to implement features of the Green Parks Plan and to expand sustainability throughout Gateway, resulting in appreciable beneficial impacts.

The following proposed actions common to both action alternatives would represent important steps in reducing the park's greenhouse gas emissions and improving sustainability practices and long-term energy conservation:

- Establishing multimodal transportation hubs at Floyd Bennett Field, Fort Wadsworth, and Sandy Hook that will facilitate alternative modes of transportation to and between the park lands, including walking and biking, waterborne transportation, land-based shuttles, and public transportation

- Transportation-related facility development, such as bike lanes, trails, kayak launches, and pedestrian paths, coupled with expanded outreach that will encourage the use of public transit and shuttles instead of individual cars

- Continued greening of the park vehicle fleet to include hybrid and other efficient vehicles

- Park staff encouraging suppliers, permittees, and contractors to follow sustainable practices and addressing sustainable park and partner practices in interpretive programs

The following proposed actions in both action alternatives would increase energy requirements, resulting in adverse impacts on the park's budget and staffing, as well as energy reduction goals:

- New visitor facilities, including the wetlands center, as well as expanded use and occupancy of Fort Hancock buildings and hangars at Floyd Bennett Field

- Overnight camping, which would require an energy source not currently needed (especially structural camping and RV campgrounds with utility hookups)

- Fuel used by heavy equipment to excavate and grade for new buildings and campgrounds and for restoration and wetland construction projects

- New modes of motorized transportation bringing visitors to the park (e.g., ferries and shuttles), increasing fuel usage

In summary, the proposals common to both alternatives would have a substantial beneficial impact on park operations in that they would result in improved operational efficiency through partnerships, a reduction in the deferred maintenance backlog due to a more focused parkwide preservation effort, and an increase in the sustainability of park operations, building practices, and energy utilization. These impacts would be widespread, and in combination with partnership management of programming and other features at

several park sites, would provide significant benefits for park management and operations. However, if funding and staffing levels remain inadequate, these benefits would not be realized and park operations would be adversely impacted due to the continued decline of the condition of park assets. Adverse impacts from development and use of new visitor facilities would result in some localized adverse impacts to park budget and staffing.

Alternative B: Discovering Gateway - NPS Preferred Alternative

Impacts of Alternative B

As stated under "Common to Both Action Alternatives," alternative B would result in substantial beneficial impacts on park operations. The parkwide banding and preservation effort would create more spaces for administrative and visitor uses, preserve structures, and reduce maintenance backlog through both the adaptive reuse of buildings and the designation of managed ruins that would be allowed to deteriorate. The consolidation and relocation of Gateway maintenance areas would improve operational efficiency. Also, increased partner involvement in operations and maintenance as well as building preservation, and especially adaptive reuse, would have a beneficial impact on park operations, allowing for the redistribution of staff and more operational efficiency given the reduction of the duplicative use of personnel and equipment.

Staffing and Funding

The emphasis of alternative B is to work with partners to develop revenue-generating visitor and recreation programming. This focus could result in additional funding sources for rehabilitation and preservation of park assets, and therefore provide substantial benefits for park operations by potentially offsetting operations and maintenance costs and creating more financially self-sustaining visitor facilities and programs. This additional source of revenue, in combination with greater support and coordination with partners, would also offset the adverse impacts on park operations that the addition of new visitor and recreation facilities could create.

Sustainability

The following actions proposed in alternative B for new or enhanced facility development and visitor uses would have an adverse impact on energy and resource conservation in the park, as well as on staff time and budget involved in developing visitor facilities and visitor management, beyond those articulated under "Common to Both Action Alternatives."

Bergen Beach would be developed to invite more uses, which would require the construction and operation of new facilities such as trails, picnic facilities, concessions, and staging areas for water-based recreation. Similarly, the Pennsylvania Avenue and Fountain Avenue Parks would be developed and include new facilities such as a performance venue, trails, and observation platforms. On Sandy Hook, Batteries Kingman and Mills would be transformed

into visitor activity nodes and would therefore introduce new energy requirements and life-cycle maintenance costs. Consequently, these new developments would carry substantial additional operational and maintenance costs, with concomitantly adverse impacts on staffing and budgets.

Alternative B would represent a substantial increase in the amount of camping available parkwide. This alternative would include an emphasis on higher-intensity forms of camping than alternative C, including more RV parks and drive-in campgrounds. These car-dependent forms of camping are more energy intensive than tent and walk-in camping, resulting in additional adverse impacts on the park's goals for energy conservation and sustainability. The following proposed actions would increase energy requirements, resulting in adverse impacts on the park's budget and staffing and on the park's energy reduction goals:

- New visitor facilities, including the wetlands center, as well as expanded use and occupancy of Fort Hancock buildings and hangars at Floyd Bennett Field

- Overnight camping, which would require an energy source not currently needed (especially structural camping and RV campgrounds with utility hookups)

- Fuel used by heavy equipment to excavate and grade for new buildings and campgrounds and for restoration and wetland construction projects

- New modes of motorized transportation bringing visitors to the park (e.g., ferries and shuttles), increasing fuel usage

Alternative B would likely result in an increase in visitation and more motorized transportation bringing visitors to the park (e.g., personal vehicles, ferries, land-based shuttles), which would likely increase energy consumption required by park operations, resulting in adverse impacts on park sustainability goals for energy conservation.

Cumulative Impacts

Cumulative impacts on visitor use and experience from past, present, and reasonably foreseeable projects beyond those in the GMP would remain the same as described for alternative A. Cumulative impacts related to sustainability and energy and resource conservation for alternative B would be greater than under alternative A (no action). The park's contribution to greenhouse gas emissions in the New York metropolitan area from park operations would be minimally reduced in the short term and significantly reduced over time as sustainable business practices are integrated into all park activities.

These cumulative actions have contributed or would contribute both adverse and beneficial impacts on park operations. When the impacts on park operations from alternative B are combined with the impacts of other projects in the park and region, and assuming growing partnership participation and appropriate funding, an overall beneficial cumulative impact would be expected. In furtherance of NPS-wide policy, the park would pursue public–private partnerships to assist with the reuse and preservation of fundamental resources (historic

structures) for a wide variety of uses, including visitor services such as lodging, administrative and partner needs, and recreational business opportunities, with resultant beneficial impacts on park operations because partners would help ensure building preservation and upkeep.

With a substantial increase in rehabilitation and adaptive reuse, more staff, increased budget, and an expanded operational capability would be required to manage the proposed new park activities and to ensure upkeep and protection of renovated and reused park buildings and assets. Assuming that operational capacity is expanded, alternative B would contribute an appreciable beneficial impact to park operations and management.

Conclusion

The focus of alternative B on working with partners to develop revenue-generating visitor and recreation programming would provide important and potentially significant benefits for park operations and budgets. With partner participation and adequate funding, and refocusing on maintaining the highest-priority assets, the proposed substantial increase in rehabilitation and adaptive reuse included in alternative B would result in long-term beneficial impacts on park operations as deferred maintenance would be addressed and the overall condition of park resources would be improved. These benefits would be significant.

Adverse impacts on park budget and staffing from increased management of visitor use facilities and visitor experience would result from adding facilities and improving access and programming, and some increase in energy needed to sustain these facilities would adversely affect energy conservation goals. Neither of these impacts would be significant. However, over the term of the GMP, direct impacts related to sustainability and energy and resource conservation would be beneficial for this alternative, substantially greater than those under the no-action alternative, and significant. While the cumulative adverse impacts on sustainability from urban development, climate change and more intensive development would be noticeable, they would be balanced by NPS commitment to pursuing sustainable facility development and building the resiliency of the parks and their surrounding communities.

Implementation of alternative B would result in a minimal reduction in short-term energy use and a more extensive long-term reduction as proposed sustainable business practices become integrated comprehensively into all park activities. The park's contribution to greenhouse gas emissions in the New York metropolitan area from park operations would be minimally reduced in the short term and significantly reduced over time as sustainable business practices are integrated into all park activities.

Alternative C: Experiencing Preserved Places

Impacts of Alternative C

In alternative C, park management would be more focused on the long-term preservation, research, and interpretation of fundamental coastal defense and maritime cultural resources,

focusing staff and budgetary involvement on both the preservation and interpretation of the park's fundamental natural and cultural resources. More so than in alternative B, the park would pursue public–private partnerships to assist with the reuse and preservation of fundamental historic structures for a wide variety of uses, including visitor services such as lodging, administrative and partner needs, and recreational business opportunities. This strategy would result in substantial beneficial impacts for park operations, and less need for increases in park budget and staffing levels to maintain operational integrity.

In partnership with New York City, the NPS would develop and operate a composting facility that includes an anaerobic digester. The impacts of operating this facility would be environmentally beneficial by diverting trash destined for landfills and reducing greenhouse gases. Operational impacts of these modified trash and recycling initiatives would be minimal, because the management of the facilities would be contracted under cooperative agreements with New York City.

As stated under "Common to Both Action Alternatives," alternative C would also result in substantial beneficial impacts on park operations from the parkwide banding and preservation effort, the consolidation and relocation of Gateway maintenance, and increased partner involvement in operations and maintenance as well as building preservation.

Staffing and Funding

Alternative C is less recreation oriented than alternative B, providing a greater emphasis on resource preservation. Under alternative C, facility development would be less intensive and visitation would be lower than in alternative B, resulting in a less adverse impact on park staff and operations budgets. Whereas alternative B may affect interpretive or law enforcement staff at the park, alternative C is likely to increase the workload for resource management division personnel.

Sustainability

The following actions proposed for facility development and visitor uses in alternative C would have a beneficial impact on energy and resource conservation in the park beyond those articulated under "Common to Both Action Alternatives."

In alternative C, there is a stronger emphasis than in alternative B on adopting innovative sustainable practices, resulting in beneficial impacts, as evidenced by the proposal for improved parkwide recycling and waste management including a large composting facility and anaerobic digester at Floyd Bennett Field.

Under alternative C, equestrian facilities at Bergen Beach would be removed and the area would be managed as a natural area with less facilities and energy requirements than exist today, with beneficial impacts on sustainability.

Alternative C would include fewer new facilities than alternative B, with beneficial impacts. Some actions that would result in greater energy demands than are currently required include rehabilitating portions of Fort Tompkins as a visitor facility and converting Sandy Hook's Nike Missile site into an interpreted, visitor-ready site.

Compared to alternative B, camping-related facility development would result in lower energy requirements. Alternative C would emphasize lower-intensity forms of camping, such as backcountry/beach, programmatic, and walk-in tent camping and would have fewer RV and drive-in campsites.

Cumulative Impacts

Cumulative impacts on park management, operations, and facilities under alternative C from past, present and reasonably foreseeable projects would remain the same as described for alternative A.

Collectively, these cumulative actions have contributed or would contribute to both adverse and beneficial impacts on park operations due to an increased emphasis on restoration and a lesser emphasis on increasing recreational visits. When the impacts on park operations from alternative C are viewed in combination with impacts from these other projects in the park and region, an overall appreciable beneficial cumulative impact would occur. In furtherance of NPS-wide policy, the park would pursue public–private partnerships to assist with the reuse and preservation of fundamental historic structures for a wide variety of uses, including visitor services such as lodging, administrative and partner needs, and recreational business opportunities, resulting in appreciable beneficial impacts on park operations because partners would help ensure building preservation and upkeep.

The proposed substantial increase in rehabilitation and adaptive reuse would require more staff, increased budget resources, and enhanced operational capability. Park operations and staffing would experience an imperceptible adverse impact in the absence of compensating funding to offset additional demands.

Cumulative adverse impacts related to sustainability and energy and resource conservation would be greater for this alternative than alternative A (no action), but beneficial compared to alternative B. Implementation of alternative C would result in a minimal reduction in short-term energy use and a greater long-term reduction as sustainable business practices become integrated comprehensively into all park activities. The park's contribution to greenhouse gas emissions in the New York metropolitan area from park operations would be minimally reduced in the short term and substantially reduced over time as sustainable business practices are integrated into all park activities.

Conclusion

With partner participation and adequate funding, and refocusing on maintaining the highest-priority assets, the proposed substantial increase in rehabilitation and adaptive reuse included in alternative C would result in long-term beneficial impacts on park operations as deferred maintenance would be addressed and the overall condition of park resources would be improved. These benefits would be significant. An additional focus on preservation of cultural and natural resources and a more aggressive pursuit of public–private partnerships for reuse of historic structures in alternative C would provide additional potentially significant benefits for these park assets. Increases in visitor facilities, recreational opportunities, resource preservation and protection, and visitor use would have potential adverse impacts on park management and operations budgets and staffing. However, the operational efficiencies of partnering with New York City and others and the increased visibility in preservation communities could compensate for gaps in staffing or budgets associated with these increases in amenities or services. Also, proposed actions common to both action alternatives to improve energy efficiency and sustainability, in combination with a greater emphasis on sustainable facilities and operations in alternative C than B (such as including an anaerobic digester), would add to significant beneficial impacts on park operations expected under either alternative.



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Chapter 5: Consultation and Coordination







History of Community Participation

There are many different public agencies, local governments, non-profit organizations and individual citizens who have an interest in this plan. Reaching out to the community for their ideas and expertise and listening to their concerns is an important step in the GMP planning effort. Important input into the development of this ~~draft~~ final GMP/EIS was contributed from a combination of public open houses, outdoor information sessions, electronic mail, individual meetings and letters. Concerns, opportunities, interests, expectation and suggestions were identified through consultations with park staff and during public forums and meetings with stakeholders. Press releases and invitations to public open houses and stakeholder meetings were sent to local newspapers. Gateway posted and maintained announcements regarding the status of the GMP on the park's website and Facebook page.

Reaching out to the community for their ideas and expertise and listening to their concerns is an important step in the GMP planning effort. Important input into the development of this final GMP/EIS was contributed from a combination of public open houses, outdoor information sessions, electronic mail, individual meetings and letters.

Scoping

The public involvement process began with a "Notice of Intent" to prepare an environmental impact statement for the general management plan; this notice was published in the Federal Register in July 2009.

In July 2009, the first GMP newsletter was introduced and more than 7,000 copies sent out to the park's mailing list. Copies of the newsletters were posted on the park's website and distributed at visitor contact stations or by staff throughout the park. In addition, the newsletter was translated and printed in Mandarin Chinese, Russian and Spanish. The park hosted five open houses at the Great Kills Beach Center (Staten Island, New York), Bay 9 at Riis Park (Queens, New York), Sandy Hook Lot D Beach Center (Sandy Hook, New Jersey), Aviator Sports at Floyd Bennett Field (Brooklyn, New York), and the Fort Wadsworth Visitor Center (Staten Island, New York) to provide people information about the GMP planning process and opportunities to participate, including an invitation to attend future public open house workshops. Members of the park's planning and civic engagement team, rangers, and other staff were on hand to share information and answer questions about the GMP process.

In September 2009, the park hosted another six public open houses at the Gateway Marina (Brooklyn, New York), World War Veterans Park at Miller Field (Staten Island, New York), Fort Hancock Chapel (Sandy Hook, New Jersey), Jamaica Bay Wildlife Refuge Visitor Center (Queens, New York), Ranger Station at Floyd Bennett Field (Brooklyn, New York), and the Fort Wadsworth Visitor Center (Staten Island, New York) to provide information about the GMP planning process and to gather public comments.

Comments were received by mail, electronic mail and through the NPS Planning, Environment, and Public Comment (PEPC) website. Almost a thousand people participated in these combined forums, which resulted in hundreds of comment sheets and thousands of individual comments. Enjoyment of the beaches and access to the Atlantic Ocean was expressed by many as their favorite feature of Gateway. The entire beach experience—clean sand, salty air, sunshine, and water—was considered exceptional, especially within a short ride from the city. One of the sentiments heard most frequently was the great value placed



on the relatively undeveloped natural setting and open spaces throughout areas of the park. A large number of the comments received expressed appreciation for the close-to-home, affordable, and family-oriented experiences available at Gateway. Many people identified the need for connectivity to park sites and alternative transportation options, especially public transit. Some people wanted to see more trail connections (for all types of use) in the parks to increase the diversity of recreation and access opportunities. In addition, some asked for new or different opportunities for water-based trails, establishing facilities and routes. Some people identified a concern with the level of maintenance of visitor amenities, including park facilities and historic structures. People often cited concern over the balance between visitor access and resource preservation and the need for the plan to address protection of the park's unique natural and cultural resources.

Over 7,000 copies of the second GMP newsletter were sent to the park's mailing list. The newsletter was also posted on the park's website and distributed at visitor contact stations or by staff throughout the park.

Preliminary Alternatives Open Houses and Review

In the fall 2010, the Gateway planning team presented three preliminary alternative concepts and requested community input. Over 7,000 copies of the second GMP newsletter were sent to the park's mailing list. The newsletter was also posted on the park's website and distributed at visitor contact stations or by staff throughout the park. In order to reach as much of the metropolitan audiences as possible, the newsletter was translated and printed in Mandarin Chinese, Russian and Spanish. The newsletter provided a summary of the three alternative concepts, as well as an update on the planning process, the foundation for planning, a summary of your ideas from the 2009 scoping meetings, and the planning challenges. In November 2010, the NPS hosted 9 public open houses at Federal Hall National Memorial (New York, New York), Starrett City Brooklyn Sports Club (Brooklyn, New York), Monmouth University (West Long Branch, New Jersey), Brookdale Community College (Lincroft, New Jersey), Kingsborough Community College (Brooklyn, New York), Oakwood Heights Community Church (Staten Island, New York), Monmouth Beach Cultural Center (Monmouth Beach, New Jersey), Jamaica Bay Wildlife Refuge (Queens, New York), and Fort Wadsworth Visitor Center (Staten Island, New York) to gather public comment on a range of preliminary alternative concepts for future management of the park. An additional three meetings were held in March 2011 at New Jersey locations including Monmouth Beach and Highlands Borough to discuss the future preservation of Fort Hancock and Sandy Hook.

Comments were received by mail, electronic mail and through the NPS Planning, Environment, and Public Comment website. Hundreds of comment sheets and thousands of individual comments were received. Many of the comments received indicated that all three of the alternative concepts would indeed help Gateway carry out its purpose. In general, comments favored the concepts (or elements of the concepts) fairly equally; there was not a concept that was clearly preferred by a majority. Ideas and topics included the importance of building stewardship for Gateway's resources, increasing sustainability in park management, and raising public awareness of the park. Many people suggested that park managers actively pursue the preservation, restoration, and adaptive re-use of historic structures, with many suggesting that partners could assist in this effort. Some people voiced concerns with the current level of maintenance at the park. Maintaining public access and ensuring a variety of recreation opportunities were also frequently mentioned.



Hundreds of comment sheets and thousands of individual comments were received. Many of the comments received indicated that all three of the alternative concepts would indeed help Gateway carry out its purpose.

Draft Management Alternatives Open Houses and Review

In July 2012, Secretary of the Interior Ken Salazar and New York City Mayor Michael Bloomberg released the third newsletter for public comment at a press conference announcing the signing of a cooperative management agreement between New York City and Gateway. Over 3,000 copies of the third GMP newsletter were sent to the park's mailing list. The newsletter was also posted on the park's website and distributed at visitor contact stations or by staff throughout the park. NPS hosted six outdoor information sessions and public open house meetings at Great Kills Beach Center and Education Center (Staten Island, New York), Riis Park Bathhouse (Queens, New York), Sandy Hook Lot D Beach Center (Sandy Hook, New Jersey), and Ryan Visitor Center at Floyd Bennett Field (Brooklyn, New York), to gather comments on the four draft management alternatives. Comments were received by mail, electronic mail and through the NPS Planning, Environment, and Public Comment website. Hundreds of comments were received and showed a strong preference for Alternative C: Experiencing Preserved Places.

Draft GMP/EIS Open Houses and Review

The Draft GMP/EIS was released for public review on August 2, 2013. Information about the comment period was sent out to the park's GMP mailing list and posted on the park's website and Facebook page. NPS hosted three public open house meetings in August at the Ryan Visitor Center at Floyd Bennett Field (Brooklyn, New York), Sandy Hook Light House (Sandy Hook, New Jersey), and the Fort Wadsworth training room (Staten Island, New York) to provide information and answer questions on the Draft GMP/EIS, distribute copies of the document and gather public comments. In September 2013, the park held another two public open houses and stakeholder meetings at the Jamaica Bay Wildlife Refuge Visitor Center (Queens, New York) and the Fort Hancock Chapel (Sandy Hook, New Jersey). The review period was 90 days and ended on October 22, 2013.

A total of 715 pieces of correspondence about the draft plan were received from individuals, organizations, and agencies. Comments and responses are summarized in Chapter 6: Comments and Responses to Comments on Draft Plan. Agency letters are reproduced in Appendix C .



Briefings to Elected Officials

Throughout this GMP process, the park superintendent and other staff have met with members of Congress and their staffs to discuss the planning process. During these visits, information about the preliminary and draft alternatives, the Draft GMP/EIS, community outreach, and future park development was presented and discussed. In July 2012, the park superintendent joined NYCDPR staff in briefings with the Brooklyn, Queens and Staten Island Borough Presidents and community interests to discuss the GMP. These elected officials and their staff provided ideas, suggestions, and support for the continuation of the GMP process. ~~Briefings to present and discuss the Draft GMP/EIS are scheduled for Summer 2013.~~ In July 2013, the NPNH Commissioner, park superintendent and other staff met with members of Congress and their staffs to present and discuss the Draft GMP/EIS. In September 2013, the NPNH Commissioner and acting park superintendent joined NYCDPR staff in briefings with the Brooklyn and Staten Island Borough Presidents and community interests to discuss the Draft GMP/EIS.

Fort Hancock 21st Century Advisory Committee

Concurrent with the development of this GMP, Gateway is working with a Federal Advisory Committee Act group, the Fort Hancock 21st Century Advisory Committee, to identify appropriate future uses and redevelopment strategies for the buildings and cultural landscape at Fort Hancock. The committee was formed in September 2012 under the Federal Advisory Committee Act of 1972 (FACA). FACA committees are formed to provide advice to the Executive Branch of government, which includes the National Park Service. The 20 committee members, who applied to serve and were chosen by Interior Secretary Ken Salazar, serve without compensation and represent a wide array of local and national leaders in government, business, recreation and real estate as well as experts in natural, scientific and education resources. The committee will meet every four-to-six weeks over a two or three year term and will strive to operate by consensus. Relevant documents, background material, meeting minutes, and other useful information used by the Committee can be found on their website at http://forthancock21stcentury.org. Their recommendations will guide implementation of the GMP.

Environmental Quality Review and Consultations

Section 106 Consultation

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties listed on or eligible for listing on the National Register of Historic Places and afford the Advisory Council on

Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. The Section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of project planning. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties (36 CFR Part 800).

Section 106 consultation for the GMP and the alternatives proposed, including the preferred alternative, has been initiated with the New York and New Jersey Historic Preservation Officers (New York and New Jersey SHPOs) and the ACHP and has included consultation on the GMP's broader concepts and the development of the alternatives. In March 2012, Gateway sent letters to the New York and New Jersey SHPOs and the ACHP to initiate consultation for the GMP. In late March 2012, an on-site meeting was held with the New York and New Jersey SHPOs briefing them on the scope of the draft management alternatives. The New York and New Jersey SHPOs and the ACHP were updated on the status of the GMP and its Section 106 process in early June 2013. Additionally, the NPS sent letters to the New Jersey and New York SHPOs and the ACHP in July 2013 to update them in more detail on the GMP process and provide the draft GMP for review and comment.

While the GMP ~~will be~~ was provided to the SHPOs, the ACHP and many others for review and comment, during the Draft GMP/EIS public comment period, further Section 106 consultation, including more detailed Section 106 Assessment of Effects to historic properties, ~~will continue to take place~~ has continued as the GMP ~~proceeds~~ proceeded. ~~The NPS is currently developing a section 106 Programmatic Agreement in consultation with the New Jersey and New York SHPOs and the ACHP. The Programmatic Agreement will extend from the section 106 steps conducted for the GMP and define the section 106 process necessary for the implementation of the GMP's final selected alternative that will be identified in the GMP/ROD. The Programmatic Agreement will be made available for public review and comment later this summer and will be included in the GMP/ROD, concluding the section 106 process for the GMP.~~ In October 2013 the NPS invited the New Jersey and New York SHPOs, the ACHP, the Delaware Nation, Delaware Tribe of Indians, and the Stockbridge-Munsee Community to participate in consultation on the development of a Section 106 Programmatic Agreement that outlines how Section 106 will conclude for the GMP and how it will proceed as the GMP is implemented. The NPS has developed a draft Programmatic Agreement that is included in Appendix C on page 667 and was also made available for public comment in February 2014. It is the intent of the NPS to have the executed Programmatic Agreement included in the GMP/EIS Record of Decision, concluding the Section 106 process for the GMP. Implementation of the actions described in ~~a~~ the GMP's selected alternative will require extensive Section 106 consultation once the GMP is complete. That consultation process ~~will be~~ is outlined within the Programmatic Agreement and ~~will include~~ includes working with the New Jersey and New York SHPOs ~~and ACHP~~ to identify the appropriate consulting parties for various concepts and elements of the GMP. Section 106 consultation will continue as the GMP is implemented and appropriate planning and design for individual actions is underway.

Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat.





Tribal Consultation

~~American~~ Federally-recognized Indian Tribes with possible interest in sites within Gateway were ~~contacted to invite consultation~~ invited to consult regarding the Draft GMP/EIS. While no pre-contact and historic period archeological sites with Native American components have been identified in the park, the Delaware Nation, Delaware Tribe of Indians and the Stockbridge-Munsee Community were invited to consult in June 2013. The Draft GMP/EIS was provided to these tribes in July 2013 and they were invited to participate in the development of the Section 106 Programmatic Agreement.

In October 2013 the NPS invited the Delaware Nation, Delaware Tribe of Indians and the Stockbridge-Munsee Community along with the New Jersey and New York SHPOs and the ACHP to participate in consultation on the development of the Section 106 Programmatic Agreement that outlines how Section 106 will conclude for the GMP and how it will proceed as the GMP is implemented. Although the tribes did not choose to participate in the development of the programmatic agreement, they will continue to be included in the Section 106 consultations as the GMP is implemented.

Section 7 Consultation

Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 USC 1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. NPS management policies also require cooperation with appropriate state conservation agencies to protect state-listed and candidate species of special concern within park boundaries.

The park corresponded with the Long Island Field Office (LIFO) and the New Jersey Field Office (NJFO) of the U.S. Fish and Wildlife Service to inform them of the GMP process and verify the federally-listed species. During previous joint LIFO/NJFO coordination, review of similar compliance documents was conducted jointly, with consolidated comments and advice to NPS on Section 7 consultation requirements handled by one of the field offices. ~~Comments will be provided following the review of the Draft GMP/EIS.~~

The Draft GMP/EIS was sent to the LIFO and NJFO for review and comment in August 2013. The park received comment letters on the Draft GMP/EIS from the NJFO on November 1 and from the LIFO on December 13. Both letters expressed concerns about proposed activities in the preferred alternative that may affect federally listed species. Between November 2013 and February 2014, NPS and USFWS staff held multiple meetings and conference calls to clarify comments, discuss concerns, and propose revisions to text and management zoning maps in the Final GMP/EIS. In March 2014, NPS provided an effects analysis to USFWS pursuant to Section 7 of the Endangered Species Act (ESA).

The NPS and USFWS initially agreed that review of the GMP for effects to federally listed species would be conducted through informal consultation under Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) However,

upon completing USFWS review of the Draft GMP/EIS and the NPS's effects analysis, USFWS concluded that review under Section 7(a)(1) of the ESA was more appropriate. Section 7(a)(2) of the ESA requires consultation on all Federal agency actions may affect listed species. However, USFWS policy states that, when there is insufficient project-specific information on an agency program or management plan to support a proper effects analysis, a 7(a)(1) programmatic review is appropriate. Following USFWS review of the revised GMP and the effects analysis, the USFWS concluded that the NPS's proposed adoption of the new GMP falls into this category (i.e., of insufficient information) and therefore is more appropriately addressed by a Section 7(a)(1) programmatic review. This type of review outlines a "blueprint for conservation activities" during implementation of the GMP.

On March 10, the USFWS sent a letter to NPS concluding the Section 7 (a)(1) review of the GMP and providing the conservation framework for subsequent, project-specific 7(a)(2) consultation that will be conducted on all GMP implementation activities proposed at Gateway. A copy of the consultation letters is provided in Appendix C on pages 627-664.

In order for the GMP to be adaptive to changing conditions, the NPS would regularly review the status of threatened and endangered species and revise conservation measures as needed. Any plans or actions that include changes to the types, levels or locations of visitor use that may cause (or contribute to cumulative) impacts to Threatened and Endangered Species would be subject to consultation with USFWS. Future implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, will include conservation measures for threatened and endangered species, following appropriate review and consultation with USFWS. Conservation measures will include, but not be limited to, those identified in this plan (e.g., see Common to Both Action Alternatives, page 62, camping, page 70 and references to Shoreside Plan throughout). Future implementation of the GMP involving change in management practices or policies will also undergo review and consultation to avoid and minimize adverse effects to threatened and endangered species.

New York City Environmental Quality Review Process

A general agreement between NPS and the City of New York established the City as a cooperating agency in the process of preparing the GMP/EIS. Representatives of various NYC agencies are participating in the EIS process and will identify potential future actions that may affect New York City and future environmental review.

City Environmental Quality Review, or CEQR, is the process by which agencies of New York City review proposed discretionary actions to identify the effects those actions may have on the environment. CEQR is New York City's process for implementing State Environment Quality Review Act. This Act requires that state and local governmental agencies assess environmental effects of discretionary actions before undertaking, funding or approving such actions, unless they fall within certain statutory or regulatory exemptions from the requirements for review. CEQR procedures pertain to proposed discretionary actions specifically taking place within the boundaries of New York City. CEQR adapts and refines the state rules to take into account the special circumstances of New York City.

List of Final GMP/EIS Recipients

Copies of the final GMP/EIS were distributed to the following government officials, government agencies, and non-governmental organizations and institutions. Individuals on the GMP mailing list were contacted and copies distributed to individuals, groups, property owners, and businesses who requested the document.

Congressional Delegation

New Jersey Senator Corey Booker
New Jersey Senator Robert Menendez
New York Senator Kirsten E. Gillibrand
New York Senator Charles E. Schumer
New Jersey Representative Rush Holt
New Jersey Representative Frank Pallone, Jr.
New York Representative Yvette Clarke
New York Representative Michael Grimm
New York Representative Hakeem Jeffries
New York Representative Gregory Meeks

Federal Agencies

Advisory Council on Historic Preservation, Office of Federal Agency Programs
Army Corps of Engineers
Department of Agriculture, Natural Resources Conservation Service
Department of Defense, Army
Department of Defense, Coast Guard
Department of Defense, Marine Corps
Department of the Interior, Fish and Wildlife Service
Department of the Interior, U.S. Geological Survey
Environmental Protection Agency
National Oceanic and Atmospheric Administration

New Jersey Legislative Delegation

Senator Joseph M. Kyrillos, Jr.
Assemblywoman Amy H. Handlin
Assemblyman Declan J. O'Scanlon, Jr.

New York Legislative Delegation

Senator Joseph P. Addabbo, 15th Senate District
Senator John L. Sampson, 19th Senate District
Assemblyman Phillip Goldfeder, 23rd District

New Jersey State Agencies

State Historic Preservation Office
Department of Environmental Protection

New York State Agencies

Department of Environmental Conservation
State Historic Preservation Office

New Jersey County and Local Governments

Monmouth County Planning Department
Borough of Atlantic Highlands
Borough of Highlands
Borough of Monmouth Beach
Borough of Sea Bright

City of New York

Brooklyn Borough President Eric Adams
Queens Borough President Melinda Katz
Staten Island Borough President James Oddo
Councilman Alan Maisel, 46th District
Councilman Eric Ulrich, 32nd District
Councilwoman Inez Baron, 42nd District

NYC Agencies

Mayor's Office of Environmental Coordination
Mayor's Office of Long-term Planning and Sustainability
Department of Environmental Protection
Historic Landmarks Commission
Law Department
Department of Parks and Recreation
Department of Planning
Department of Transportation

Tribal Organizations

Delaware Nation
Delaware Tribe of Indians
Stockbridge-Munsee Community

Businesses, Groups and Organizations

American Littoral Society
Appalachian Mountain Club
Army Ground Forces Association
Asbury Fishing Club
Audubon Society
Aviator Sports
Breezy Point Cooperative
Breezy Point Surf Club
Broad Channel Civic Association
Brooklyn Bird Club
Brooklyn Golf Center
Clean Ocean Action
Dover Gourmet Corporation
Floyd Bennett Cricket Club
Floyd Bennett Field Garden Association
Friends of Gunnison
Friends of Pennsylvania and Fountain Avenue Landfills/Citizen Advisory Committee
Gateway Bike & Boathouse
HS Concessions Inc.
Jamaica Bay Eco Watchers
Jamaica Bay Riding Academy
Jen Marine Development LLC
Jersey Coast Anglers Association
Linnean Society of New York
Marinas of the Future
Marine Academy of Science and Technology
Metropolitan Waterfront Alliance
Midland Beach Civic Association
Miramar Yacht Club
Monmouth County Audubon Society
National Parks and Conservation Association
National Parks of New York Harbor Conservancy
Natural Resources Protective Association
New Jersey Light House Society
New Jersey Marine Science Consortium
New York/New Jersey Baykeeper
New York City Audubon Society
Protectors of Pine Oaks
Queens Bird Club
Regional Plan Association
Rockaway Artist Alliance
Rockaway Little League

Rockaway Point Yacht Club
Rockaway Theatre Company
Rockaway Waterfront Alliance
SeaStreak
Sebago Canoe Club
Sierra Club
Staten Island Museum
Staten Island Padres Athletic Association
Staten Island Soccer League
The Arts and Humanities For Staten Island
The Historic Aircraft Restoration Project
The Ocean Institute
The Sandy Hook Foundation
The Trust for Public Land

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Chapter 6: Comments and Responses to Comments on Draft Plan




Y WILDLIFE REFUGE



Summary of Public Comment Process

This chapter presents the analysis of public and agency comments received on the draft GMP/EIS with NPS responses. The draft GMP/EIS was released for public review on August 2, 2013. The draft GMP/EIS was available at the park and on the National Park Service planning website (http://parkplanning.nps. gov/gate). Information about the review period was sent out to the park's GMP mailing list and posted on the park's website and Facebook page. The public was able to submit comments on the plan using any of the following methods: electronically through the NPS Planning, Environment, and Public Comment (PEPC) website; in person at public open house meetings or by mailing comments to the NPS.

During the comment period, NPS hosted three public open house meetings in August at the Ryan Visitor Center at Floyd Bennett Field (Brooklyn, New York), Sandy Hook Light House (Sandy Hook, New Jersey), and the Fort Wadsworth training room (Staten Island, New York) to provide information and answer questions on the draft GMP/EIS, distribute copies of the document and gather public comments. In September 2013, the park held another two public open houses and stakeholder meetings at the Jamaica Bay Wildlife Refuge Visitor Center (Queens, New York) and the Fort Hancock Chapel (Sandy Hook, New Jersey). The review period was 90 days and ended on October 22, 2013.

Comment Analysis Process

Comment analysis is a process used to compile and combine similar public comments into a format that can be used by NPS in organizing, clarifying, and addressing technical information pursuant to National Environmental Protection Act (NEPA) regulations. It also aids in identifying the topics and issues to be evaluated and considered throughout the planning process.

This chapter includes a synopsis of concerns voiced by citizens and groups regarding the draft GMP/EIS. These concerns are captured in "concern statements" followed by a quote from a letter best representing that concern. The representative quotes are not intended to be an exhaustive list of every comment but are instead a representation of the types of comments received on the scope of the draft GMP/EIS.

All comments were read and analyzed. The analysis process attempts to capture the full range of public concerns received on the draft GMP/EIS. Comments from people who chose to respond do not necessarily represent the sentiments of the entire public. Furthermore, this was not a vote-counting process, and the emphasis was on content of the comment rather than the number of times a comment was received. The information in this chapter is intended to be a summary of the comments received, rather than a statistical analysis.

Range of Comments

A total of 715 pieces of correspondence were received, all of which were carefully reviewed by the NPS. From these, a total of 2,592 distinct comments were extracted and grouped according to similar issues and concerns expressed.

The most prevalent concerns expressed in the comments received included the following topics:

- Suggestions for changes to historic resources management at the park including maximizing re-use by lessees; less commercialization of historic buildings; adding a museum or enlarging existing museums; suggestions on which specific structures to interpret and which to protect; suggestions on what specifically to preserve in existing buildings (roofs, employee housing; gymnasium); buildings that should be preserved instead of stabilized; retrofitting to better withstand storm damage; highest priority buildings within the preservation category;

- Suggestions for more or fewer facilities including adding festivals to raise funds; reducing boating; add boating ramps and access; adding fishing; where to have trails or blinds, add signs and how to name areas; eliminating camping or boat launches at Sandy Hook; changes in use of the community garden or concessions; removing some uses from Floyd Bennett Field; changes or restoration of the marina at Great Kills Park; opening and closing time suggestions for visitor centers or the park itself;

- Suggestions for changes to natural resources management at the park including increasing enforcement to protect birds at Spermaceti Cove; how to manage grasslands at Floyd Bennett Field; how and where to locate campgrounds to avoid impacts to wildlife; management of East Pond to maximize breeding by shorebirds; predator control; noise control; and managing Plumb Beach to minimize recreational uses.

- Restoring West Pond and specifics on how to do so, what to plant and how to manage vegetation, whether to return to a larger pond or the pre-storm size pond; installing boardwalks, trails or viewing towers;

- Staffing suggestions including improved enforcement to protect safety and resources; specific hiring suggestions such as for landscape managers or staff with particular educational backgrounds, or for patrolling waters of Jamaica Bay.

- Concerns over impacts to birds and habitat across the park as well as specific concerns for birds and habitat at Sandy Hook including effects of camping and concentrated human use; boating near nesting wildlife in Jamaica Bay or along the Sandy Hook shoreline; habitat removal to create campgrounds, trails and other recreation opportunities.

- Concerns over impacts to rare or listed vegetation and wildlife from increased activity and/or facilities in or adjacent to their habitat including camping, trails, the introduction of overnight visitation, noise, trampling of habitat, and introduction of human activities in areas where it does not occur now, such as on Hoffman Island and Canarsie Pol.

The NPS also received many comments regarding park management and how it should be directed, including: prioritizing protection of resources or open space; prioritizing preservation and protection of wildlife and habitat at Sandy Hook; maintaining Jamaica Bay in an undisturbed state free from active recreation and development; applying lessons learned from Hurricane Sandy; protecting threatened or endangered species; eliminating, reducing, balancing or increasing active recreation in the park; and prioritizing and

reducing protection of historic structures. Other comments received included comments on transportation issues, planning suggestions, costs, safety issues, community involvement and specific community concerns.

A majority of the comments received stated a preference for, or opposition to, one alternative or another, which the NPS acknowledges and has considered. A number of comments addressed very specific concerns, made very specific suggestions or asked for more detail. While we have reviewed and acknowledge these comments, we note that an NPS general management plan is meant to make broad decisions about the overall management of the park and the EIS is meant to compare and contrast the environmental implications of those broad decisions. If, in the future, implementing the selected approach for the GMP would result in site specific environmental impacts, the NPS will conduct appropriate site-specific planning and compliance at that time.

Changes to the Preferred Alternative

The NPS has made changes to its preferred alternative, alternative B, as a result of public comment and consultation with the U.S. Fish and Wildlife Service under Section 7 of the federal Endangered Species Act. The majority of these changes are revisions to management zones in various park areas. Maps in chapter 2 for each park unit reflect relevant management zoning revisions as well as descriptions of the park areas from pages 77-99.

Changes to management zoning in alternative B are summarized below:

In the Jamaica Bay Unit:

- Plumb Beach – Recreation Zone along the shoreline changed to Natural Zone

- Bergen Beach – Recreation Zone in northern section changed to Natural Zone

- Floyd Bennett Field area – Recreation Zone around the marina was reduced and Natural Zone increased

- Jamaica Bay Wildlife Refuge – Natural Zone on Canarsie Pol and Ruffle Bar changed to Sensitive Resource Subzone; some areas of Natural Zone along the shoreline changed to Sensitive Natural Subzone; Sensitive Natural Resource Subzone changed to Natural Zone west of New York City's Sunset Park

- Silver Gull Beach Club and Breezy Point Surf Club – changed Active Beach Subzone to Recreation Zone

- Breezy Point Tip – increased Sensitive Resource Subzone and decreased Natural Zone

In the Sandy Hook Unit:

- North Tip- Natural Zone decreased and Sensitive Resource Subzone increased over vast majority of area

- North Beach/Fort Hancock Parade Ground area – increased Historic Zone; modified Recreation Zone; decreased Active Beach Subzone

- Maritime Holly Forest - Sensitive Resource Subzone increased between Nike Missile sites

- Spermeceti Cove – Natural Zone changed to Sensitive Resource Subzone

- Beach Area B – shoreline south of area B changed from Recreation Zone to Natural Zone

- Developed Zone – increased multiple areas to reflect maintenance areas and water/ sewage treatment facilities

In the Staten Island Unit:

- Hoffman Island – Natural Zone changed to Sensitive Resource Subzone

- Great Kills Park – Sensitive Resource Subzone added along northern shoreline; Recreation Zone replaced with Natural Zone along Hylan Boulevard and Ranger Station

Comment Response Organization

NPS responses to the specific concerns and issues outlined above are provided in this chapter. The substance of the comments grouped under each topic is expressed as one or more concern statements, with representative examples of the comments from that group, followed by the NPS response. The chapter is organized by the following major topics:

- Climate Change
- Community Involvement
- Cultural Resources and Management
- Fundamental Resources
- Natural Resources and Management
- Park Operations and Management
- Recreation Management
- Site Specific Analysis and Data
- Traffic and Transportation

The text has been revised in several cases to reflect additions or changes suggested by agencies, organizations or other commenters during review of the public draft, or to update text from the draft GMP/EIS for completeness and accuracy. These changes are shown in the document as strikeouts for deletions and shaded gray for additions.

List of Commenters

The following government agencies and organizations submitted comments on the draft plan. Copies of letters received from agencies are in Appendix C. Some individuals submitting comments choose to list themselves as a member of a group. This does not necessarily mean that the comments represent the official group.

Agencies

Environmental Protection Agency
U.S. Fish and Wildlife Service

State Agencies

New York State Historic Preservation Office

Regional or Local Government Agencies

Monmouth County Planning Board
New York City Department of Parks and Recreation
The Port Authority of New York and New Jersey

Organizations

American Forts Network
American Littoral Society- Northeast Chapter
Army Ground Forces Association
Audubon New York
Black Hills Audubon
Boy Scouts of America
Breezy Point Cooperative Inc.
Broad Channel Civic Association
Brooklyn Bird Club
Chesapeake Audubon
City University of New York
Coast Defense Study Group
Committee to Save Great Kills Park Marina
Conserve Wildlife Foundation of New Jersey
Eastern Long Island Audubon Society
Fire Island Raptor Enumerators
Floyd Bennett Garden Association
Fort MacArthur Museum
Fyke Nature Association
Genesee Valley Audubon Society
Great Gull Island Project

Hudson River Audubon Society of Westchester
Hudson-Mohawk Bird Club
Huntington UFSD
Huntington-Oyster Bay Audubon Society
Jamaica Bay Ecowatchers
Kymry Group, Bird Calls Radio
Lehigh Valley Audubon
Linnean Society of New York
Mearns Bird Club
Monmouth County Audubon Society
National Parks and Conservation Association
National Rifle Association
Natural Resources Protective Association
Nuture Environmental Stewardship Today!
New Jersey Audubon
New Jersey Beach Buggy Association
New Jersey Trappers Association
New York City Audubon
New York Climate Action Group
New York State Ornithological Association
New York State Young Birders Club
Northern Catskills Audubon, Inc.
Postal Logic LLC
Protectors of Pine Oak Woods
Queens County Bird Club
Ray's Bike Rentals
Rockaway Little League
Rutgers University
Saw Mill River Audubon
Sierra Club
South Shore Audubon
Starrett City Tenants Association
Waterman Bird Club
Wattles Stewardship Center

Public Comment Summary

Climate Change

Concern Statement: Commenters noted that the park should protect resources from future storm events and apply lessons learned from Hurricane Sandy recovery.

Examples of comments:

- Any final Gateway plan and strategy should also incorporate lessons learned from Sandy to prevent and mitigate loss to Gateway assets, land and resources

- First, climate change, and the impact of expected super storms like Hurricane Sandy, make it imperative that bold steps be taken to return large parts of this historical wetland to its natural state where it can again fulfill its age old function of storm surge mitigation and serve as a buffer and a filter when waters inundate our shorelines and then recede.

- How do the management strategies for climate change incorporate sea level rise? There are several references to the protection of equipment and facilities within the 100-year floodplain and facilities at risk of storm surge. The Port Authority recommends reviewing the New York City Panel on Climate Change "Climate Risk Information 2013," which was released in June 2013. The best available sea level rise estimates for our area are established in this document, and are being used by New York City for planning purposes.

Response: The NPS notes and agrees with commenters on the need to adjust and adapt the management of parks like Gateway to the future effects of climate change. Climate change was a major consideration in developing the GMP/EIS and the final document incorporates the principles and policies of federal executive orders, DOI and NPS management policies, the *NPS Climate Change Response Strategy and Action Plan and the Hurricane Sandy Rebuilding Strategy,* released in August 2013. Pages 54-59 in the final GMP/EIS describe the approach that the park would take to mitigate and adapt to the effects of climate change during the next 20 years including management strategies related to natural and cultural resources, facilities and infrastructure. Some of these strategies include increasing coastal resiliency, reducing greenhouse gas emissions, conducting vulnerability assessments, and collaborating with academic partners. As part of GMP implementation, the park would continue to incorporate technical data and anticipated climate change impacts into natural and cultural resources management, visitor experience, and facility planning. Information is provided on shoreline and salt marshes on pages 60-61 as well as under individual park areas. Some ideas in the GMP may not be implemented over the next 20 years due to further evaluation of changing environmental conditions.

Community Involvement

Concern Statement: Commenters expressed that NPS should increase communication with adjacent neighborhoods and involve community members more with planning and implementation efforts because of the community's knowledge of park resources.

Examples of comments:

- However, in achieving this goal I would strongly suggest that Gateway also needs to balance the privacy, autonomy and needs of close and adjoining neighboring communities with this mission and priority. This can only be accomplished via clear communication and transparency on all future action plans and close cooperation with their neighbors.

- Be sensitive to the environment and engage the people in the immediately surrounding area for their input as they have been the keepers of this gem.

- I believe that it is very important to have a large community involvement in the discussions of the alternatives. A lot of people in the civic association have lived here their whole life and will have alot of insight into certain areas that will definitely help in this process.

- Please involve the many dedicated and knowledgeable naturalists who visit Gateway in both the planning and action processes. We are available to advise you, your staff and any consulting companies that are brought into the project on ways to maximize the Gateway Recreation Area and Jamaica Bay Wildlife Refuge for the benefit of wildlife in a way that is compatible with the recreation needs of the local and visiting human population.

Response: The NPS has been committed to community involvement in the general management planning process and will continue to provide opportunities for involvement during GMP implementation. As described in the History of Community Participation on pages 561-563, NPS reached out to the community in many ways during the planning process including hosting 34 information sessions and open house meetings at community locations and various park sites to gather ideas and comments on development of the plan, including management alternatives.

The preferred alternative has a strong focus on developing new connections with communities and park lands adjacent and nearby Gateway. As part of GMP implementation, the park will identify opportunities for greater community involvement in programming, stewardship and planning. In addition, as specific projects or facilities are planned, the park would continue to reach out for ideas and feedback. By working together with committed citizens, organizations, the academic community and other government agencies, Gateway can broaden public participation in determining how this new vision in the preferred alternative will be achieved.

Cultural Resources and Management

Ruins Subzone and Band

Concern Statement: Commenters stated that coastal defense structures and others resources should not be allowed to become ruins. In some cases, commenters made specific suggestions on what should be preserved, stabilized or allowed to go to ruins.

Examples of comments:

- We are concerned that a large number of locations, particularly a number of the significant concrete batteries from both the Endicott-Taft era and the World War II period, are apparently not included as core historical locations but are instead indicated as ruins zones.

- When viewing the NPS website with the draft GMP, we are concerned with Appendix B which set the priority on "Contributing Structures" within the park. This study creates a new status, called "ruin" for many coast defense structures. A structure with a "ruin" status may be removed or fenced off to keep from being a safety hazard and no work will be done to better the condition of the resource. We advocate that NPS should not let these historic resources become ruins.

- The creation of Gateway NRA in 1972 was based on the historic coast defenses of New York Harbor as without these former defenses there would be no national park. These historical defenses that range from our Colonial era to the Cold War were conveyed into the trusted hands of the NPS with creation of the NRA. Protection of these unique cultural resources was further recognized by the placement of many of these structures on the National Register of Historic Places as a National Historic Landmark, making them a historic property of national significance. Throughout its stewardship of Gateway NRA the National Park Service has recognizes its responsibilities for the preservation of these cultural resources through Section 106 of the National Historic Preservation Act (NHPA). The new GMP cannot revoke the NPS responsibility to preserve these unique structures for future generations and interpret them rather than allowing them to become non-accessible ruins.

Response: Gateway possesses more than 800 historic buildings, structures, landscapes and archeological sites. As described under the Planning Challenges section on page 16, many of these resources were inherited in poor condition when the park was created and the funding to repair and maintain these resources has never been sufficient. As part of the GMP process, the NPS underwent a systematic and extensive process to prioritize the 330 contributing resources in the park's nine National Historic Districts and Landmarks (see pages 64-69 and Appendix B of the GMP/EIS). These historic structures and landscapes were evaluated for eight factors including current condition, National register status, potential use and vulnerability to future storm events. This process was undertaken to ensure the park was able to preserve those high priority resources, given logistic and financial constraints. Those resources recommended to be managed as ruins consist of structures in poor condition where one or more of the basic structural elements has been lost and due to this condition, are without viable reuse options (see Appendix B).

In order to meet its responsibilities under the National Historic Preservation Act, the NPS invited the New Jersey and New York State Historic Preservation Officers, the Advisory Council on Historic Preservation, the Delaware Nation, Delaware Tribe of Indians, and the Stockbridge-Munsee Community to participate in consultation on the development of a Section 106 (of the National Historic Preservation Act) Programmatic Agreement that outlines how Section 106 will conclude for the GMP and how it will proceed as the GMP is implemented.

These types of management decisions are not easy and the NPS is aware that visitors, specialists and even agencies are not in agreement on all decisions regarding which structures were placed in which categories; however, we believe our approach was data rich, systematic and involved all agencies and tribes that would be affected by the decisions. It is important to note that not all decisions are finalized; a key component of the new Programmatic Agreement is further revaluation of those resources identified as ruins. Specific treatment of the resources identified as ruins will be determined through this Section 106 process.

Prioritization of Contributing Resources

Concern Statement: A commenter stated that information on the prioritization of contributing structures should be clarified to reflect that it applies to both alternatives B and C.

Examples of comment:

It is only clear in reading through Appendix B: Contributing Structures Prioritization that those results are applied to both Alternatives B and C. That information is unclear in the draft GMP text itself, and should be included in the GMP if NPS publishes another for public review draft.

Response: Please refer to Chapter 2, Desired Conditions Common to Both Action Alternatives, page 54. The introductory paragraphs describe that the information in this section of the GMP will be taken under both of the two action alternatives. Actions affecting both alternatives B and C are presented as such in Chapter 4, Cultural Resources, beginning on page 456 and in Appendix B.

Fort Hancock and Sandy Hook Proving Ground National Historic Landmark

Concern Statement: Commenters stated that the NPS should emphasize the greatest level of preservation and re-use of the Fort Hancock National Historic Landmark buildings and batteries. All batteries that will be stabilized and opened for visitor access at Fort Hancock need to be identified.

Examples of comments:

- I want to see the greatest level of preservation and re-use of the Fort Hancock National Historic Landmark buildings and batteries. There is tremendous energy and effort going on at Battery Gunnison to steadily augment what programming we can offer to park visitors. Support to others groups - historically-focused, environmentally-focused - needs to increase to bring Fort Hancock into its rightful place as a 'Top Tier' National Historic Landmark. The historic interpretation of Fort Hancock's military past is one of the two top components/ mission of Gateway's enabling legislation.

- Fort Hancock's buildings and batteries should be preserved and/or adaptively reused by any means necessary.

- Since the buildings role has been fulfilled and they are no longer habitable, it's time to remove these decrepit structures and return this area to an open space for gatherings, picnics and relaxation for the public to enjoy. A public who have expressed their concern for the decline of the parks infrastructure as well as a demand for more picnic areas, benches, shade, bike racks ... Removing this small number of buildings would not diminish the historical significance of the area, nor will it address the remaining buildings in decay but would be a long overdue step toward the revitalization as a whole and would once again allow all to enjoy this beautiful area as it was before.

Response: The preservation of the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark is a high priority for the NPS. With over 100 structures and fortifications as part of this NHL, the NPS is challenged to preserve and maintain these resources. As part of the GMP process, the NPS underwent a systematic and extensive process to prioritize the contributing resources in the park's nine National Historic Districts and Landmarks, including both National Historic Landmark Districts at Sandy Hook. In addition, the Secretary of the Interior authorized a special federal advisory committee, the Fort Hancock 21st Century Advisory Committee, to identify appropriate future uses and redevelopment strategies for the buildings and cultural landscape associated with Officers Row, the parade ground and barracks that had been prioritized by NPS.

The NPS must make hard decisions about how cultural resources would be treated in the future. The planning team analyzed extensive data on current conditions and deferred maintenance that influenced the development of alternatives. In the draft GMP/EIS, the NPS wanted to be transparent about the challenges facing the park and the likelihood that some resources may need to be let go. Pages 64-69 and Appendix B of the draft GMP/EIS describe the NPS evaluation process for prioritizing 330 historic structures and landscapes. This process was undertaken to ensure the park was able to preserve those high priority resources, given logistic and financial constraints. These decisions represent the best evaluation at the time of GMP development and the final decisions on these resources may change. As stated on page 65, the NPS would continue to evaluate its historic structures and landscapes, especially for vulnerability to climate change.

As the GMP implementation proceeds, any proposed changes to the historic structures and landscapes that are contributing resources to the National Historic Landmarks would require further Section 106 consultation with the New Jersey State Historic Preservation Officer (NJ SHPO) and the Advisory Council on Historic Preservation (ACHP). As part of the GMP process, NPS evaluated and proposed that some of these structures should be considered ruins and might be removed from the landscape in the future (see Appendix B). A new programmatic agreement between the NPS, and NY and NJ SHPO will further define a process for determining if a historic structure would be preserved or removed from the landscape (see Appendix C). Upon completion of the GMP, the NPS will be consulting with the New Jersey SHPO to determine additional batteries to be stabilized, as well as their proposed uses.

Although this means not all of the National Historic Landmark is stabilized or preserved, those structures that are will meet the desired future conditions outlined in management zoning on pages 47-53 and Table 2-3 on pages 66-68.

Maritime History

Concern Statement: The maritime history of the New York City area is an integral part of the cultural environment and must be considered.

Example of comment:

- One must also consider the well documented history of the geographic surroundings of GATE. The first Europeans in the NYC area, the Dutch explorers looking for a passage to Asia, and the following European settlers, all arrived by boat. The development of a water route that first opened the trans-Allegheny regions of North America to commerce via the Hudson and Mohawk rivers and the subsequent Erie Canal, again is all boat-related history. Then in the Revolutionary War, most of the battles in and around NYC were influenced by the availability of boats to move troops between Long Island, Manhattan and New Jersey. Finally as NYC developed into the largest seaport in the Western Hemisphere, it was again a boat based environment. For almost four hundred years, boats of all types have been an integral part of the NYC cultural environment.

Response: The maritime history of New York Harbor is important and was considered in the GMP. The NPS evaluated maritime resources within the park and areas outside its boundary and concluded that the primary fundamental maritime resources are located at the Sandy Hook Unit in New Jersey. The broader maritime stories of the New York Harbor area would continue to be part of interpretive programs and materials. Information provided in Chapter 3 regarding the historic development of the New York City area is presented as summary in nature with specific emphasis on maritime, aviation, and military history. This summary information guides the reader to more specific reference materials where greater historic detail can be obtained.

Fundamental Resources

Concern Statement: Some commenters questioned why floodplains, wetlands and wildlife were not specifically listed as fundamental resources given their high value and importance.

Examples of comments:

- On page 364 of the Gateway GMP DEIS you write: “Floodplains are not identified as a fundamental resource or value.” Why is that, since floodplains have such a high value in Federal and State law? Floodplains, along with wetlands, should be listed as a fundamental resource.

- On pages 12 and 13 of the draft GMP/EIS, NPS lists the fundamental resources and values of Gateway. Although NPS has acknowledged that the habitats of Gateway support a “rich biota that includes migratory birds, marine finfish, and shellfish, plant communities,

and rare; threatened, and endangered species", no biota has been specifically named a fundamental resource of Gateway. While it is important to wildlife of all kinds, Gateway provides critical breeding, foraging, and migratory stopover habitat for many bird species and assemblages that are considered to be at risk. These species are charismatic megafauna, as valuable to Gateway as bison are to Yellowstone, and the Jamaica Bay unit.

- Chapter 4, page 428, line 13 - "No listed or rare species are also identified as fundamental resources by the park." - While perhaps not meeting all of NPS's requirements to fulfill the definition of a 'fundamental resource', these species should nonetheless be afforded the care and protection NPS would offer to a fundamental resource, due to their regional, national, or even global importance. Given that wildlife is explicitly mentioned in the enabling legislation, that wildlife viewing is explicitly named as a fundamental value, we strongly disagree with the decision not to also name wildlife as a fundamental resource for GNRA.

Response: At the beginning of the GMP process, the NPS carefully analyzed and considered the park's legislation, Congressional Record and significant natural areas in determining its fundamental resources and values. NPS sought public feedback on the park's fundamental resources throughout the planning process and distributed information in the Summer 2009, Fall 2010 and Summer 2012 newsletters.

A description and list of the park's fundamental resources is included on pages 9-14. The NPS defines fundamental resources and values as "the park's attributes - the features, systems, processes, experiences, stories, sounds, smells, opportunities for visitor enjoyment or others – that are critical to achieving the park's purpose and to maintaining its significance. The significance statement related to coastal systems and natural areas is described on pages 11-12 in the GMP/EIS, and states that "Gateway contains an assemblage of coastal ecosystems formed by natural features, both physical and biological, that include barrier peninsulas, estuaries, oceans, and maritime uplands. The habitats that compose these ecosystems, so rare in such highly developed areas, support a rich biota that includes migratory birds, marine finfish and shellfish, plant communities, and rare, threatened, and endangered species…"

NPS chose to identify the coastal systems, natural areas and waters identified on page 12 as fundamental resources rather list the individual categories of resources, such as floodplains, wetlands or wildlife. A description of these resources is provided in chapter 3: Affected Environment. These areas are primarily included in the Marine, Natural and Sensitive Resource Subzone and would receive high levels of protection, monitoring and restoration.

Natural Resources and Management

Prioritizing Preservation Over Recreation/Visitor Use

Concern Statement: Numerous commenters stated that the preservation of wildlife habitat and open spaces should be the top priority for park management under the preferred alternative rather than recreation.

Examples of comments:

- Resource management should be given top priority in all parts of the Park. Recreation is important but is secondary to the parks proper management of natural resources.

- The park contains significant and unique natural resources from marshes, dunes, shorelines and developing woodlands in an area that is otherwise heavily urbanized. For this reason, the National Park Service should have protection and enhancement of resources as its overarching management objective. Recreational activities can still be enhanced and should be allowed and managed within this framework.

- I believe that it is the NPS's responsibility to ensure that natural habitat be preserved for generations to come. Please honor that commitment to preserve and protect Gateway.

Response: Preservation of Gateway's natural areas, wildlife habitat, open space and marine environments is a high priority for NPS under the preferred alternative. In the draft GMP/EIS, more than 84% of the park is zoned in the Natural Zone, Sensitive Resource Subzone and Marine Zone under the preferred alternative. These zones provide the highest levels of resource protection, management and restoration.

The reasons why Congress established Gateway as a unit of the national park system are summarized in the Purpose and Need for the Plan on pages 3-4 and in the Foundation for the Future section on pages 9-10. The purposes for which Gateway was created are briefly stated in the establishment section of the park's legislation (also included in the GMP Appendix A): "in order to preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features.." Allowing visitor access and creating recreational or educational programs for them to experience and learn about the park's resources is in keeping with the park's legislation and overarching policy of the NPS.

The balance between preservation and recreation is a challenging task that Gateway managers continuously address and the NPS worked to strike this balance in the draft GMP/EIS. Both the zoning and supporting narrative descriptions of the preferred alternative continue to support most of the current activities that occur in the park today, many in their current locations as well. In addition, the preferred alternative provides the addition of new community connections, opportunities and services, while preserving resources, which could enhance visitor experience in the future.

The desired natural resource conditions that the NPS will strive to achieve for all zones are described on pages 48-53 and on Table 2-2 on pages 62-63. In addition, the NPS will focus on improving conditions and management of the bay and oceanic waters including water quality enhancements and preservation of the estuarine shorelines, salt marshes, estuarine benthic habitats and estuarine and marine finfish and shellfish communities. A description of these proposed conditions and management actions are on pages 59-64. As part of GMP implementation, Gateway would continue exploring options with the New York City Department of Parks and Recreation (NYCDPR) and other partners to provide a

variety of recreational, educational and stewardship activities and programs. These options may include joint management with NYCDPR and providing services and facilities through concessioners and private enterprises as outlined in Appendix A.

The NPS believes the preferred alternative would protect the inherent integrity of the park's natural resources, processes, systems and values while at the same time providing meaningful and appropriate opportunities to enjoy them.

Manage Park Areas for Natural Resource Values

Concern Statement: Commenters expressed concerns that specific areas in the park s should be managed primarily for bird and wildlife habitats and there should be no increase in recreational activities, such as camping and boating, in the preferred alternative.

Examples of comments:

- We oppose planned recreation activities for Big Egg Marsh, Canarsie Pol, and Hoffman and Swinburne Islands. Numerous species of waterbirds and shorebirds depend on these areas for nesting and feeding. Increased human presence and activity can bring nest abandonment and predation with reduced production in these very important breeding areas. These locations are not appropriate for recreation and should receive a high level of protection.

- Human activity such as boating, fishing, camping, picnicking, swimming, concession stands and walking off the main path are disruptive to the habitat and the precious birds and other wildlife which thrive in Jamaica Bay.

- The management plan should consider the threats and importance of Plumb Beach and include protective actions rather than development.

- In the face of growing visitation of our coastal areas, we believe the best way to continue that balance at Sandy Hook is not more development but a stronger commitment to natural resource protection. Sandy Hook also contains maritime holly forest and red cedar woodlands which ate globally imperiled and provide important habitat for both breeding and migrating birds Alternative B places "emphasis on high-intensity camping facilities 'including' an RV campground structural camping, and drive-in campgrounds," in and around these forested areas may require removal or alteration of these rare plant communities.

- Expansion of recreational facilities such as camping at the north end or water-based activities like kayaking and motor-boating in sensitive areas like Spermaceti Cove and Horseshoe Cove seriously disturb the wild life in these fragile areas. Although the Park Service may have designated some of these areas as out of bounds, it has been our experience that enforcement is lax and many people who use the Park are unaware of the detrimental effect of violating those restrictions. NPS needs to curtail expansion of recreational areas and to provide better enforcement for those areas which already exist.

Response: The NPS agrees that certain areas of the park should be managed to promote natural conditions and there should be appropriate recreational activities or restricted visitation to protect wildlife and habitat. The desired resource conditions and appropriate levels of recreation and facilities are defined under management zoning on pages 47-53 in the draft GMP/EIS. As part of USFWS consultation, additional information about conservation measures have been added in the final GMP/EIS. In response to USFWS and public comment, NPS changed some zones in certain areas for resource protection, particularly for sensitive species and habitat.

Numerous commenters expressed opposition to increasing recreation activities in the Jamaica Bay Wildlife Refuge (JBWR), citing concerns for bird and wildlife disturbance. The NPS notes and agrees with the idea that JBWR should be managed for wildlife and appropriate recreational activities. In fact, as noted in the draft GMP/EIS, 98% of the Wildlife Refuge was zoned as Marine, Natural or Sensitive Resource Subzone. The management of the JBWR would be very similar to current conditions in the preferred alternative. However, following public comment on the draft GMP/EIS, the NPS has elected to change the management zones from Natural Zone to Sensitive Resource Subzone and restrict visitation to all NPS managed islands in Jamaica Bay as it does now, except for portions of the main island that provide access to the visitor center and East and West Pond areas. In addition, a small area of Recreation Zone located over an area adjacent to the Cross Bay Boulevard that is used for fishing, kayak access and parking would be changed to Natural Zone to further restrict the types of activities that would occur there. In the final GMP/EIS, 100% of the JBWR is zoned Marine, Natural or Sensitive Resource Subzone. The portion of Big Egg Island not owned or managed by NPS (it is owned and managed by NYC) is anticipated to continue to be an interpretive and educational site to illustrate successful marsh restoration efforts.

For Plumb Beach, commenters expressed the value of the area for horseshoe crab, nesting birds and saltmarsh habitat and noted that these habitats should continue to be a high priority for protection and restoration instead of increasing recreation. Based on public comment and reconsideration of resource and safety issues, an area along the shoreline of Plumb Beach was changed from Recreation Zone to Natural Zone. A defined and improved path from the parking lot to the beach would help in keeping visitors from trampling vegetation or threatening the marsh at the site. Parts of the area would be restricted to visitation during horseshoe crab spawning periods. Existing beach uses would continue, but improved launch and spectator areas for wind sports would not be pursued. The NPS and NYC agencies would continue to improve the conditions of the building and adjacent parking and trail areas to control litter and activities.

Some commenters suggested that areas of the Staten Island Unit, including Crooke's Point, Great Kills Park and Hoffman Island should be rezoned to restrict recreational activities and provide more protection of wildlife or wildlife habitat. Hoffman Island has been changed from the Natural Zone in the draft GMP/EIS to Sensitive Resource Subzone in the final GMP/EIS which would restrict public access to the island. All of Crooke's Point would remain as a Natural Zone to allow for activities such as fishing, walking, wildlife observation and habitat monitoring and restoration. Certain areas at Great Kills Park that were zoned Recreation in the draft GMP/EIS were revised to reflect more desired natural conditions in the future. An area along the shoreline of Oakwood Beach was changed to Sensitive Resource Subzone to

promote habitat restoration. Additional areas of the Recreation Zone were converted to Natural Zone in wooded areas adjacent to Hylan Boulevard and around a freshwater pond adjacent to the Ranger Station. The remaining Recreation Zone will be retained to allow flexibility to shift recreational activities as environmental conditions change at the site. Some of these areas may ultimately be managed as a Natural Zone.

In reference to Sandy Hook, commenters stated that areas in this unit contain important wildlife habitat and species that are sensitive to disturbance and Sandy Hook provides particularly good habitat and the NPS should pay particular attention to protecting these species and their habitat. In the draft GMP/EIS, alternative B would zone the northern part of Sandy Hook in either the Natural Zone or Resource Protection Subzone and it would be managed as it is now except that habitat conditions and monitoring of sensitive habitat areas would be enhanced (see p. 92 of the Draft GMP/EIS). Following consultation with the USFWS under Section 7 of the Endangered Species Act, the park has agreed to expand the Sensitive Resource Subzone in the northern area, a change that will prevent even passive recreational use during nesting season. All camping, such as that under consideration at Batteries Kingman and Mills, would be evaluated through separate planning, data collection and impact analyses to determine whether they should be built and if so, how to design them so as to minimize or completely avoid impacts, such as those that may occur to wildlife. The park has also chosen to rezone the southernmost beachside coastal segment (south of beach area B) as Natural as it is in alternative C. Additional shoreline at Spermaceti Cove would also be rezoned from Natural to Sensitive Resource Subzone. These changes are combined with widespread increases in Sensitive Resource Subzone of interior forests and woodlands, coastal and bayside shoreline areas as shown in the revised map of alternative B. Although beach recreation will remain as it is now for the most part and concentrated human activity would also be located at Fort Hancock and any new camping areas, conditions for wildlife would be similar to what they are now. We believe the preferred alternative reflects a priority of resource protection at Sandy Hook.

Impacts from Recreation, Facilities and Visitors

Concern Statement: Commenters remain concerned about the impacts of additional people, facilities, water-based recreation, infrastructure and increased access in the preferred alternative on rare species or species of special concern.

Examples of comments:

- Many of the planned infrastructural developments and changes in land-use associated with alternative B would be likely to degrade the condition of wildlife (including state and federally-listed species), vegetation; critical habitats, and natural resources throughout Gateway and will thereby ultimately diminish the potential for enjoyment of these resources by future generations. 'In all such instances, these adverse 'impacts are unacceptable, including occasions in which the adverse effects of a proposed action are considered by NPS to be "imperceptible".

- Campground siting adjacent to grassland areas will likely result in significant adverse impacts to sensitive grasslands as they may be perceived as "unused" land available for recreation. Alternative B does not address these adverse impacts, nor does it suggest mitigation strategies.

- Please provide specific information about how NPS plans to mitigate the adverse effects of camping on the backcountry environments

Response: The NPS shares concerns about the potential impact of improved or new recreational activities, such as camping or kayaking, which may bring increased visitation and disturb wildlife, plants and habitat. For the most part, recreational facilities are sited in the same location as they occur now or are proposed for already disturbed areas. Creating camping areas would increase the number of people as well as noise, odors and other indicators of human presence some species of wildlife avoid. However, these new facilities are unlikely to remove large areas of wildlife habitat as some are currently disturbed and/or already used for camping. Also, campgrounds would have the effect of concentrating visitors, which is less likely to have impacts to wildlife than even passive cross-country walking in wildlife habitat or walking on the beach near nesting birds for example. Trails would require removal of habitat, but are also known to keep visitors from walking across intact habitat, creating social trails or disturbing nesting or feeding wildlife a certain distance from the trail.

The USFWS expressed concerns about recreation and transportation systems on species of special concern such as the piping plover. NPS has consulted with the USFWS under Section 7 of the Endangered Species Act. During this consultation, changes were made to management zoning in specific areas of concern and conservation measures reiterated. Prior to the development of camping or other recreational facilities, additional site specific planning and impact analysis would occur. This site specific analysis would also include mitigation measures to reduce impacts and are outlined in Appendix C under the USFWS consultation letter.

Sandy Hook

As described in the draft GMP/EIS, the beaches of Sandy Hook are used by the listed piping plover and seabeach amaranth (beaches) and several rare shorebirds. The vegetation in the interior of Sandy Hook is also rare and includes red cedar and holly woodlands. For all areas where piping plovers nest, all conservation measures already adopted by the park such as closures, fencing, predator control etc. (as described in NPS 2007a and NPS 2009e) would continue in any alternative. Holly forests would continue to be fenced and unavailable to the general public.

The draft GMP/EIS described impacts expected as a result of adding camping, trails or additional visitors (see pages 438-439 of the draft) and notes the most likely additional impact from alternative B on species of special concern would come from overnight camping on the beaches (in removable structures). These areas are identified as protected for piping plovers in plover management documents (NPS 2007a). The rezoning would allow camping and other recreational activities. Campers would not occupy habitat now used by these species, but could be on beaches that are adjacent to them or areas that would potentially be suitable for nesting. This source of human presence at night or in late evenings or early mornings as campers walk the area could disturb feeding birds or make existing habitat otherwise less desirable. The north end of Sandy Hook, which is also heavily used by nesting piping plovers is primarily zoned as "Natural," although an interior portion is Sensitive

Resource Protection subzone. The natural area for alternative B at Sandy Hook would be available for "a variety of natural immersion experiences to increase visitor awareness and enjoyment of the natural environments including nature study, wildlife viewing, camping, and instructional programming." None of these has been specifically chosen to occupy the northern part of Sandy Hook. A multi-use trail to provide access from the bayside of Sandy Hook to the ocean side also has the potential to affect rare cedar woodland or other unique vegetative communities and will need to be cited properly to avoid these impacts.

A summary of changes to these zones to help in protecting piping plovers, seabeach amaranth and associated rare or state-listed species (such as least tern, for example) is provided. They include rezoning a larger portion of the north end as Sensitive Resource Subzone and thereby restricting visitor access; rezoning the Recreation zone proposed for the area south of beach area B and clarifying that any camping proposal along the coast that may affect piping plovers would be required to undergo additional analysis and consultation with the USFWS before it is approved; and closing the area south of beach area B during the plover nesting season. These changes would keep visitors from accessing known plover nesting areas by accident (as the actual nesting area would remain closed during March 15 to September 1 under existing management), would make deliberate entry less likely because additional area and buffers are protected and ensure camping does not disturb nesting birds. Impacts to feeding shorebirds may continue, but the degree of severity to species of special concern given these new conservation measures would be minimal; that is localized and adverse and would not be likely to be significant.

In addition to these impacts, camping facilities proposed near the existing camping area and on land surrounding Batteries Kingman and Mills as well as at Floyd Bennett Field or Ft. Tilden may require removal of vegetation that could be wildlife habitat. The sites at Sandy Hook are on already disturbed lands, although some vegetation/wildlife habitat may need to be removed. These lands are currently vegetated with successional maritime forest and/or northeastern modified successional forest. Although successional maritime forest is a relatively rare and natural vegetative community, northern modified successional forest is not (see pages 182-185 of the draft EIS for more information). The addition of camping areas would likely require the removal of some native vegetation, which could also be wildlife habitat for woodland species, a localized adverse impact. Impacts from using space at the batteries for camping are not likely to be adverse as vegetation here is disturbed and unnatural. Trails extending from the campgrounds and from the Fort Hancock area westward would need to be sited carefully to avoid rare vegetative and wildlife habitat communities as noted in the EIS (see pages 407-409 of the final GMP/EIS for example). Alternative B closes areas adjacent to the planned camping facilities at Sandy Hook to protect rare vegetative communities such as the Holly Forest or saltmarsh near Battery Arrowsmith as well as salt panne and tidal marsh. As noted above, closing any beach camping area during nesting season would greatly alleviate impacts to not only the plover but other associated shorebirds and vegetation.

Jamaica Bay Wildlife Refuge

For the Jamaica Bay Wildlife Refuge, the GMP/EIS (pages 430-431) notes at least two species of stated- listed wading birds, several state-listed shorebirds (least tern, common tern and

black skimmer) and the majority of 25 osprey nests in the Jamaica Bay Unit use island or saltmarsh shoreline habitat in Jamaica Bay for feeding, resting and nesting, as does the diamondback terrapin, a species of management concern for the park. Several rare or state-listed plants also occupy marsh, mudflat or wet sandy environments on islands in the bay. The EIS notes that these species benefit by the park policy of keeping islands visitor free as well as efforts by the NPS, Army Corps of Engineers, New York City and other partners to restore marsh habitat, an action common to all alternatives but expanded in alternatives B and C. In the draft GMP/EIS, alternative B includes the possibility of allowing visitors at Canarsie Pol or Big Egg Island, zones shorelines of Ruffle Bar and Little Egg Island as "Natural" (rather than protected subzone, with the possibility of visitor access) and designates a water trail established in the bay for non-motorized use. The impacts of these actions are described in the draft EIS (pages 416 and 421) and include energy loss, lowered nesting success, and susceptibility of eggs and chicks to predation and cold weather. These impacts are described as potentially significant. Because of the potential for significant impact to nesting birds, the NPS has decided to zone all Jamaica Bay marsh islands as Sensitive Resource Subzone, which would restrict visitor access. The main island that includes the Jamaica Bay visitor center and parking would still retain a combination of Natural Zone and Sensitive Resource Subzone to allow access to areas such as the West Pond. The portion of Big Egg Island managed by New York City would continue to be available for use as an educational and interpretive location to illustrate marsh restoration techniques. With these changes to visitation at the Jamaica Bay Wildlife Refuge, impacts to nesting wildlife of concern are less likely to be significant.

Floyd Bennett Field and Fort Tilden Grasslands

Commenters noted that the location of recreational activities and facilities at Floyd Bennett Field and Fort Tilden would disturb grassland birds and diminish habitat. The draft GMP/EIS (pages 430 and 435) notes that stated listed plants, birds (horned lark, upland sandpiper, savannah sparrow and northern harrier) and the rare checkered white butterfly occupy habitat in grasslands at Floyd Bennett Field and/or Fort Tilden. The numbers of some of these species, particularly horned larks and upland sandpiper, have fallen dramatically in New York in the last few decades, primarily because of habitat loss. As the draft document (page 435) notes, locating campgrounds or recreational facilities in the vicinity would concentrate visitors interested in the outdoors, who may be likely to hike through or investigate the grasslands as part of their exploration. The same is true at Fort Tilden, where both action alternatives anticipate some camping and educational or recreational use of habitat. Parking along runways at Floyd Bennett Field for large events could disrupt movement by listed birds from one area of the grasslands to another. These impacts are characterized as localized and adverse in the draft EIS.

Under the preferred alternative, no facilities are planned to be located on or adjacent to grasslands at Floyd Bennett field. The current grassland habitat between the runways and taxiways would become part of the Historic Zone. To retain the historic character of the open pattern of the airfield landscape, NPS would maintain low vegetation, such as grasslands for wildlife habitat. It is true that additional visitors and, in particular, campers could disturb

natural resources and even displace wildlife. Campers or day visitors could roam widely across the area the grassland area at FBF, crush vegetation or frighten wildlife away. These impacts are discussed generally in chapter 4 of the EIS in the vegetation, wildlife and species of concern sections as is appropriate in a programmatic document. Measures to mitigate these impacts could include seasonal or geographic restrictions, designated trails, signage and the periodic relocation of backcountry campsites if monitoring shows impacts from trampling. NPS would evaluate the potential for additional grasslands as further planning studies for Floyd Bennett Field are conducted

Hoffman Island

For Hoffman Island, commenters were particularly concerned about disturbing feeding or breeding birds by allowing visitation to Hoffman and Swinburne islands. Alternative B would have kept Swinburne Island closed to visitation, but NPS would have explored the feasibility of developing a dock on Hoffman Island in order to allow visitors on the island. The draft GMP EIS summarizes impacts of human disturbance on colonial wading birds, which nest in the spring and rest and feed at other times of the year, and harbor seals which use Hoffman Island as a haul-out area in the winter. Bird species include a variety of herons, ibis and egrets, some of them state-listed. Recreationists can disrupt foraging, social behavior, feeding animals and communication, as well as cause energy losses and reduced nesting success in some species. Birds nesting in dense colonies like those on Hoffman and Swinburne Islands can be particularly vulnerable to disturbance. The adults change their behavior and expend energy in vigilance, taking flight or other actions that drain reserves. They also leave the chicks or eggs vulnerable to predation or cold weather when they take flight. The distance at which a bird flushes varies between individuals, but also tends to vary among species. More sensitive species flush when people or boats are further away; this group includes many of the species at Hoffman and Swinburne Islands. Harbor seals are also easily disturbed by humans. The EIS concludes that current management has offered substantial benefits to these species from keeping Hoffman and Swinburne Island free of visitation and that alternative B may result in significant localized adverse impacts from allowing visitation to occur. As a result of these possible impacts and concerns expressed by the public, the NPS has chosen to continue to keep Hoffman Island closed to visitation. Hoffman Island has been changed from Natural Zone to Sensitive Resource Subzone in the modified alternative B. The impacts anticipated under alternative B in the draft GMP EIS would be greatly reduced as a result of this change. Swinburne remains a Sensitive Resource Subzone without visitation.

Water-based Recreation and Transportation

Specific to water-based recreation and transportation, the primary concern noted by commenters is the proposed new launch sites on the bayside of Sandy Hook, although some concern over kayaking or other water sports in Jamaica Bay when close to marsh habitat was also expressed. The impacts of allowing even non-motorized watercraft to approach nesting waterbirds are analyzed in the final GMP/EIS (see pages 421-425 for example). If combined with visitation as described above, the impacts to some colonial waterbirds nesting success could be significant. However, also as noted above, the NPS has decided to close Hoffman Island in the Staten Island Unit and all marsh islands in Jamaica

Bay wildlife Refuge. Alternative B continues to include a water trail that "hugs the shoreline" of Jamaica Bay islands and refuge shoreline, as well as water trails and guided tours to facilitate paddling from Fort Wadsworth down the coast to Miller Field and Great Kills Park. Leading kayakers or other non-motorized boats along designated water trails has the potential to alleviate impacts from visitors coming too close or actually stopping on islands, as non-motorized boats without guides are currently allowed in both Jamaica Bay and in Lower New York Bay between Hoffman and Swinburne Island and the coast of Staten Island. Water trails that "hug" the coastline in either of these locations has the potential to disturb nesting birds to the same or even greater degree than visitors on foot. The draft GMP/EIS (see pps 421-422) summarizes literature on flushing distances in birds approached by non-motorized boats.

Impacts from boat launches would be similar to any other visitation on land, except that visitors will be concentrated in a particular area and wildlife, including any species of special concern, would likely be disturbed enough to avoid it. The deliberate location of water trails adjacent to islands where nesting could be ongoing is likely to have substantial adverse impacts on energy reserves of adults and nesting success for some sensitive species. As noted in the draft GMP/EIS, these impacts could be significant. Impacts to wildlife feeding or resting along the bayside shore of Sandy Hook are likely to be similar to what they are now with potentially more boat traffic as launches are cited in this park unit; that is, adverse but not significant unless nesting is disturbed.

At Sandy Hook, recreational kite surfing on the bayside (including Spermaceti Cove and Plumb Island) has been observed to scatter feeding shorebirds and pets have had substantial impacts on shorebirds, nesting terrapins and spawning horseshoe crabs. These impacts have led the park to restrict access to these sensitive areas. As described in the draft GMP/EIS, Spermaceti Cove in alternative B would have been zoned "Natural" to allow boat launches and other activities. However, following consultation with the USFWS, the park has chosen to maintain most of Spermaceti Cove as a Sensitive Resource subzone and close it to visitor use as it does now. Although it is not contemplating a buffer for non-motorized boat use near sensitive nesting sites as part of the GMP, the park is going to consider the possibility in its future planning, notably the Marine and Estuarine Resources Management Plan.

Given these factors, impacts to wildlife at Sandy Hook from Alternative B are not largely different from those occurring now (e.g. compared to the No Action alternative) and are not likely to be significant. Additional planning and analysis required to create campgrounds here or in the Jamaica Bay Unit of the park (at Floyd Bennett Field or Fort Tilden), and mitigation to prevent use of grasslands or other important habitat at all adjacent locations would keep impacts to wildlife at these locations from becoming significant. Buffers for water trails or closures during breeding and nesting seasons would also substantially mitigate impacts to wildlife on islands in Jamaica Bay and Hoffman/Swinburne Islands.

Cumulative Impacts to Wildlife

Concern Statement: Commenter disagrees that the contribution of an imperceptible cumulative impact is accurate or acceptable.

Example of comments:

- Chapter 4, page 422, lines 29-32 - "... [A]lternative B would have the potential for more intensive contributions to adverse cumulative impacts from habitat loss associated with increased development, such as at Fort Tilden or Sandy Hook, or from allowing visitor use of marsh islands or Hoffman Island, than alternative A." – Because of existing cumulative adverse impacts, wildlife in GNRA are extremely vulnerable to additional adverse impacts. Even "small" impacts can have significant cumulative impacts that may rise to the level of impairment. How will NPS monitor these impacts?

- Chapter 4, page 422, lines 38-40 - "Adverse impacts from alternative B are unlikely to be more than imperceptible compared to existing cumulative adverse impacts on wildlife." This statement is inaccurate. In light of existing cumulative effects and the complex and emergent nature of ecological systems, a seemingly 'imperceptible' adverse effect may be substantially amplified. We find it unacceptable that NPS is willing to accept such effects, considering the fact that a seemingly 'imperceptible' effect could very well be the "straw that breaks the camel's back" for biotic communities.

Response: NPS continues to believe that impacts of any changes proposed in the action alternatives would add no more than an imperceptible adverse impact to the already significant cumulative impacts wildlife in the New York City region experience from urban development and the presence and activity of humans. The analysis of cumulative impacts is commensurate with this contribution. The analysis of impacts to wildlife was based on review of scientific literature, professional knowledge of park staff and consultation with USFWS. NPS acknowledged that the analysis was programmatic, meaning qualitative rather than quantitative; however, we believe that the analysis was based on adequate information and that our prediction of the intensity of impacts and contribution to cumulative impacts is reasonable. Further, management zoning changes were made to the preferred alternative at sites such as Sandy Hook and Hoffman Island that further protect wildlife and sensitive ecosystems as noted in chapter 4 of the final GMP/EIS on pages 419-425. These changes have reduced the intensity of the direct and indirect impacts of alternative B, which also reduces the contribution to cumulative impacts.

Jamaica Bay Wildlife Refuge - East and West Ponds Management

Concern Statement: Numerous commenters expressed support for filling the West Pond breach caused by Hurricane Sandy and restoration of both the East and West Ponds, citing habitat diversity provided by fresh water bodies and recreational opportunities afforded by the ponds and trails; however, some commenters noted that West Pond would be more valuable as saltmarsh habitat that could support native species.

Examples of comments:

- There is a pressing need at present for the recent breach in the West Pond to be repaired, with the eventual objective of reducing the Pond's salinity to the level it had been in the past, when it had supported freshwater plants and animals.

- I would like to see JBWR, both East and West ponds, restored to its originally intended purpose. In addition to supporting wildlife, which needs all the support it can get, it provides an invaluable asset for education in natural ecosystems and conservation.

- I am not one of those who believe that fixing an artificial fresh water West Pond is the best thing to do even though it is an important resource and would maximize diversity. I actually think that allowing it to revert to an expanded salt marsh would be a much more valuable management strategy as long as native species are emphasized in the regrowth of the marsh.

Response: NPS recognizes the importance of the East and West Ponds for bird habitat and the accompanying trail for walking and wildlife observation. As noted in the GMP/EIS, the breach in East Pond was repaired very soon after Hurricane Sandy. As part of Hurricane Sandy recovery efforts, the NPS is undertaking additional planning and compliance, including an environmental assessment, to determine the impacts of the salt water intrusion, and explore options for public access and restoring the freshwater West Pond. Following the executed GMP record of decision, the public would be invited to participate in the planning process, including public meetings, to discuss ideas and concerns as part of scoping and review of the draft environmental assessment, including alternatives.

Mitigation Measures

Concern Statement: Commenters questioned the effectiveness of mitigation measures in the EIS that suggested that creating or restoring plant communities in other locations make up for adverse effects of degradation from increased visitation or facilities.

Examples of comments:

At numerous points throughout the environmental impact statement of alternative B, the National Park Service has acknowledged that certain actions are likely to result in the degradation of plant communities and habitats. However, it is suggested throughout the document that these losses would be mitigated by the creation and restoration of plant communities and habitats elsewhere in the park, and that any adverse effects will be rendered inconsequential. It is incorrect to assume that restored or created habitats can attain comparable ecological function to the original habitats, nor is it appropriate to claim that the restoration of one habitat type nullifies the adverse impacts associated with the destruction of a different habitat type.

Response: In fact, the EIS is quite careful not to suggest any offsetting effect in the analysis of impacts of each alternative. The expansion of coordinated research and restoration efforts for saltmarsh are important beneficial effects on this vegetative community in both action alternatives (see pages 371-372 in the draft EIS). Creation of fresh and saltwater wetlands at Floyd Bennett Field, comprehensive study and planning effort to maximize freshwater wetlands and increased efforts to restore wetland vegetation by removing invasive species are efforts common to both action alternatives which have the potential for significant benefits. The effects of increased visitation and camping and other facilities are described on pages 404-409 in the final GMP/EIS and are characterized as localized and adverse. As an example, the "Conclusions" paragraphs end with the following

"In sum, Alternative B would have significant beneficial impacts on park vegetation and localized adverse impacts that would require careful planning to prevent them from becoming significant." Note there is no attempt to suggest the beneficial impacts offset any localized adverse effects of increased visitation.

Park Operations and Management

Enforcement and Safety

Concern Statement: Commenters stated concerns that increasing the number of visitors in the park would lead to resource damage or public safety issues. Commenters also noted that currently some areas of the park are not adequately maintained or patrolled to be safe.

Examples of comments: need more quotes about safety

- Increased public attendance without increased supervision, which seems unlikely as Park budgets/ rangers have continually been reduced, would cause greater damage.

- No conceivable enforcement plan that could adequately protect the beach-nesting birds there, including NJ's highest density of the federally endangered Piping Plover, from kids, dogs, high pedestrian traffic, and vandalism

- Chapter 4, page 507, lines 28-33 - "Alternative B would greatly increase the diversity of recreational opportunities offered throughout the park and encourage wider visitation and participation by the local and regional population, including those that are not traditional park visitors. The expansion in recreation and visitor use opportunities would be expected to result in an estimated 5 to 10 percent increase in annual visitation over the course of 15 years. This could mean 450,000 to 900,000 more visitors a year." - It is unrealistic to be able to serve an additional 450,000 to 900,000 visitors without significant increases in enforcement, public safety, and public services. Also, to ensure that recreational activities do not impair fundamental resources increases.

- The Ft. Tilden area, in particular is not at all well maintained and with an increase in visitors will pose sanitation and/or pest problem as well as safety concerns. The lack of maintenance and safety hazards in the Ft. Tilden area needs to be addressed as they are unsightly and unsafe.

- I feel that motorized recreational vehicles should be vastly curtailed within the park in order to decrease erosion and pollution of the entire area - Water and land. The bay and harbor are particularly dangerous areas to allow boating due to commercial traffic. In fact, all of NYC harbor should be forbidden to private recreational Watercraft. Land areas should be dedicated to either pedestrian or bicycle, perhaps trail bike, access. This will create the least erosion, cleanest air, and least disturbance to the wildlife.

Response: Management strategies for elements of the alternatives to accommodate additional visitors or expansion of recreational opportunities are yet to be confirmed. The User Capacity Indicators and Standards section on pages 125-128 describes how NPS will guide the types and levels of visitor use and monitoring of desired resource conditions

in the park. As part of GMP implementation, Gateway would update operational plans should visitation or other conditions change. These plans could include the Wildland Fire Management Plan, Structural Fire Management Plan, Emergency Operations Plan, and Hurricane Plan, to name a few. Updating these plans would require continued coordination with local law enforcement, fire departments and other visitor safety and resource protection agencies. In addition, park management reviews and adjusts its annual seasonal staffing plan to meet visitation or resource protection needs. As described on page 133, the types and numbers of positions for maintenance, resource management, visitor and other park functions would likely change as the preferred alternative is implemented. A number of actions in the preferred alternative will require major partner contributions and/ or cooperation by other entities to be accomplished. They include partnering with New York City, private sector partners/ concessioners, use of volunteers and non-profit organizations as noted on pages 548-553 of the draft GMP/EIS.

The GMP EIS recognizes there are potentially dangerous situations that occur from accidents, the remoteness of some areas, user conflicts and unauthorized access. However, neither alternative B nor C is expected to increase threats to visitor safety. For example, deteriorating structures would be removed or stabilized and increased enforcement presence throughout the park lands would improve response capabilities for park staff and lend reassurance to visitors. Both alternatives would include carefully controlling construction sites and resource restoration sites with fencing and monitoring to prevent adverse impacts on visitor safety. This information is on pages 492-497 of the final GMP/EIS.

The emphasis in the GMP is on increasing human propelled boat use while maintaining marinas and other facilities needed for motorized boat users. Safety considerations include designated water trails relatively close to shore that would be clearly signed to alert all boaters to the presence of non-motorized boat users. Opportunities for water-based recreation would be substantially expanded, including enhanced marinas at Great Kills Park and Floyd Bennett Field, designated water trails, mooring fields, additional launch sites and more instructional programming, equipment rentals and fishing access. As noted in Chapter 4, Visitor Use and Experiences under Health and Safety, safety hazards associated with boat use would be mitigated though improved marking and the designation of water-based recreational use areas. Furthermore, additional guided tours and instructional programming for self-propelled watercraft use will ensure more visitors are educated about the Gateway waters and informed about commercial boat traffic on the bay and harbor. Overall, it was determined that expanded access to and enjoyment of Gateway's waters, beaches, and coastal environments would result in a substantial long-term beneficial impact to the visitor experience of Gateway.

Staffing and Budget

Concern Statement: Commenters indicated additional natural resource management, Jamaica Bay Wildlife Refuge, and/or NPS rangers or other enforcement staff need to be added to be able to protect resources and visitors as more people come to visit the park. Commenters are concerned about possible fees and the cost of implementing alternative B is higher than the park is likely to be able to manage given past NPS funding deficits.

- Jamaica Bay is a large 13,000 acre body of marsh, shorelines, uplands and open water. Currently no one is patrolling the open waters of Jamaica Bay which is most of the park. Each year we find many illegal crab traps, people on the nesting bird islands, horseshoe crab poaching, people netting huge numbers of small fish, etc. The park needs to invest in a patrol boat and a work boat for Jamaica Bay to educate the public and enforce regulations.

- Hire scientists, naturalists, biologists to manage the park, not just park rangers who provide education.

- The National Park Service must make a firm commitment of money, staffing and other resources to the protection and enhancement of the park's natural resources, especially in Jamaica Bay.

- The goals of alternative B seem overly ambitious considering the current state of resources and structures and budget. If they are going to be accomplished will there be a budget for maintenance as maintenance not only of buildings but of resources is clearly a huge issue already for this park.

- The ambitious development under proposal B worries me as it seems that the Park will offer the same sort of recreational activities offered by other commercial businesses in the area. It will flood the park with these pleasure seekers and will offer activities that people will have to pay for, like, say the right to enjoy things like boating and kayaking and camping. That will not only destroy the natural beauty of the area but lock out the people who may not have the means to enjoy these activities.

- The recreation proposals all seem to be aimed at commercialization of GNRA for the benefit of vendor/partners and those who can afford to "pay to play". GNRA must serve those who cannot afford to pay more than the bus fare to get to Floyd Bennett Field. It should not become a country club parceled out to sports vendors.

Response: NPS recognizes and explains in the draft GMP/EIS (see page 549, for example) that neither alternative B nor C could be fully implemented without partners. Across all three units of the park, partners would play an increasing role in supporting park cultural and natural resource management, facility rehabilitation and restoration, and even maintenance, that could not be accomplished at the levels proposed in alternative B or C without partner funding and volunteer efforts. This would help to eliminate duplication in the NYC and NPS management responsibilities and presumably would lead to reallocation of budget and staff. If the NPS and its partners agree that additional resource management, scientists, enforcement of resource protection rules or visitor safety are in need of additional staff, some of the reallocated personnel and budget would be added to these divisions. Continuing on pages 551-553, the actions of partners to develop revenue-generating visitor and recreation programming in combination with eliminating duplication between the maintenance and resource management staff at both New York City and the park would free up funds to allow features of either alternative B or C to be implemented over time. Activities that are free now are very likely to remain so in the future. However, some new activities or facilities, such as entrance to the new Wetland Center, camping, balloon rides at Floyd Bennett Field etc. would be fee-based.

Recreation Management

Concern Statement: Some commenters prefer no active recreation in the park, some commenters want uses more relevant to community interests and others state that low-impact activities would be the proper balance.

Examples of comments:

- My suggestion would be for more focus on low-impact and passive recreation such as walking, birding, butterflying, nature study, stargazing, swimming at currently designated beaches, canoeing and kayaking, maybe sailing (but NOT wind-surfing and kit-boarding which are very disturbing to birds- they take flight from what appear to be fast-moving large winged predators), community gardens, art and theatre projects, limited horseback riding, and quiet contemplation of nature.

- Promote additional recreation within the park and in nearby areas. Gateway NRA must be MORE relevant to today's communities

- There should be NO active recreation. There should be no camping, hiking, biking, fishing, boating or concessions. All recreation should be passive observation of the wildlife.

- Finally, we don't believe that resource management and public engagement are mutually exclusive options. Recent developments at Jamaica Bay, such as the announcement of a Science and Resiliency Institute, are proof that the Park Service's stewardship and public engagement objectives can be creatively combined.

Response: In developing the GMP alternatives, the NPS gave serious consideration to the levels and types of recreational activities and appropriate locations in the park and defined these uses in the draft GMP/EIS and the preferred alternative. Alternatives do differ in the type and extent of recreational opportunities. Each alternative offers a variety of visitor experiences, including the opportunity for solitude or quiet contemplation, walking or bird watching as well as more active programming or activities.

To inform the GMP process, the planning team relied on three primary sources of information to guide proposed recreational activities: the results of public scoping; a synthesis of visitor use and trends over 35 years; and recreation demand and use analysis. Under the History of Community Participation on pages 561-563, the results of scoping are described including the types of activities and experiences people thought were important for the planning team to consider. In addition, The Pennsylvania State University's Department of Recreation, Park and Tourism Management synthesized findings from past visitor studies and analyzed area demographics and projected trends. This synthesis included visitation and types of activities that people favored in the park. Information about visitor use and activities is described on pages 251-265 in the draft GMP/EIS. To better understand current and future activity trends, a recreation demand and use analysis was conducted that evaluated 37 current and proposed recreational activities within the park and at nearby parks.

The management zones described on pages GMP 48-53 provide for three specific active recreation zones where appropriate activities and facilities would be concentrated – Recreation Zone, Active Beach Subzone and Community activity subzone. These three zones combined equal less than 10% of the total park acreage and have the highest levels of use, especially during summer months. Most of these recreational uses occur in the same location as they do today or will be shifted to other appropriate areas such as Floyd Bennett Field.

The biggest change in recreation use was the increase in camping opportunities. The GMP describes on pages 69-74 the different types of camping that will be explored throughout the park. Before these new camping areas are developed, additional planning and compliance will be undertaken to analyze how to design them so as to minimize impacts on habitats and wildlife. Prior to increasing facilities or access areas for non-motorized boating, the NPS will prepare a marine and estuarine resource management plan which will identify and evaluate the types and levels of marine recreational use. Recreation uses in park waters are already regulated under the park's Compendium and restrict personal watercraft (i.e. jet skis).

The NPS believes that this systematic approach created two alternatives that both show an appropriate balance between recreational uses and resource protection; that is, each meets the NPS obligation to both conserve and provide for enjoyment of park resources and values.

Site Specific Analysis and Data

Concern Statement: Numerous commenters addressed very specific concerns, made very specific suggestions, or requested site-specific data and analysis related to proposed recreational facilities and transportation in the preferred alternative as well as projects occurring outside park boundaries.

Example of comments:

- You should show current public use data by park sub-unit, by activity.

- You write: "Alternative B proposes expanding current pathways, adding water-based recreation and some introductory camping opportunities, and rebuilding the marina (damaged by Hurricane Sandy) into a water-based recreation facility in a different portion of the harbor. Ferry service may be added." (GMP DEIS, p. 340). While the concept of a water-based public recreation facility, open to the general public, in either Alternative B or my preference, Alternative C, sounds interesting, this would require an engineering feasibility study, which to my knowledge has not been done. Also you would need to consider the impact on vistas and view corridors

- While there is some verbal discussion about longshore transport of sand at Great Kills, there is no map showing the amount and vectors of that flow and no calculations or estimates of deposition 10, 20, 50,and 100 years into the future. In the case of Great Kills, mention is made (p. 150, p. 334) of the Oakwood Beach sewage treatment plant subsurface outfall pipe and its effects on sand transport but it is never shown on any map. On page 150 it is referred to only as a "very long outfall pipe." How long is it and where exactly is it located and where does it terminate?

- Runoff coefficients and runoff characteristics are environmental impacts that have to be accounted for if you are planning to increase paved or grassed area, or change the topography. How much more runoff can we expect under Alternative B as compared to Alternative C, and how will that runoff be pre-treated before discharge, as is required under NPDES regulations?

- Maybe I missed it, but I could not find any vegetation entitation data or maps. In a coastal estuarine region where we are on major avian and insect migration paths, and also so urbanized, ANY remaining vegetation or sites that could be revegetated are important. Your DEIS provides no statistics on acres that would be affected under the Alternatives. What exactly is the impact? How many acres of currently shrub or even phragmites areas be paved over or grassed over under your preferred Alternative B?

- While there is a lot of general textual discussion of wetlands, you cannot do a good analysis of any proposal without wetlands maps (State & Federal (NWI)) shown overlayed on an aerial image and maps/plans, and a list of acreages. Only 8% of the land on Staten Island is freshwater wetlands. Most are New York State Class I wetlands. They are also Federal (NWI) wetlands. The rest of the City is <1% iregulated wetlands (0% in Manhattan). [NYS wetland statistics by county: http://www.dec.ny.gov/docs/wildlife_pdf/wetstats3.pdf] Regionally, 95% of the wetlands that existed at the time of the first colonial settlement are gone.

- In any coastal park, an understanding of flood zones and how that might impact planning and project site selection is impossible without showing the flood zone maps overlayed on park aerial images and the plan maps.

- Please provide an analysis of the flotsam and jetsam on the beaches and in the adjacent wetlands: the small and large debris, including beverage containers, tampon applicators, boating and fishing debris, etc. How much, what it consists of, where are its sources, which entities are responsible. Provide an analysis of how this impacts the recreation choices of current and prospective park users, how much it costs to clean up, effects on wildlife, etc. It certainly has an impact on park users and park management planning.

Response: While we have reviewed and acknowledge these comments, NPS notes that this GMP/EIS is a programmatic document that focuses on zoning and large scale changes and their potential impacts to resources and values. The level of analysis in the GMP/EIS is deliberately ecosystem wide and programmatic and is intended to evaluate the relative impacts of different directions in an alternative and give a broad idea of the resources that might be affected. A variety of data was used to inform the management zoning, desired future conditions, alternatives, affected environment, and impact analysis presented in the draft GMP/EIS as evidenced by the extensive bibliography, including over 300 references on pages 685-700. These documents and geospatial data sets were reviewed and analyzed during the planning process. The relevant information was summarized and/or incorporated by reference and the specifics were not included in order to reduce the bulk of the draft plan nor was it necessary for the broad level of decision-making of a GMP.

When pieces of these alternatives are ready to be considered for implementation, the NPS would complete needed site specific feasibility, cost and environmental studies to determine how best to build a facility, improve transportation infrastructure or design new recreation areas, such as campgrounds. In addition, consultation and compliance with state and federal agencies would also occur. Relevant site specific data and maps would be included in these planning and compliance documents for public review and comment.

Traffic and Transportation

Concern Statement: Commenters noted that improving alternative transportation options, including ferries, would help improve access to the park. Other commenters remain concerned that attracting additional visitors and vehicles would increase traffic congestion and prevent access for emergencies, especially in adjacent communities.

Examples of comments:

- The influx of public transportation only causes added congestion in an area where residents only have one road in/out of their community where they LIVE. This is of concern should there be a mandatory evacuation in the future.

- The safety hazards associated with increasing visitors to the Breezy Tip would also present themselves at Riis Park. The vehicles which block the access roads to the bridge also block the only road that allows traffic to pass by the bridge. These delays have prevented emergency vehicles from responding to emergencies west of the bridge and on the bridge.

- There is also only one road and passage from Fort Tilden in and out of Breezy Point and to the extreme Western tip of the peninsula. The increased traffic flow along with obvious additional parking needs bring real potential concerns and problems relative to the overall safety and security of our community. It also raises issues and concerns relative to any necessary evacuation of our community in the event of another significant storm.

- All changes have to be studied to ensure that Sandy Hook is not being over-developed, resulting in even more crowded situations.

Response: Improving park access and alternative transportation are key planning challenges that the GMP addressed. Under the preferred alternative, a variety of options to, from, and within Gateway's sites would be available. Public access to and within Gateway would be made convenient through a combination of public transit, ferry services, and non-motorized modes such as walking, biking and human-powered boats. While visitation would likely increase, the alternatives strive to reduce visitor dependency on personal automobiles by providing a number of alternative transportation options. Throughout the park, expanded ferry and water taxi use, shuttles as well as improved connectivity and enhanced bike and pedestrian -friendly infrastructure would provide visitors with car free options for both getting to and through the park.

To the extent possible, existing infrastructure including entrances will be used. Access to park units will be improved substantially by the introduction of new signs and better wayfinding and limited development of new egress and ingress. Signs, orientation kiosks and more welcoming entry points will raise the visibility of Gateway's park units and keep visitors from inadvertently traveling to communities instead. Additionally, by improving connectivity between the park units and surrounding communities with greenway connections and new trails, the NPS and its partners hope to reduce auto-dependence among visitors and make it easier for more people to enter the park units on foot or by bike. The specifics of routes into or out of a particular area are something that has not yet been decided. Future decisions about access and routing will be made in coordination with local community planners and the NPS.

In order to achieve this goal, NPS would explore these options with transit, transportation and planning agencies and organizations for expanded routes, services and physical connections. Gateway would utilize existing facilities such as marinas, docks, trails and road network as the foundation for an improved transportation system so that less of the park's resources would be disturbed. Prior to expanding or developing services and facilities, additional planning, consultation and compliance would be undertaken.

To continue to provide emergency service, the park would likely continue to use routes that have proven successful. In addition, the NPS will continue to update its emergency response procedures in subsequent, more site-specific plans than the GMP. Through step-down transportation and safety plans, NPS and local emergency services will analyze access and ensure they gain access to park units to address emergencies.

In the transportation section of chapter 4 in the final GMP/EIS on pages 511-540, the analysis demonstrates that the introduction of several alternative transportation options (e.g. shuttle, water taxi use, ferry, bike infrastructure) would reduce reliance on private vehicle access to the park and minimize impacts associated traffic congestion and overfilled parking areas. Even if parking is designed to meet the carrying capacity identified for a site, a sudden influx of visitors arriving by boat or bus could overwhelm the site and exceed its capacity. Therefore, when planning the operation of these transportation modes, the NPS would consider visitation surges at particular sites in order to avoid exceeding the area's carrying capacity. Impacts to the visitor experience at Gateway were analyzed in chapter 4 of the EIS in the Visitor Use and Experience section. It was determined that while the increase in visitation and potentially more crowds and congestion may be construed as an adverse impact, on balance the provision of more and improved visitor uses and recreation opportunities would result in a substantial long-term beneficial impact to visitor experience.

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Appendices



Appendix A: Legislation and Administrative Commitments

Gateway Legislation

Title 16, Chapter 1, Subchapter LXXXVII, 460cc of the United States Code
Ratified on Oct. 27, 1972

460cc. Establishment

In order to preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features, the Gateway National Recreation Area (hereinafter referred to as the "recreation area") is hereby established.

(a) Composition and boundaries
The recreation area shall comprise the following lands, waters, marshes, and submerged lands in the New York Harbor area generally depicted on the map entitled "Boundary Map, Gateway National Recreation Area," numbered 951–40017 sheets 1 through 3 and dated May, 1972:
(1) Jamaica Bay Unit—including all islands, marshes, hassocks, submerged lands, and waters in Jamaica Bay, Floyd Bennett Field, the lands generally located between highway route 27A and Jamaica Bay, and the area of Jamaica Bay up to the shoreline of John F. Kennedy International Airport;
(2) Breezy Point Unit—the entire area between the eastern boundary of Jacob Riis Park and the westernmost point of the peninsula;
(3) Sandy Hook Unit—the entire area between Highway 36 Bridge and the northernmost point of the peninsula;
(4) Staten Island Unit—including Great Kills Park, World War Veterans Park at Miller Field (except for approximately 26 acres which are to be made available for public school purposes), Fort Wadsworth, and the waterfront lands located between the streets designated as Cedar Grove Avenue, Seaside Boulevard, and Drury Avenue and the bay from Great Kills to Fort Wadsworth;
(5) Hoffman and Swinburne Islands; and
(6) All submerged lands, islands, and waters within one-fourth of a mile of the mean low water line of any waterfront area included above.

(b) Boundary revisions: notification of Congressional committees; publication in Federal Register
The map referred to in this section shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior, Washington, District of Columbia. After advising the Committee on Natural Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate in writing, the Secretary of the Interior (hereinafter referred to as the "Secretary") is authorized to make minor revisions of the boundaries of the recreation area when necessary by publication of a revised drawing or other boundary description in the Federal Register.

460cc–1. Acquisition of property

(a) Authority of Secretary; donation of State lands
Within the boundaries of the recreation area, the Secretary may acquire lands and waters or interests therein by donation, purchase or exchange, except that lands owned by the States of New York or New Jersey or any political subdivisions thereof may be acquired only by donation.

(b) Transfer from Federal agency to administrative jurisdiction of Secretary
With the concurrence of the agency having custody thereof, any Federal property within the boundaries of the recreation area may be transferred, without consideration, to the administrative jurisdiction of the Secretary for administration as a part of the recreation area.

(c) Breezy Point Unit; public use and access; agreement for use of lands for single-family residential community; specific provisions; Rockaway parking lot conveyance
Within the Breezy Point Unit, (1) the Secretary shall acquire an adequate interest in the area depicted on the map referred to in section 460cc of this title to assure the public use of and access to the entire beach. The Secretary may enter into an agreement with any property owner or owners to assure the continued maintenance and use of all remaining lands in private ownership as a residential community composed of single-family dwellings. Any such agreement shall be irrevocable, unless terminated by mutual agreement, and shall specify, among other things:

(A) that the Secretary may designate, establish and maintain a buffer zone on Federal lands separating the public use area and the private community;

(B) that all construction commencing within the community, including the conversion of dwellings from seasonal to year-round residences, shall comply with standards to be established by the Secretary;

(C) that additional commercial establishments shall be permitted only with the express prior approval of the Secretary or his designee.

(2) If a valid, enforceable agreement is executed pursuant to paragraph (1) of this subsection, the authority of the Secretary to acquire any interest in the property subject to the agreement, except for the beach property, shall be suspended.

(3) The Secretary is authorized to accept by donation from the city of New York any right, title, or interest which it holds in the parking lot at Rockaway which is part of the Marine Bridge project at Riis Park. Nothing herein shall be deemed to authorize the United States to extinguish any present or future encumbrance or to authorize the State of New York or any political subdivision or agency thereof to further encumber any interest in the property so conveyed.

(d) Jamaica Bay Unit; Broad Channel Community; title acceptance conditions
Within the Jamaica Bay Unit,

(1) the Secretary may accept title to lands donated by the city of New York subject to a retained right to continue existing uses for a specifically limited period of time if such uses conform to plans agreed to by the Secretary, and

(2) the Secretary may accept title to the area known as Broad Channel Community only if, within five years after October 27, 1972, all improvements have been removed from the area and a clear title to the area is tendered to the United States.

460cc–2. Administration

(a) Provisions applicable; utilization of authorities for conservation and management of wildlife and natural resources; Jamaica Bay Unit

The Secretary shall administer the recreation area in accordance with the provisions of sections 1, 2, 3, and 4 of this title, as amended and supplemented. In the administration of the recreation area the Secretary may utilize such statutory authority available to him for the conservation and management of wildlife and natural resources as he deems appropriate to carry out the purposes of this subchapter: Provided, That the Secretary shall administer and protect the islands and waters within the Jamaica Bay Unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area which is incompatible with this purpose.

(b) William Fitts Ryan Visitor Center; designation

(1) The Secretary shall designate the principal visitor center within the recreation area as the "William Fitts Ryan Visitor Center" in commemoration of the leadership and contributions which Representative William Fitts Ryan made with respect to the creation and establishment of this public recreation area. To inform the public of the contributions of Representative Ryan to the creation of the recreation area, the Secretary shall provide such signs, markers, maps, interpretive materials, literature, and programs as he deems appropriate. Not later than December 31, 1980, the Secretary shall take such additional actions as he deems appropriate to recognize and commemorate the contributions of Representative Ryan to the recreation area.

(2) The portion of the Staten Island Unit of the recreation area known as Miller Field is hereby designated as "World War Veterans Park at Miller Field". Any reference to such Miller Field in any law, regulation, map, document, record, or other paper of the United States shall be considered to be a reference to "World War Veterans Park at Miller Field".

(c) Federal-State cooperative agreements for police and fire protection

The Secretary is authorized to enter into cooperative agreements with the States of New York and New Jersey, or any political subdivision thereof, for the rendering, on a reimbursable basis, of rescue, firefighting, and law enforcement services and cooperative assistance by nearby law enforcement and fire preventive agencies.

(d) Water resource developments

The authority of the Secretary of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements (including the deepening of the shipping channel from the Atlantic Ocean to the New York harbor) on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary of the Interior and the Secretary of the Army and which are consistent with both the purpose of this subchapter and the purpose of existing statutes dealing with water and related land resource development.

(e) Airway facilities; maintenance, operation, and installation; Jamaica Bay and Floyd Bennett Field restrictions

The authority of the Secretary of Transportation to maintain and operate existing airway facilities and to install necessary new facilities within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary of the Interior and the Secretary of Transportation and which are consistent with both the purpose of this subchapter and the purpose of existing statutes dealing with the establishment, maintenance, and operation of airway facilities: Provided, That nothing in this section shall authorize the expansion of airport runways into Jamaica Bay or air facilities at Floyd Bennett Field.

(f) Hunting, fishing, and trapping

The Secretary shall permit hunting, fishing, shellfishing, trapping, and the taking of specimens on the lands and waters under his jurisdiction within the Gateway National Recreation Area in accordance with the applicable laws of the United States and the laws of the States of New York and New Jersey and political subdivisions thereof, except that the Secretary may designate zones where and establish periods when these activities may not be permitted, for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment.

(g) Sandy Hook and Staten Island Units; programs for preservation, restoration, interpretation, and utilization of sites and structures
In the Sandy Hook and Staten Island Units, the Secretary shall inventory and evaluate all sites and structures having present and potential historical, cultural, or architectural significance and shall provide for appropriate programs for the preservation, restoration, interpretation, and utilization of them.

(h) Donations for services and facilities; acceptance
Notwithstanding any other provision of law, the Secretary is authorized to accept donations of funds from individuals, foundations, or corporations for the purpose of providing services and facilities which he deems consistent with the purposes of this subchapter.

(i) Rights to solid waste byproducts of Fountain Avenue Landfill; conveyance from United States to city of New York; rights-of-way and permits; conditions; payments to United States for development and improvement of Gateway National Recreation Area
Notwithstanding the provisions of subsection (a) of this section, the United States hereby conveys to the city of New York all rights to the methane gas and associated byproducts resulting from solid waste decom position on the area within the Jamaica Bay Unit known as the Fountain Avenue Landfill site, subject to payments to the United States of 50 per centum of the revenue received by the city of New York, if any, from the development of such rights. The Secretary shall grant to the City, its lessee or assignee, all rights-of-way and other permits necessary from the Department of the Interior to extract and transport the gas from the site: Provided, That the rights-of-way and other permits shall provide for reasonable restoration of the site, including removal of any processing or storage facilities used in the disposal, development, or ext raction of the gas, access by the Secretary to the site for safety and other recreation area purposes, and such other reasonable conditions as the Secretary deems necessary to further purposes of the recreation area. All such payments to the United States shall be credited to the appropriations of the National Park Service for the development and improvement of Gateway National Recreation Area.

460cc–3. Gateway National Recreation Area Advisory Commission

(a) Establishment; termination date
There is hereby established a Gateway National Recreation Area Advisory Commission (hereinafter referred to as the "Commission"). Said Commission shall terminate twenty years after the date of the establishment of the recreation area.

(b) Membership; appointment; terms of office; representation of interests
The Commission shall be composed of fifteen members each appointed for a term of two years by the Secretary as follows:

(1) two members to be appointed from recommendations made by the Governor of the State of New York;
(2) two members to be appointed from recommendations made by the Governor of the State of New Jersey;
(3) two members to be appointed from recommendations made by the mayor of New York City;
(4) two members to be appointed from recommendations made by the mayor of Newark, New Jersey; and
(5) seven members to be appointed by the Secretary to represent the general public.

(c) Chairman; vacancies
The Secretary shall designate one member to be Chairman. Any vacancy in the Commission shall be filled in the same manner in which the original appointment was made.

(d) Compensation and expenses; vouchers
A member of the Commission shall serve without compensation as such. The Secretary is authorized to pay the expenses reasonably incurred by the Commission in carrying out its responsibility under this subchapter upon vouchers signed by the Chairman.

(e) Voting
The Commission established by this section shall act and advise by affirmative vote of a majority of the members thereof.

(f) Consultations of Secretary with members
The Secretary or his designee shall, from time to time, consult with the members of the Commission with respect to matters relating to the development of the recreation area.

460cc–4. Authorization of appropriations; limitation; adjustments

There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this subchapter, but not more than $12,125,000 for the acquisition of lands and interests in lands and not more than $92,813,000 (July, 1971 prices) for development of the recreation area, plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in the construction costs as indicated by engineering cost indices applicable to the type of construction involved herein.

Summary of Administrative Commitments

Party with Whom Agreement Exists	Type of Agreement
American Littoral Society	Cooperative Agreement
Army Ground Forces Association	Memorandum of Agreement
Bike New York	General Agreement
Department of Sanitation (NYC)	Cooperative Agreement
Eastern National	Cooperating Association Agreement
Eastpointe Condominium Association	General Agreement
Federal Aviation Administration	Interagency Agreement
Great Kills Survey Access Agreement	General Agreement
Marine Academy of Science & Technology	Memorandum of Agreement
NPNH Conservancy	General Agreement
National Oceanic & Atmospheric Administration	Interagency Agreement
NYC Department of Parks and Recreation	Cooperative Management Agreement
NYC Department of Parks and Recreation – Frank Charles Park	Cooperative Management Agreement
New York City Police Department	Cooperative Agreement
Polytech University	General Agreement
Rockaway Artist Alliance	Cooperative Agreement
Rockaway Theater Company	Cooperative Agreement
Sandy Hook Foundation	General Agreement

Appendix B: Contributing Structures Prioritization Process Results

In order to guide GMP decisions, the park determined that a prioritized list of resources was necessary to inform future preservation efforts, funding, and maintenance. Using variety of information sources, a group of park and regional office staff with expertise in history, architecture, cultural landscapes and business services created a process to evaluate structures and associated landscapes that are contributing resources to the park's nine National Register Districts (see the "Cultural Resources – Historic Districts and Structures" section of Affected Environment for a complete description). The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation.

These historic resources were evaluated for the following criteria and results presented in the table below:

Fundamental Resource: identified in Foundation Document as a fundamental resource (see chapter 1: Foundation for Planning)

National Register Status and Level of Significance: individual listed, listed as district: local, state or national

Criteria used to evaluate properties for the National Register of Historic Places and National Historic Landmarks was used to guide the level of significance and status. Historic contexts are found at a variety of geographical levels or scales. The geographic scale selected may relate to a pattern of historical development, a political division, or a cultural area. Regardless of the scale, the historic context establishes the framework from which decisions about the significance of related properties can be made.

Local Historic Contexts

A local historic context represents an aspect of the history of a town, city, county, cultural area, or region, or any portions thereof. It is defined by the importance of the property, not necessarily the physical location of the property. For instance, if a property is of a type found throughout a State, or its boundaries extend over two States, but its importance relates only to a particular county, the property would be considered of local significance.

State Historic Contexts

Properties are evaluated in a State context when they represent an aspect of the history of the State as a whole. These properties do not necessarily have to belong to property types found throughout the entire State: they can be located in only a portion of the State's present political boundary. It is the property's historic context that must be important statewide. A property whose historic associations or information potential appears to extend beyond a single local area might be significant at the State level. A property that overlaps several State boundaries can possibly be significant to the State or local history of each of the States. Such a property is not necessarily of national significance, however, nor is it necessarily significant to all of the States in which it is located.

National Historic Contexts

Properties are evaluated in a national context when they represent an aspect of the history of the United States and its territories as a whole. These national historic contexts may have associated properties that are locally or statewide significant representations, as well as those of national significance. A property with national significance helps us understand the history of the nation by illustrating the nationwide impact of events or persons associated with the property, its architectural type or style, or information potential. It must be of exceptional value in representing or illustrating an important theme in the history of the nation.

Condition

Information on the condition of the resources was taken from two separate NPS managed databases: Facility Management Software System (FMSS) and the List of Classified Structures (LCS). The FMSS Facility Condition Index (FCI) takes into account the repair backlog and the replacement value of each resource which is then assigned a condition category of Good, Fair, Poor, or Serious based on industry and NPS standards. Structures on the LCS are assessed to determine whether the structure and their significant features are intact, structurally sound, and performing their intended purpose. LCS conditions are assigned a condition category of Good, Fair and Poor. Because each is a managed database with specific requirements for updating, these two rating systems were utilized as follows:

Good - structures with the lowest FCI and/or that are listed in good condition on the LCS
Fair - structures with a lower FCI and/or that are listed in fair condition on the LCS
Poor - structures with a higher FCI and/or that are listed in poor condition on the LCS
Serious - structures with the highest FCI

Uniqueness to the Park

Common - there are a number of similar structures in the park
Uncommon - there is one or a few structures of this type in the park and/or there are a number of similar structures in the park, but there are aspects of this particular structure that make it unique. An example may be a battery with design similar to a number of other batteries in the park, but this particular battery was the only one of its type used for a particular gun.

Visibility

Prominent - structures that are visible to all visitors and make a statement in the landscape
Accessible - structures that are visible to visitors
Remote – structures that due to location are hidden from public view and are not readily accessible to visitors.

Potential Use

Occupied – structures that are currently occupied – this includes buildings that are used for interpretation and planned curatorial and/or maintenance storage.
Vacant with a high potential for reuse – structures that are currently vacant but based on the type of structure, location and condition, reoccupation and reuse of the structure is viable.
Vacant with a low potential for reuse - structures that are currently vacant but based on the type of structure, location and condition, the cost of rehabilitation of the structure will limit the potential for reuse.

Vulnerability to Future Storm Events

At the time the banding was prepared, updated FEMA maps were not yet available, therefore the climate change vulnerability assessment was based on damaged from Hurricane Sandy.

Not Vulnerable - structures that were not damaged
Minimal Vulnerability - structures that incurred minor wind related damage
Moderate Vulnerability - structures that incurred more moderate damage including flooding below the occupied floor level.
Significant Vulnerability - structures that incurred major damage, flooding of the occupied floors and structural damage.

Priority Bands

Numerical points were assigned to each criterion and totaled for a score. Depending on that score, each resource was placed in one of three bands: preserve, stabilize, or ruin. The bands are defined as follows:

- **Preserve:** Actions will be taken to maintain and preserve these structures. Efforts will be made to maintain these structures in their current condition or move these structures into good condition through preservation or rehabilitation by NPS or partners. These structures will be utilized for operations, visitor services, and interpretation.

- **Stabilize:** Structures where actions will be taken to render an unsafe, damaged, or deteriorated property stable while retaining its present form. Minimal efforts will be made to maintain the structure in its current condition. Unless a use and/or funding is found, the structure may fall into disrepair.

- **Ruin:** Structures in poor condition where one or more of the basic structural elements has been lost and due to this condition are without viable reuse options. Resources may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resource.

The contributing structures and landscapes priority band may change as data used to evaluate these resources is updated. As conditions in the FMSS and LSC systems are updated and national register nominations are updated and/or new nominations are prepared, the list of resources and the priority band will be updated. The priority band may change.

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Sandy Hook Unit									
Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District									
9-Gun Battery	Stabilize	Yes	NR-District	National	Vacant - Low Potential	Uncommon	Prominent	Not	Serious
Batteries McCook and Reynolds (also known as Mortar Battery)	Preserve	Yes	NR-District	National	Occupied	Uncommon	Remote	Minimal	Fair
Battery Arrowsmith [Ruin]	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Minimal	Poor
Battery Granger	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Minimal	Poor
Battery Gunnison	Preserve	Yes	NR-District	National	Occupied	Uncommon	Accessible	Moderate	Fair
Battery Kingman	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Common	Remote	Not	Poor
Battery Mills	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Common	Remote	Minimal	Poor
Battery Morris	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Battery Peck	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Battery Potter	Preserve	Yes	NR-District	National	Occupied	Uncommon	Accessible	Moderate	Fair
Coal Shed 260	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Fair
Switchboard Room 256	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Fair
Switchboard Room 257	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Central Power Plant 259	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Moderate	Fair
Battery Urmston	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Igloo Magazine 442	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Fair
Igloo Magazine 443	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Significant	Serious
Lieutenants' Quarters 01	Preserve	Yes	NR-District	National	Occupied	Uncommon	Prominent	Moderate	Fair
Lieutenants' Quarters 02	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 03	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 04	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 05	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 06	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 07	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 08	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Captains' Quarters 09	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Captains' Quarters 10	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Captains' Quarters 11	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Commanding Officer's Quarters 12	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Captains' Quarters 13	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Captains' Quarters 14	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Captains' Quarters 15	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Lieutenants' Quarters 16	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Poor
Lieutenants' Quarters 17	Preserve	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Poor
Lieutenants' Quarters 18	Preserve	Yes	NR-District	National	Occupied	Uncommon	Prominent	Minimal	Good
Duplex Officers' Quarters 21	Preserve	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Fair
NCO Quarters 20	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Minimal	Good
Chapel 35	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Moderate	Fair
Commissary 47	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Moderate	Good
Bachelor Officers' Quarters 27	Preserve*	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Bakery 33	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Duplex NCO Quarters 29	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Fair
Duplex NCO Quarters 66	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Remote	Minimal	Good
Emergency Power Plant 324	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Enlisted Men's Barracks 22	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Moderate	Fair
Enlisted Men Barracks 23	Preserve*	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Enlisted Men's Barracks 24	Preserve*	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Enlisted Men's Barracks 25	Preserve*	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
Mess Hall 55	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Mess Hall 56	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Mess Hall 57	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Mess Hall 58	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Moderate	Good
Barracks and Mess 74	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Moderate	Good
Post Laundry 77	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Officers' Mess Hall 301	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Camp Headquarters 302	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Officers' Latrine 304	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Dispensary 305	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Enlisted Men's Mess Hall 315	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Post Exchange 316	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Enlisted Men's Mess Hall 317	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Enlisted Men's Latrine 318	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Enlisted Men's Latrine 319	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Enlisted Men's Latrine 320	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Enlisted Men's Latrine 321	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Sewage Pump Plant 306	Stabilize	No	NR-District	Contributing	Occupied	Common	Remote	Moderate	Poor
Sewage Pump Station 307	Ruin	No	NHL-District	Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Poor
Fire Station Office 34	Preserve*	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Fair
Firehouse #1 Building 51	Preserve*	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Fair
Firehouse #2 Building 76	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Guardhouse 28	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Fair
NCO Club/Post Stables 36	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Moderate	Fair
NCO Quarters 30	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Fair
NCO Quarters 335	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
NCO Quarters 52	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Fair
NCO Quarters 64	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Fair
Nike Radar Site-Barracks 402	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Not	Fair
Nike Radar Site-Barracks 403	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Not	Fair
Nike Radar Site-Latrine 406	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Not	Fair
Nike Radar Site-Boiler Room 407	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Minimal	Fair
Nike Radar Site-Generator House 410	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Nike Radar Connecting Corridors	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Fair
Nike Radar Site-Equipment & Ops. 454	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Poor
Nike Radar Site-Sentry Box 413	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Poor
Nike Radar Site-Connec. Corridors 411	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Uncommon	Remote	Moderate	Poor
Nike Radar Site-Generator House 414	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Poor
Nike Launch Site-Boiler House 435	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Nike Launch Site-Latrine 434	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Nike Missle Launch [4 silos]	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Remote	Moderate	Fair
Nike Launch Site-Missile Assembly 449	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Moderate	Fair

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Nike Launch Site-Ready Barracks 430	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Nike Launch Site-Ready Barracks 431	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Nike Launch Site-Ready Barracks 432	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Nike Launch Site-Ready Barracks 433	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Nike Launch Site-Ready Building 437	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Nike Launch Site-Sentry Box 439	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Nike Launch Site-Sentry Box 447	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Significant	Fair
Nike Launch Site-Warhead Bldg. 450	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Significant	Fair
Nike Radar Site-Hipar Building 468	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Poor
Nike Radar Site-Sentry Box 423	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Officers' Latrine 300	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Serious
Post Exchange 53	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Poor
Post Exchange Gas Station 60	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Post Headquarters 26	Preserve*	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Moderate	Fair
Post Morgue 326	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Post Office 41	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Good
Post Theater 67	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Significant	Good
Post Theater-Transformer Building	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Fair
Pumphouse 206	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Good
Radio Station 207	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Significant	Poor
Quartermaster's Office/ Storehouse 32	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Fair
Service Club YMCA Building 40	Preserve*	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Fair
Storehouse 65	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Two Family NCO Quarters 71	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Minimal	Good
Two Family NCO Quarters 72	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Minimal	Fair
Two Family NCO Quarters 73	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Fair
Two Family NCO Quarters 75	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Good
Two Family NCO Quarters 80	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Prominent	Moderate	Fair
Barracks 119	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Significant	Serious
Barracks 120	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Significant	Serious

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Two Family Officers Quarters 144	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Good
Two Family Officers' Quarters 145	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Good
Warehouse 49	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Good
Storehouse 344	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Poor
Generator Building 350	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Poor
Pumphouse & Sewage Lift Station 37	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Good
Water Pumping Plant 341	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Remote	Significant	Good
Limehouse 342	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Engineers Quarters 340	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Moderate	Good
Double Fireman's Quarters 338	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Remote	Moderate	Good
Aerator House 343	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Minimal	Good
Gate Guardhouse 438	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Provost Marshal's Office 470	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Prominent	Significant	Fair
Gate House 471	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Significant	Good
Oil & Paint Storehouse	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Poor
Shell Warehouse 45	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Fair
Parade Ground	Preserve	Yes	NR-District	National	Occupied	Uncommon	Prominent	Minimal	Good
Roadways	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Sandy Hook Light	Preserve	Yes	NR-Individual Listing	National	Occupied	Uncommon	Prominent	Not	Fair
Sandy Hook Light-Keeper's Quarters 84	Preserve	Yes	NR-Individual Listing	National	Occupied	Uncommon	Prominent	Not	Good
Garage 85	Preserve	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Sandy Hook Proving Ground-Brick Officers Qtrs. 114	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Serious
Sandy Hook Proving Ground-Laundry 113	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Minimal	Serious
Sandy Hook Proving Ground-Ordnance Barracks 102	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Poor
Sandy Hook Proving Ground-Foreman's Residence 104	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Fair
Sandy Hook Proving Ground-Locomotive Engineer Qtrs	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Fair
Sandy Hook Proving Ground-Proof Battery	Stabilize	Yes	NR-District	National	Occupied	Uncommon	Remote	Minimal	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Sandy Hook Proving Ground-Magazine 173 Traverses	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair
Sandy Hook Proving Ground-Magazine 174 Traverses	Stabilize	Yes	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair
Sandy Hook Proving Ground-Electrical Shed 124a	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Significant	Fair
Sandy Hook Proving Ground-Machine/Smith Shop 125	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Uncommon	Accessible	Significant	Serious
Sandy Hook Proving Ground-Paint Shop 132	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Remote	Significant	Poor
Sandy Hook Proving Ground-Power Plant 124	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Significant	Poor
Sandy Hook Proving Ground-Shelter House 131	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Significant	Poor
Sandy Hook Proving Ground-Storehouse 130	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Fair
Paint Storehouse 184	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Poor
Post Engineer Warehouse 156	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Good
Storehouse 134	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Poor
Laundry & Latrine 157	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Sandy Hook-Park Entrance, Area Manager House #600	Ruin	No	Ineligible	Not significant	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Poor
Spermaceti Cove-#2 Life Saving Station	Preserve	Yes	NR-Individual Listing	National	Occupied	Uncommon	Accessible	Moderate	Good
Jamaica Bay Unit									
Floyd Bennett Field Historic District									
Administration Building	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Fair
Fire Pump House	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Garage & Maintenance Shop	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Not	Good
Hangars 1 and 2	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Not	Poor
Hangars 3 and 4	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Not	Poor
Hangars 5 and 6	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Not	Good
Hangars 7 and 8	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Not	Good
Fire House / Storage	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Not	Poor
Synthetic Training Building	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Not	Serious
Barracks No.2/CPO Club	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Not	Good
CPO Barracks No.5/Navy HQ Bldg	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair
West Recreation Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Marines Barracks No. 15	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Not	Good
Navy Enlisted Men Recreation Bldg	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Not	Good
Power Plant "A"	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Fair
Fire Station and Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Fair
Station Maintenance Shop	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Fair
Torpedo Storage	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Not	Poor
Power Plant "B"	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Good
Cold Storage Commissary	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Good
General Storehouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Fair
NAPB Seaplane Hangar B	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Poor
Inert Storage	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Poor
Ordinance/Practice Bomb Storage	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Married Officer's Quarters A	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Not	Serious
Married Officer's Quarters B	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Not	Serious
US Coast Guard Main Hangar	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Remote	Not	Fair
US Coast Guard Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Fair
Contributing Runways	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Not	Fair
Contributing Taxiways	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Not	Fair
Contributing Apron	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Not	Good
Sea Plane Ramp	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Fair
Airfield	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Not	Fair
Contributing Roadways	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
High Explosive Magazine	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
High Explosive Magazine	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
High Explosive Magazine	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
High Explosive Magazine	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Ammunition	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
North Service Substation	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Poor
Fire Protection Pump Station	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Serious
Fuse Detonator Magazine	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Good

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Fuse Detonator Magazine	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Good
Fuel Storage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Good
Sewage Pump Station	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Serious
South Service Substation	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Serious
Fire Pump Station	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Good
Water Tank	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Water Tank	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Electrical Vault	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Serious
Pump House	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Serious
Transformer Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Fort Tilden Historic District									
Battery Construction 220	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Minimal	Poor
Battery Harris - Bombproof Magazine	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Fair
Battery Harris - Magazine 401	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Magazine 405	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Magazine 409	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Magazine 414	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Power Plant #1Tank	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Power Plant #2 Tank	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris - Power Plant #3	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Battery Harris East	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Fair
Battery Harris West	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Fair
Battery Kessler	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Accessible	Moderate	Poor
Fire Control & Plotting Room	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Harbor Entrance Command Post	Stabilize	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Good
Igloo Magazine 403	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Igloo Magazine 404	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Mine Casemate & Plotting Room	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Good
Nike Silo 310	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Poor
Nike Silo 311	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Poor
Nike Silo 312	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Poor
Nike Silo 313	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Not	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Nike Site - Gate House	Ruin	Yes	NR-District	National	Vacant - High Potential for Reuse	Common	Remote	Minimal	Serious
Storage Shed 322	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Significant	Fair
Storage Shed 402	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Poor
Sentry Booth	Ruin	Yes	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Missile Assembly	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Poor
Generator Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Good
Latrine / Motor Pool Office	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Not	Poor
Beach House	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Remote	Minimal	Serious
NCO Snack Bar	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Moderate	Poor
NCO Annex/ Latrine	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Moderate	Poor
Beach House/ Water Meter	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Moderate	Poor
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Good
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Fair
Administration	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Good
Main Transformer Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Ordinance Shop/ Storage	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Minimal	Poor
Administration/ Storage	Ruin	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Minimal	Poor
Motor Shop/ Rockaway Alliance	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Theatre	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Prominent	Minimal	Good
Chapel	Stabilize *	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Minimal	Serious
Community Building	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Poor
Post Headquarters/ Office	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Serious
Post Sewage Lift Unit	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Good
Residence	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Dispensary/ Residence	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Store House	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Quarters	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Storage	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Serious
B-3 Comfort Station	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Parade Ground	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Good
Administration / Harbor Ferry Master	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Minimal	Good
Gas Station	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Good
Oil Shop / Ground Storage	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Poor
Quartermasters /Plumbers Shop	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Oil Storage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Auto Shop	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Poor
Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Poor
Storage/ Electrical Shop	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Minimal	Fair
CG Main Building	Preserve	No	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Poor
CG Boat House	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Garages	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Serious
Power House	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Moderate	Poor
Jacob Riis Park Historic District									
Ball Field Electrical Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Bathhouse - Beach Pavilion	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Significant	Poor
Bathhouse - East Wing Pavilion	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Significant	Good
Bathhouse - Entrance Pavilion	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Good
Bathhouse - West Wing Pavilion	Preserve	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Uncommon	Prominent	Significant	Good
Boiler Room	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Significant	Good
East Mall Building	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Poor
Garage	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Serious
Park Police Stables	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Poor
Parking Lot	Preserve	No	NR-Individual Listing	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Fair
West Mall Building	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Good
Golf Course	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Playing Courts	Ruin	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Moderate	Serious
Boardwalk/ Promenade	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Significant	Poor
Mall	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Prominent	Minimal	Fair
Lighting -Type A, B and 1931	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Good
Wise Clock	Preserve	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Prominent	Minimal	Good
Silver Gull Beach Club Historic District									
Clubhouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Cabanas [A,B,C & D]	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Significant	Fair
Gatehouses - East and West	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Breezy Point Surf Club Historic District									
Barracks	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Bayberry Room	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Birdhouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Gatehouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Cabanas A,B,C,D,W	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Bath Cabins E,F	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Original Court Restrooms/ Showers	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Administration Building	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Cafeteria/Ballroom	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Ocean Court Cabins [008-212]	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Ocean Court Cabanas A,A-B,B, B-c, B-s,C-D,D E,E-N,F,G,H	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Ocean Court Terrace Cabanas Q-Z	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Seahorse Café/Cap Gig's Lounge	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Good
Ocean Court Restroom/ Showers	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Fair
Staten Island Unit									
Fort Wadsworth Historic District									
B.C. & C.R.F. Stations	Ruin	No	NR-District	National	Vacant - Low Potential for Reuse	Common	Accessible	Moderate	Poor
Battery 218	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Minimal	Poor
Battery Ayres	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Battery Bacon	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Battery Barbour	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Battery Barry	Ruin	Yes	NR-District	National	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Serious
Battery Catlin	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Battery Catlin Magazine	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Accessible	Not	Serious
Battery Dix	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Common	Accessible	Minimal	Poor
Battery Duane	Preserve	Yes	NR-District	National	Occupied	Uncommon	Prominent	Not	Fair
Battery Hudson	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Accessible	Minimal	Poor
Battery Mills	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Battery Richmond	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Not	Serious
Battery Turnbull	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Accessible	Moderate	Poor
Battery Upton	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Minimal	Serious
Battery Weed	Preserve	Yes	NR-Individual Listing	National	Occupied	Uncommon	Prominent	Moderate	Fair
Battery Weed - Light Station	Preserve	Yes	NR-Individual Listing	State/Local/ Contributing	Occupied	Uncommon	Prominent	Not	Fair
Building 101 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Building 102 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
Building 103 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 104 - Detached Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 105 - Detached Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 106 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
Building 107 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Good
Building 109 - Admin / Off. Club	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Not	Poor
Building 110 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
Building 111 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 112 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 113 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
Building 114 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Fair
Building 115 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 116 - Detached Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 117 - Detached Garage	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor

	Band	Fundamental Resource	National Register Status	Level of Significance	Potential Use	Uniqueness	Visibility	Climate Change Vulnerability	Pre-Sandy Condition
Building 119 - Housing	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Not	Poor
Building 138 - Mars Station	Stabilize	No	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Minimal	Poor
Building 139 - Signal Storage	Stabilize	No	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Minimal	Good
Building 140 - Mining Casemate	Stabilize	No	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Minimal	Poor
Building 147 - Torpedo Storage	Stabilize	Yes	NR-District	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Moderate	Serious
Building 148 - Warehouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Building 210 - Inf. Battery Bks.	Preserve*	No	NR-District	State/Local/ Contributing	Occupied	Uncommon	Accessible	Minimal	Poor
Building 211 - Open Warehouse	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair
Building 301 - Motor Pool	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Building 302 - Motor Pool	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Building 303/304 - Motor Pool Off	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Building 305 - Administration	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Poor
Building 307 - Ready Magazine	Stabilize	Yes	NR-District	National	Vacant - Low Potential for Reuse	Common	Remote	Moderate	Fair
Building 309 - Stables (Storage)	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Minimal	Fair
Building 310 - Storage Shed	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Building 339 - Seaplane Hangar	Ruin	No	NR-District	State/Local/ Contributing	Occupied	Common	Remote	Moderate	Poor
Building 352 - NCO Club	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Common	Accessible	Not	Fair
Building 404 - Gatehouse	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Not	Fair
Building 406 - Gatehouse	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Not	Poor
Experimental Battery	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Significant	Poor
Fort Tompkins	Preserve	Yes	NR-Individual Listing	National	Vacant - High Potential for Reuse	Uncommon	Prominent	Minimal	Fair
Glacis Gun Battery	Ruin	Yes	NR-District	National	Vacant - Low Potential for Reuse	Uncommon	Remote	Significant	Poor
Transformer Building	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Common	Accessible	Minimal	Good
Battery Weed Seawall	Preserve*	No	NR-District	National	Occupied	Uncommon	Prominent	Significant	Serious
Roadways	Stabilize	No	NR-District	State/Local/ Contributing	Occupied	Common	Accessible	Minimal	Fair
Miller Army Airfield Historic District									
Elm Tree Light	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - Low Potential for Reuse	Uncommon	Prominent	Minimal	Fair
Hangar 38	Stabilize	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Prominent	Significant	Poor
Hangar Apron	Preserve	No	NR-District	State/Local/ Contributing	Vacant - High Potential for Reuse	Uncommon	Accessible	Minimal	Good
Band * - Due to location and/or current use the band for this resource was changed from the calculated rating and band.									

Appendix C: Compliance Coordination

Section 7 of the Endangered Species Act

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice/

In Reply Refer To:
2014-I-0027

Suzanne McCarthy, Acting Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

NOV 0 1 2013

Dear Ms. McCarthy:

The U.S. Fish and Wildlife Service's (Service) New Jersey Field Office (NJFO) has reviewed the National Park Service's July 2013 (NPS) Draft General Management Plan/Environmental Impact Statement (DGMP/EIS, or Draft Plan) for the Gateway National Recreation Area (Gateway) in New York and New Jersey. This letter provides the NJFO's comments only on those portions of the Draft Plan dealing with the Sandy Hook Unit of Gateway, which is located in Monmouth County, New Jersey. Additional comments on the New York units of Gateway may be provided by the Service's New York or Long Island Field Offices.

AUTHORITY

These comments are provided pursuant to the National Environmental Policy Act of 1969 as amended (83 Stat. 852; 42 U.S.C. 4321 *et seq.*) (NEPA); Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA); the Migratory Bird Treaty Act of 1918 (40 Stat. 755; 16 U.S.C. 703-712), as amended; and Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. These comments do not preclude separate review and comments by the Service as afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), if Plan implementation requires any permits from the U.S. Army Corps of Engineers pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344 *et seq.*); and/or as afforded by the December 22, 1993 Memorandum of Agreement among the U.S. Environmental Protection Agency, New Jersey Department of Environmental Protection (NJDEP), and the Service, if Plan implementation requires any permits from the NJDEP pursuant to the New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B *et seq.*).

FEDERALLY LISTED SPECIES

Piping Plover

Sandy Hook support New Jersey's largest nesting population of the federally listed (threatened) piping plover (*Charadrius melodus*) (background information on this species is enclosed). In

2012,[1] 50 pairs of plovers nested in Sandy Hook, more than 40% of New Jersey's total of 121 pairs. Sandy Hook's breeding success (productivity) in 2012 was also considerably higher than the State-wide average, with Sandy Hook's rate at 1.02 chicks fledged per pair, versus 0.72 for New Jersey as a whole. The piping plover recovery plan[2] establishes a target of 575 nesting pairs within the New York-New Jersey Recovery Unit, and a 5-year average productivity of 1.5 chicks fledged per pair. New Jersey's plover population is characterized by fluctuations at low levels,[1] a hallmark of high demographic risk. This demographic vulnerability is compounded by a very high concentration of the State's population within Sandy Hook, where stochastic weather events or other factors could impact a very high proportion of total pairs.

Seabeach Amaranth

Sandy Hook also supports New Jersey's largest and most consistent population of the federally listed (threatened) plant seabeach amaranth (*Amaranthus pumilus*) (background information on this species is enclosed). In 2012, NPS staff counted 1,186 amaranth plants in Sandy Hook, out of the State-wide count of 1,239, or nearly 96% of New Jersey's total. Importantly, Sandy Hook's amaranth population has been far more stable than rest of the State, with robust populations even in years when other areas of New Jersey fell to very low plant counts. Since State-wide surveys began in 2001 through 2012, Sandy Hook has showed a stable to slightly increasing trend in plant counts, while the rest of the State showed much higher variability and an overall sharply downward trend. The seabeach amaranth recovery plan[3] establishes the following target: the species exists in at least six of the nine States within its historic range, and a minimum of 75 percent of the sites with suitable habitat within each State are occupied by amaranth populations for 10 consecutive years. Of the six sites in New Jersey that were consistently occupied by seabeach amaranth in each of the 10 years from 2003 to 2012, four (67%) are in Sandy Hook.

However, we understand from NPS staff that the 2013 counts were down sharply in Sandy Hook, to only 311 plants, due to habitat effects from Hurricane Sandy. As with plovers, the concentration of New Jersey's amaranth population in Sandy Hook leaves it vulnerable to stochastic events such as storms. Although Sandy Hook's 2013 amaranth count was down sharply, it's percent of the State-wide total continued to climb to 99%, with only 3 plants found elsewhere in New Jersey.

Northeastern Beach Tigerbeetle

In 1994, a population of the federally listed (threatened) northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) was re-established and the northern tip of Sandy Hook (background information on this species is enclosed). Recent surveys have not detected any beetles, and it is unclear if this population is still extant.

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[1] http://www.state.nj.us/dep/fgw/ensp/pdf/plover12.pdf
[2] http://ecos.fws.gov/docs/recovery_plan/960502.pdf
[3] http://ecos.fws.gov/docs/recovery_plan/961112b.pdf

Red Knot

The NJDEP Landscape Project maps depict habitat for the rufa red knot (*Calidris canutus rufa*) at the northern tip of Sandy Hook, and on the sand bars forming Spermacetti Cove. On September 30, 2013, the Service proposed to list the rufa red knot as a threatened species under the ESA.[4] Background information on this species is enclosed.

SERVICE COMMENTS

The DGMP/EIS presents three alternatives: Alternative A (No Action, continuation of current management practices and policies), Alternative B (Discovering Gateway, recreation emphasis), and Alternative C (Experiencing Preserved Places, preservation emphasis). The NPS has identified Alternative B as its preferred alternative, and Alternative C as the Environmentally Preferable Alternative under NEPA.

The Service supports the NPS in its effort to update the GMP in response to the many environmental and cultural changes since the current GMP was adopted in 1979, and in attempting to adapt to ongoing climate change including sea level rise.

Sensitive Resource Subzone

We note that neither Alternative B nor C designates any of Sandy Hook's habitat areas for federally listed threatened or endangered (TE) species as the most protected category of Sensitive Resource Subzone, except for the sand bars around Spermacetti Cove that are mapped by NJDEP red knot habitat and that occasionally support small numbers of breeding plovers. Adult plovers and fledged plover chicks may also use these sand bars for foraging, and we support the designation of these sand bars as Sensitive Resource Subzone. However, we recommend that the NPS consider designation of additional TE habitats as Sensitive Resource Subzone, such as the beaches at the northern tip of Sandy Hook. The northern beaches support a large proportion of Sandy Hook's plover nests (14 of 50 nests in 2012) and provide TE species with of one of New Jersey's very few unstablized, accreting beach habitats, which are vital the recovery of these species. Sandy Hook's northern beaches provide the only such habitat in Monmouth County, and warrant the highest levels of protection.

Shoreside Threatened and Endangered Species Management Plan

Page 212 of the DGMP/EIS summarizes the goals and provisions of Sandy Hook's 2007 Shoreside Threatened and Endangered Species Management Plan (Shoreside Plan). The Service recognizes the substantial benefits to TE species provided by the Shoreside Plan and by the NPS's ongoing monitoring, management, and protection of piping plovers, seabeach amaranth, northeastern beach tigerbeetles, and red knots, as well as their habitats. The Shoreside Plan as it has been implemented by the NPS is an important component of the NPS's fulfillment of its responsibilities under Section 7(a)(1) of the ESA, which directs Federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species . . . "

[4] http://www.regulations.gov/#!documentDetail;D=FWS-R5-ES-2013-0097-0001

At a meeting in May 2012, NPS and Service staff agreed to continue work on reformatting the Shoreside Plan as a stand-alone document, free of other TE management alternatives that were considered but rejected by NPS under NEPA. A stand-alone document will be easier to follow and update, and will facilitate species management on the ground. We look forward to continuation of our partnership with NPS to reformat the Shoreside Plan, and to advance the recovery of TE species that rely on Sandy Hook's unique coastal habitats.

Alternatives Analysis

The Service has serious concerns that the recreational and development elements included in Alternative B will have substantial long-term impacts on Federal trust wildlife resources such as TE species and migratory birds. These concerns are based on statements in the DGMP/EIS that show the sharp contrasts between Alternatives B and C (excerpts enclosed). These statements show clearly that Alternative C would have far less adverse impact on wildlife resources, and would include many more proactive elements to manage and protect these resources. Table 2-2 on page 61 states the following desired conditions (*i.e.*, goals) for Gateway: "Threatened and endangered species and habitats are protected to the greatest extent possible and other particularly sensitive species and biotic communities are closely monitored and protected. . . . Recreational uses are compatible with resource protection goals. Visitors to the marine zone avoid physical impacts and conserve the aesthetic and ecological values of shoreline areas and marine habitats." Based on the statements excerpted in the enclosure, Alternative C is more compatible with these goals than Alternative B.

ESA CONSULTATION

As you are aware, Section 7(a)(2) of the ESA requires Federal action agencies to consult with the Service on proposed activities that may affect federally listed species. The Service encourages the NPS to initiate consultation on the DGMP/EIS as soon as possible, and to complete consultation prior to issuance of the final GMP/EIS.

Under Section 7(c) of the ESA, the lead Federal agency for an action has the responsibility to prepare a BA if the proposed action is a major construction project that requires an EIS under NEPA, or if the proposed action may affect a federally listed species listed. The BA should contain information concerning listed or proposed species that may be present in the action area and an analysis of any potential effects of the proposed action on such species. The following may be considered for inclusion in a BA of the proposed action, although actual contents are at the discretion of the lead Federal agency:

- results of field surveys to determine if listed species are present or occur seasonally;
- views of recognized experts on the species;
- literature review;
- analysis of direct, indirect, and cumulative effects of the action on the species; and,
- analysis of alternative actions.

The BA may be consolidated with interagency cooperation procedures required by other statutes such as the Fish and Wildlife Coordination Act or NEPA, and the results of a BA may be

incorporated into an EIS. However, the satisfaction of the requirements of these other statutes does not in itself relieve a Federal agency of its obligation to comply with the BA procedures of the ESA. The results of the BA must be forwarded to this office to determine if further consultation is necessary to protect federally listed species.

Based on the level of likely impacts to federally listed species from the updating of the Gateway GMP, and the EIS-level analysis being conducted under NEPA, we recommend that the NPS prepare a BA. The Service is available to assist the NPS in determining the contents of the BA, as well as the appropriate level of analysis regarding impacts to listed species. The Service offers the following preliminary recommendations for information to include in the BA.

- The proportion of piping plover nests and seabeach amaranth plant locations over the past 10 years that would occur in Recreation versus Natural Zones under Alternatives B versus Alternative C.[5]

- More information on the types, locations, and magnitude of possible projects to "restore natural sand transport processes."

- The likely changes in number of beach visitors to piping plover nesting areas during the nesting season as a result of markedly increased transportation into Sandy Hook that would occur under both Alternatives B and C (*e.g.*, expanded ferry and shuttle services, increased bicycle access), and, based on past visitor use and enforcement data,[6] the likely increase in the number of unauthorized intrusions into fenced or closed piping plover habitats.

- Indication if the NPS will institute any caps on the total number of visitors into Sandy Hook during the piping plover nesting season. No such caps currently exist, but visitation is generally limited by the number of parking spaces and would be expected to increase markedly upon expansion of non-car-based transportation options to access the park.

- Specific information on the types, locations, durations, seasonal timing, and number of camping opportunities in or adjacent to piping plover nesting areas, or adjacent to trails (both authorized and unauthorized trails) that lead to nesting areas, as well as the likely increase in the number of unauthorized intrusions into fenced or closed piping plover habitats, based on past visitor use and enforcement data.

- Analysis of how the implementation of the Shoreside Plan will and will not change under Alternatives B and C relative to its implementation from 2007 to 2013.

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[5] A preliminary analysis by NJFO found that roughly 40% of the plover nests documented from 2003 to 2012 would be located in the Natural Zone under Alternative B, versus about 72% under Alternative C. These data require further analysis.

[6] DGMP/EIS page 212: "The park monitors some of the violations by recreationists who enter beaches where posted signs indicate the area is closed. In Breezy Point Tip, even occasional monitoring noted 115 visitors in the closed area, including with pets or motor vehicles."

CONCLUSION

The Service supports the NPS in its effort to update the Gateway GMP in response to the many environmental and cultural changes since 1979, and in attempting to adapt to ongoing climate change. We recommend that the NPS consider designation of Sandy Hook's northern beaches as a Sensitive Resource Subzone, and request that efforts continue to reformat the Shoreside Plan as a stand-alone document. The Service has serious concerns that the recreational and development elements included in Alternative B will have substantial, long-term impacts on federal trust wildlife resources such as TE species and migratory birds; we conclude that Alternative C is more compatible with protection of these resources and the NPS's stated goals.

Revision of the GMP may affect four federally listed threatened or proposed species. Therefore, further consultation with the Service is necessary pursuant to Section 7 of the ESA. Prelminary recommendations are provided above regarding information that will be necessary to initiate consultation. We encourage NPS to complete consultation prior to issuance of the final GMP/EIS.

Please contact Wendy Walsh at (609) 383-3938, extension 48, if you have any questions regarding the comments provided in this letter, or to discuss initiation of consultation.

Sincerely,

Eric Schrading
Field Supervisor

Statements Excerpted from the National Park Service's July 2013 (NPS) Draft General Management Plan/Environmental Impact Statement (DGMP/EIS, or Draft Plan) for the Gateway National Recreation Area (Gateway) in New York and New Jersey

Page xix: "Development of new facilities in several park sites could adversely affect vegetation, and in particular imperiled vegetation associations such as those at . . . the bay side of Sandy Hook in alternative B. These impacts would be minimized both by a lesser degree of development with fewer anticipated visitors and by the park's commitment to controlling erosion and additional efforts to restore beach, dune, and upland associations at several park sites in alternative C."

Page xx: "The development of facilities and amenities at Sandy Hook under alternative B could adversely affect wildlife by removing habitat and bringing additional visitors and human disturbance. This is true of planned changes on both the bay and ocean side; those on the ocean side could particularly affect feeding or nesting rare shorebirds. While alternative C also proposes development at park sites including . . . Sandy Hook, it is far less extensive and permanent than in alternative B and impacts on wildlife would be less severe."

Page xx: "Beneficial impacts to listed species or species of management concern from actions common to alternatives B and C would come from restoring natural sand transport processes, creating wetland or open water habitat . . . and continuing restrictions and protection of listed species through fencing, buffers, and closures. Restoring habitat and protecting listed species from disturbance or direct loss would have significant benefits. Continuing visitor use in any alternative could in some cases be preventing use of otherwise suitable habitat, and visitors not respecting closures could reduce nesting success, trample nesting sites or listed plants or otherwise cause substantial localized adverse impacts. Adding visitor amenities and programming would increase the potential for this kind of adverse impact in both action alternatives, although to a lesser extent in C than B."

Page 113: "Camping opportunities would be more widely distributed throughout the park than in alternative A, but less so than in alternative B. Sites would be concentrated in fewer locations than in alternative B in order to minimize impacts and would include designated backcountry / beach camping, walk-in tent, drive-in tent and RV."

Page 122, "Alternatives B and C both propose additional access and activities at many park sites, and this increase in use has the potential for damage to wildlife habitat—including that used by species of special concern—to vegetation, and to soils. However, each alternative also includes measures that would particularly enhance biological resources and that are absent from the no-action alternative. These measures include a commitment to using expanded partnerships with academics, agencies, private entities, and [non-governmental organizations] NGOs [on research], working with neighboring landowners to remove impediments to natural coastal sand transport processes; . . . and holistically planning and implementing freshwater wetland restoration at multiple locations. Alternative B has substantially greater development of some park sites than alternative C for camping, trails, and visitor recreational facilities and amenities. Particularly at Sandy Hook, . . . current unique or undisturbed areas used by imperiled vegetation associations

or plant or wildlife species of concern, or by many thousands of individual wildlife such as migrating birds, for example, could be affected by this development and by the presence of humans."

Table 2-12, page 138, Species of Special Concern –
Alternative B: "Adverse impacts increased from increased visitor use, with harassment and significant impacts possible Continued restrictions would provide potential significant benefits.
Alternative C: "Similar to B, although alternative C anticipates additional closures and fewer visitor amenities with fewer areas of disturbance . . . "

Pages 406-407, "Alternative B would include less Natural Zone, less Sensitive Resources Subzone, and more of the beach in the central and southern portion used as recreation areas than alternative C. New and expanded trails, boating launch sites, camping facilities, and interpretive programs would be created. Direct connections between Fort Hancock and North Beach [which supported 13 plover nests in 2012, and 79% of Sandy Hooks reduced post-Sandy amaranth population in 2013] would be created and buildings at Fort Hancock would be used for lodging, food, tours, and interpretive programming. A direct connection between Fort Hancock and North Beach would need to be sited carefully to avoid removal of important saltmarsh, shrub, and dune vegetation, but would nonetheless have adverse localized impacts on vegetation from both development of the trail and potential off-trail use and trampling. . . . Beach camping including the use of yurts or cabins would become available in the Recreation Zone. These sites would be located primarily in North Atlantic upper ocean beach habitat, which is home to listed and rare plant and animal species at the park. Very careful planning and the use of exclosures, buffers, and other measures to avoid impacts on these species would be required to avoid substantial impacts on rare vegetation associations or rare plants. Impacts on beach and dune vegetation would also increase from trampling and use, with localized adverse impacts."

Page 411: "Alternative C would include a larger area zoned as natural as well as additional Sensitive Resources Subzone overlays compared to alternative B. All of Spermaceti Cove would be zoned for the protection of sensitive resources, and much of the central/southern oceanfront [that collectively supported 16 plover nests in 2012] (except for beach areas B, C, and D . . .) would be zoned as natural. . . . Under alternative C, efforts to protect beach, dune, saltmarsh, and the holly forest would be increased, a potentially widespread (e.g., across the unit) and important benefit for these vegetative communities."

Page 422: "Development of facilities and amenities, including trails, boat launch sites, and camping, are proposed in alternative B. At the same time, access to sensitive or rare habitats, including some rare vegetation associations, would be controlled . . . On the ocean site, yurts or cabins adjacent to beaches where unique shorebirds nest could add to existing impacts from visitors. These species are known to be especially sensitive to humans . . . and impacts on these shorebirds could be especially adverse. Careful siting of campgrounds and trails could avoid more substantial impacts, but saltmarsh, shrub, dune, or maritime forest habitat could still be removed. In addition, an influx of visitors, including overnight visitors, would disturb wildlife and if sustained could displace them."

Page 425: "Alternative C would add a protective subzone for many of the areas in Sandy Hook, including Spermaceti Cove and much of the central/southern oceanfront. These and other important wildlife areas at Sandy Hook (including shorebird nesting locations in the north and along the central/southern coast, as well as saltmarsh and rare vegetative communities along Horseshoe Cove and Spermaceti Cove and American holly or other maritime forest associations) would be kept as natural areas and become the sites for targeted restoration efforts. Protection and restoration would be greater than is currently the case, with potential localized beneficial impacts on wildlife."

Pages 438-439 (Alternative B): "On the ocean side, the addition of yurts or cabins on or adjacent to beaches could affect shorebirds like the piping plover or least tern. Currently, protected areas at Sandy Hook alternate with open recreational public beaches, particularly in the southern half of the site. Although adding cabins or yurts to these recreational beaches would not necessarily directly impact listed species, the addition of overnight visitors who may walk the beach in the evening or early morning when visitation is currently very low could have adverse impacts on shorebirds. Piping plovers are highly sensitive to the presence of humans, and the park currently employs a variety of intensive management efforts to keep people and predators away from nesting birds. Even so, beachgoers, dogs, large moveable objects such as kites or sails, fireworks, or other human disturbances cause piping plovers to flush from their nests, increase alert behavior, decrease foraging, and even abandon otherwise suitable nesting sites (NPS 2004f). A 2004 biological assessment of impacts on piping plovers at Sandy Hook concluded that the presence of people at the beaches of Sandy Hook may be deterring piping plovers from using a larger percentage of the site. The addition of structures and overnight visitors would worsen impacts from visitor use by increasing disturbance and potentially causing birds to abandon an even larger portion of the beach. Additional adverse impacts on shorebird feeding would result from the development and use of boat launches, trails, and additional campsites on the bay side, because this is where adults often feed. Terrapins and horseshoe crabs could also experience adverse effects from this development and the additional visitors it would bring. Any impact on horseshoe crabs would also have an indirect impact on the state-listed red knot, because this species depends solely on the eggs of horseshoe crabs to sustain its long migration."

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federally Listed Species in New Jersey

Piping plover (*Charadrius melodus*)

Within its Atlantic Coast breeding range, the piping plover was federally listed as threatened in 1986.

The piping plover is a small shorebird approximately 7 inches long with a wingspan of about 15 inches. Piping plovers have white underparts with a light beige back and crown. Breeding adults have a single black breast band, which is often incomplete, and a black bar across the forehead. The legs and bill are orange in summer, with a black tip on the bill. In winter, the birds lose the breast bands, the legs fade from orange to pale yellow, and the bill becomes mostly black. Piping plover adults and chicks feed on marine macroinvertebrates such as worms, fly larvae, beetles, and crustaceans.

Piping plovers are present on the New Jersey shore during the breeding season, generally between March 15 and August 31. These territorial birds nest above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, the ends of sandspits, and deposits of suitable dredged or pumped sand. Piping plover nests consist of a shallow scrape in the sand, frequently lined with shell fragments and often located near small clumps of vegetation. Females lay four eggs that hatch in about 25 days, and surviving chicks learn to fly (fledge) after about 25 to 35 days. The flightless chicks follow their parents to feeding areas, which include the intertidal zone of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes.

Threats to the piping plover include habitat loss, human disturbance of nesting birds, predation, and oil spills and other contaminants. Habitat loss results from development, as well as from beach stabilization, beach nourishment, and other physical alterations to the beach ecosystem. Human disturbance of nesting birds includes foot traffic, sunbathing, use of kites/kiteboards/ kitebuggies, pets, fireworks, mechanical beach raking, construction, and vehicle use. These disturbances can result in crushing of eggs, failure of eggs to hatch, and death of chicks. Predation on piping plover chicks and eggs is intensified by development because predators such as foxes (*Vulpes vulpes*), rats (*Rattus norvegicus*), raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), crows (*Corvus* spp.), and gulls (*Larus* spp.) thrive in developed areas and are attracted to beaches by food scraps and trash. Unleashed and feral dogs (*Canis familiaris*) and cats (*Felis domesticus*) also disturb courtship and incubation and prey on chicks and adults.

January 2013

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federally Listed Species in New Jersey

Seabeach amaranth (*Amaranthus pumilus*)

Seabeach amaranth was federally listed as a threatened species in 1993.

An annual member of the amaranth family, seabeach amaranth has reddish stems and small, rounded, notched, spinach-green leaves. In New Jersey, these low-growing plants are typically about 4 inches across by late summer, but can occasionally reach 2 or 3 feet in diameter. The small white flowers and dark seeds are located in inconspicuous clusters along the stems. Germination begins in May and continues through the summer. Flowering begins as soon as plants reach sufficient size (June or July) and continues until the plants die between September and December.

Seabeach amaranth is native (endemic) to Atlantic Coast beaches and barrier islands. The primary habitat of seabeach amaranth consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of non-eroding beaches (landward of the wrackline), although the species occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, inter-dunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. Seabeach amaranth usually grows on a nearly pure sand substrate, occasionally with shell fragments mixed in.

Seabeach amaranth occupies elevations from 8 inches to 5 feet above mean high tide. The plant grows in the upper beach zone above the high tide line, and is intolerant of even occasional flooding during its growing season. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. Vegetative associates of seabeach amaranth include sea rocket (*Cakile edentula*), seabeach spurge (*Chamaesyce polygonifolia*), and other species that require open, sandy beach habitats. However, this species is intolerant of competition and does not occur on well-vegetated sites. Seabeach amaranth is often associated with beaches managed for the protection of beach nesting birds such as the piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*).

Threats to seabeach amaranth include beach stabilization (particularly the use of beach armoring, such as sea walls and riprap), intensive recreational use, mechanical beach raking, and herbivory by insects.

January 2013

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federally Listed Species in New Jersey

Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)

The northeastern beach tiger beetle was federally listed as threatened in 1990.

About 0.5 inch long, the northeastern beach tiger beetle has a bronze-green head and thorax, and white to light tan wing coverings (elytra) often with dark lines. Tiger beetles are often the dominant invertebrate predators in habitats where they occur. Adults use their long mandibles to capture small amphipods, flies, and other invertebrates along the water's edge. Adults have also been observed scavenging on dead amphipods, crabs, and fish. Larvae are "sit and wait" predators that feed mainly on amphipods.

In New Jersey, northeastern beach tiger beetles inhabit wide, sandy, ocean beaches from the intertidal zone to the upper beach. Eggs are deposited in the mid- to above-high tide drift zone. Larval beetles occur in a relatively narrow band of the upper intertidal to high drift zone, where they can be regularly inundated by high tides. Larvae dig vertical burrows in the sand and wait at the burrow mouth to capture passing prey. Northeastern beach tiger beetle larvae pass through three developmental stages (instars) over 2 years, over-wintering twice as larvae, pupating at the bottom of their burrows, and emerging as winged adults during their third summer.

The northeastern beach tiger beetle was found historically along New Jersey's undeveloped Atlantic coastal beaches from Sandy Hook to Holgate, but was eliminated (extirpated) from the State. In 1994, a population of the northeastern beach tiger beetle was re-established at the Gateway National Recreation Area, Sandy Hook Unit.

The primary threat to the northeastern beach tiger beetle is habitat disturbance and destruction from development, beach stabilization activities, and recreational beach uses including pedestrian and vehicle traffic, all of which affect the larvae. Other threats include spills of oil or other contaminants, pesticide use, natural or human-induced beach erosion, and natural factors such as predation and storms.

January 2013

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federal ~~Candidate~~ Proposed Species in New Jersey

Candidate species are species that the U.S. Fish and Wildlife Service (Service) has determined warrant listing under the Endangered Species Act and await formal listing. Although these species receive no substantive or procedural protection under the Endangered Species Act until formal listing, the Service encourages consideration of candidate species in project planning.

Red Knot (*Calidris canutus rufa*)

The red knot was added to the list of Federal candidate species in 2006. Red knots are federally protected under the Migratory Bird Treaty Act, and are State-listed as threatened.

At 9 to 10 inches long, the red knot is a large, bulky sandpiper with a short, straight, black bill. During the breeding season, the legs are dark brown to black, and the breast and belly are a characteristic russet color that ranges from salmon-red to brick-red. Males are generally brighter shades of red, with a more distinct line through the eye. When not breeding, both sexes look alike—plain gray above and dirty white below with faint, dark streaking. As with most shorebirds, the long-winged, strong-flying knots fly in groups, sometimes with other species. Red knots feed on invertebrates, especially bivalves, small snails, crustaceans, and, on breeding grounds, terrestrial invertebrates.

Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on Atlantic and Delaware Bay stopover habitats during the spring (mid-May through early June) and fall (late-July through October) migration periods. Red knots winter at the southern tip of South America and breed above the Arctic Circle. These small shorebirds fly more than 9,300 miles from south to north every spring and reverse the trip every autumn, making the red knot one of the longest-distance migrating animals. Migrating red knots break their spring migration into non-stop segments of 1,500 miles or more, converging on just a few critical stopover areas along the way. Large flocks of red knots arrive at stopover areas along the Delaware Bay and Atlantic coast each spring, with many of the birds having flown directly from northern Brazil. Red knots are faithful to these specific sites, stopping at the same locations year after year. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Mussel beds are also an important food source for migrating knots, particularly if insufficient horseshoe crab eggs are available. Birds arrive at stopover areas with depleted energy reserves and must quickly rebuild their body fat to complete their migration to Arctic breeding areas. During their brief 10 to 14-day stay in the mid-Atlantic, red knots typically double their body weight.

Threats to the red knot include disturbance, reduced food availability at stopover areas, and shoreline development.

January 2013

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

December 9, 2013

Jennifer T. Nersesian, Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, NY 10305

Dear Ms. Nersesian:

The U.S. Fish and Wildlife Service's (Service) Long Island Field Office (LIFO) has reviewed the National Park Service's (NPS) document entitled, "Draft General Management Plan/Environmental Impact Statement" (Draft GMP/EIS, or Draft Plan) dated July 2013 for the Gateway National Recreation Area (Gateway or GNRA) in New York and New Jersey. This letter provides the LIFO's comments only on those portions of the Draft Plan dealing with the New York Units. The comments below are similar in scope and context to that provided by the Service's New Jersey Field Office (NJFO) due to the similarity of listed species in New York and New Jersey.

AUTHORITY

These comments are provided pursuant to the National Environmental Policy Act (NEPA) of 1969 as amended (42 U.S.C. 4321 *et seq.*); Section7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*); the Migratory Bird Treaty Act of 1918 (40 Stat.755; 16 U.S.C.7 03-712), as amended; and Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. These comments do not preclude separate review and comments by the Service as afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), if implementation of the GMP requires any permits from the U.S. Army Corps of Engineers pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344 *et seq.*).

NPS PREFERRED ALTERNATIVE

The Draft GMP/EIS presents three alternatives: Alternative A (No Action, continuation of current management practices and policies), Alternative B (Discovering Gateway, recreation emphasis), and Alternative C (Experiencing Preserved Places, preservation emphasis). The NPS has identified Alternative B as its preferred alternative, and Alternative C as the Environmentally Preferable Alternative under NEPA.

Overall, Alternative B would create increased recreational and educational opportunities within the GNRA's New York Units, drawing people into the park to increase awareness and enjoyment of the GNRA natural environment.

FEDERALLY-LISTED SPECIES

The federally-listed piping plover (*Charadrius melodus*; threatened), roseate tern (*Sterna dougallii dougallii*; endangered), and seabeach amaranth (*Amaranthus pumilus*; threatened) are known to occur within the New York portion of the GNRA, primarily within the Jamaica Bay Unit. The Jamaica Bay Unit also provides habitat for red knot (*Calidris canutus rufa*). On September 30, 2013, the Service proposed to list the *rufa* red knot as a threatened species under the ESA. Background information on piping plover, seabeach amaranth, and red knot was provided to your office in separate correspondence dated November 1, 2013, by the Service's New Jersey Field Office (NJFO), and is incorporated by reference into this correspondence.

SERVICE COMMENTS

As noted by the Service's NJFO, we also support the NPS in its effort to update the GMP and in considering climate change, including sea level rise, into the planning process. We note that neither Alternative B nor C designates to the fullest extent the habitat areas for federally-listed threatened or endangered (TE) species as the most protected category, that is, the Sensitive Resource Subzone. For example we would recommend including all of the shoreline around Breezy Point, Fort Tilden, Jacob Riis Parks, and Jamaica Bay's West Pond as Sensitive Resource Subzones, as well as Crookes Point in Great Kills Park, as they provide important habitats for piping plover, seabeach amaranth, roseate tern, and red knot.

Preferred Alternative B includes increasing recreational activities either within or adjacent to piping plover breeding and seabeach amaranth growing areas. For example, the Draft GMP/EIS calls for the expansion of public use of the active beach zone in Breezy Point where plovers and seabeach amaranth are known to occur. Such an expansion could lead to an increase of human disturbance to incubating or brooding plovers or trampling of plants. Alternative B also calls for the introduction of camping in the Natural Zone at Fort Tilden, where plovers breed. Although the camping areas are proposed in inland areas, these areas would be adjacent to beaches that supported piping plovers most recently as 2013. Campers would be likely to traverse into these breeding areas and disturb incubating and brooding plovers. Significant increases in enforcement of pedestrian and vehicular restrictions will be an important factor in addressing this impact.

Alternative B also proposes that dunes in Fort Tilden that had been overwashed from Hurricane Sandy (a natural coastal process) would be "restored" and remain in, as described in the Draft GMP/EIS, relatively "natural condition subject to natural processes." The construction of artificial dunes in this area could result in indirect adverse effects to piping plovers and seabeach amaranth. Artificial dune and beach construction impede natural processes of shoreline movement (cross-island sediment transport by overwash), thereby slowing down or preventing the natural formation of highly suitable overwash-created habitats essential for the recovery of these species (Cohen *et al.* 2007; Elias *et al.* 2000). High quality habitats for piping plovers that

are created by overwash include sparsely vegetated upper beach foredune habitats, dune blowouts (breaks in the dunes, often formed during storms), over-wash fans (over-topping of dunes and landward transport of sand), and interdunal swales (Strauss 1990).

ENDANGERED SPECIES ACT CONSULTATION

As you are aware, section 7(a)(2) of the ESA requires federal action agencies to consult with the Service on proposed activities that may affect federally-listed species. The Service encourages the NPS to initiate consultation on the Draft GMP/EIS as soon as possible, and to complete consultation prior to issuance of the final GMP/EIS.

Under section 7(c) of the ESA, the lead Federal agency for an action has the responsibility to prepare a biological assessment (BA) if the proposed action is a major construction project that requires an EIS under NEPA, or if the proposed action may affect a federally-listed species listed. Based on the level of likely impacts to federally-listed species from the updating of the Gateway GMP and the EIS-level analysis being conducted under NEPA, we recommend that the NPS prepare a Biological Assessment (BA).

The BA should contain information concerning listed or proposed species that may be present in the action area and an analysis of any potential effects of the proposed action on such species.

The Service is available to assist the NPS in determining the contents of the BA, as well as the appropriate level of analysis regarding impacts to listed species. We recommend that the contents of the BA include, but not be limited to:

The likely changes in number of beach visitors to piping plover nesting areas during the nesting season as a result of markedly increased transportation into Breezy Point, Jacob Riis, and Fort Tilden that would occur under both Alternatives B and C;

The types, locations, and magnitude of possible projects to restore natural sand transport processes;

The likely changes in number of beach visitors to piping plover nesting areas during the nesting season as a result of markedly increased transportation to natural and sensitive resource zones that would occur under both Alternatives B and C, and, based on past visitor use and enforcement data, the likely increase in the number of unauthorized intrusions into fenced or closed piping plover habitats;

Indication if the NPS will institute any caps on the total number of visitors into units supporting listed species, such as piping plover, during the breeding and growing seasons. No such caps currently exist, but visitation is generally limited by the number of parking spaces and would be expected to increase markedly upon expansion of non-car-based transportation options to access the park;

Specific information on the types, locations, durations, seasonal timing, and number of camping opportunities in or adjacent to piping plover nesting areas, or adjacent to trails (both authorized

and unauthorized trails) that lead to nesting areas, as well as the likely increase in the number of unauthorized intrusions into fenced or closed piping plover habitats, based on past visitor use and enforcement data; and

Analysis of how the implementation of the threatened and endangered species management will or will not change under Alternatives B and C relative to current management practices within the park.

MIGRATORY BIRD TREATY ACT AND EXECUTIVE ORDER 13186

Due to the significance of the Jamaica Bay Unit to a migratory birds, the Service recommends that the NPS avoid an increase of active recreation and vehicular and boat access in areas that support sensitive grassland, marsh, shorebird, and waterfowl species.

Breezy Point is a concentration area for migratory shorebirds, raptors, waterfowl, and landbirds, especially during the summer and fall migrations. Raptor species observed in this area include American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus*), and merlin (*Falco columbarius*).

Grassland birds which may use Floyd Bennett Field as a breeding area include grasshopper sparrow (*Ammodramus savannarum*), horned lark (*Eremophila alpestris*), eastern meadowlark (*Sturnella magna*), upland sandpiper (*Bartramia longicauda*), savannah sparrow (*Passerculus sandwichensis*), northern harrier (*Circus cyaneus*), American kestrel, and common barn-owl (*Tyto alba*). Overwintering grassland birds at Floyd Bennett Field include northern harrier, rough-legged hawk (*Buteo lagopus*), American kestrel, common barn-owl, short-eared owl (*Asio flammeus*), horned lark, eastern meadowlark, and savannah sparrow. Bobolink (*Dolichonyx oryzivorus*) is a regular migrant visitor in the grasslands.

The saltmarsh, dredged material, and upland islands in the middle of Jamaica Bay are largely separated from disturbance and predation occurring on the surrounding mainland, and support large numbers of nesting waterbirds and diverse migratory birds throughout the year. A few islands in the bay support or have supported heronries, including a heronry located on Canarsie Pol that has supported a variety of nesting waders including glossy ibis (*Plegadis falcinellus*), great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), cattle egret (*Bubulcus ibis*), black-crowned night-heron (*Nycticorax nycticorax*), and tricolored heron (*Egretta tricolor*). Canarsie Pol also has nesting by the state-listed common tern (*Sterna hirundo;* threatened), as well as by great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), and American oystercatcher (*Haematopus palliatus*). Common terns occur on several other islands in the bay, including Jo Co Marsh and Silver Hole Marsh, as well as at Duck Creek Marsh, East High Meadow, Ruffle Bar, and Subway Island. Laughing gulls (*Larus atricilla*) re-colonized the bay in 1979 and now occur at three colonies in the bay at East High Meadow, Silver Hole Marsh, and Jo Co Marsh. Ospreys have also nested in the marshes in Jamaica Bay in recent years. Clapper rail (*Rallus longirostris*), common moorhen (*Gallinula chloropus*), seaside sparrow (*Ammodramus maritimus*) and saltmarsh sparrow (*Ammodramus caudacutus*) also nest in the saltmarshes in the bay.

Jamaica Bay is one of the most important migratory shorebird stopover sites in the New York Bight region, especially during fall migration (July to November). The shorebirds utilize much of the bay, but tend to focus on the intertidal areas during low tide and move to East and West Ponds on Ruler's Bar Hassock during higher tides. Black-bellied plover (*Pluvialis squatarola*), semipalmated plover (*Charadrius semipalmatus*), greater yellowlegs (*Tringa melanoleuca*), ruddy turnstone (*Arenaria interpres*), sanderling (*Calidris alba*), semipalmated sandpiper (*Calidris pusilla*), least sandpiper (*Calidris minutilla*), dunlin (*Calidris alpina*), and short-billed dowitcher (*Limnodromus griseus*) have all been observed here. Shorebirds known to breed in or around Jamaica Bay include killdeer (*Charadrius vociferus*), American oystercatcher, willet (*Catoptrophorus semipalmatus*), spotted sandpiper (*Actitus macularia*), upland sandpiper, and American woodcock (*Scolopax minor*).

Jamaica Bay also has significant wintering waterfowl concentrations of greater scaup (*Aythya marila*), American black duck (*Anas rubripes*), brant (*Branta bernicula*), Canada goose (*Branta canadensis*), bufflehead (*Bucephala albeola*), canvasback (*Aythya valisneria*), mallard (*Anas platyrhynchos*), ruddy duck (*Oxyura jamaicensis*), red-breasted merganser (*Mergus serrator*), snow goose (*Chen caerulescens*), and American wigeon (*Anas americana*). Jamaica Bay supports some of the largest wintering populations of greater scaup and American black duck in New York State. Regularly occurring waterfowl also include horned grebe (*Podiceps auritus*), green-winged teal (*Anas crecca*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), and common goldeneye (*Bucephala clangula*). Concentrations of waterfowl also occur in the bay during spring and fall migrations. Waterfowl confirmed breeding in the bay include Canada goose, American black duck, mallard, northern shoveler, gadwall, redhead (*Aythya americana* - introduced), and ruddy duck.

The shorelines of Raritan Bay, both the south shore in Monmouth County, New Jersey, and the shoreline of Staten Island, New York, concentrate migratory shorebirds and Neotropical migrant landbirds. Shorebird surveys done in the early 1980s have indicated the importance of the greater Raritan Bay for spring and fall shorebird migration with seasonal totals of over 20,000 birds based on weekly surveys; three species, sanderling, ruddy turnstone, and semipalmated sandpiper, make up about 85 percent of the total of migratory shorebirds using this area. Historically, the migratory and mid-winter concentrations of waterfowl in this complex are especially significant, with 20-year midwinter averages of over 60,000 birds based on assessments completed in the mid-1990s. The combination of geographic location and configuration coupled with productive bay wetlands, flats, and waters in Raritan Bay and its tributaries, beaches, and nearshore waters make it an important migratory staging area for many species of waterfowl on the Atlantic Flyway, with peak migration occurring in late October. The number of horned grebes as well as common and red-throated loons during migration is regionally significant. Especially notable are the overwintering scaup concentrations, American black duck, mallard, and brant (*Branta bernicla*), along with lesser numbers of bufflehead, long-tailed duck (*Clangula hyemalis*), mergansers, primarily red-breasted merganser, common goldeneye, and American wigeon. Birds identified in the New York State Breeding Bird Atlas include, but are not limited to, American black duck, mallard, clapper rail, king rail (*Rallus elegans*), green-backed heron (*Butorides striatus*), marsh wren (*Cistothorus palustris*), willet (*Catoptrophorus semipalmatus*), Canada goose, gadwall, green heron (*Butorides virescens*),

osprey, northern Harrier, Cooper's hawk, American kestrel, clapper rail, killdeer, American oystercatcher, spotted sandpiper (*Actitis macularius*), willet, American Woodcock, mourning dove (*Zenaida macroura*), black-billed cuckoo (*Coccyzus erythropthalmus*), barn owl, eastern screech-owl (*Megascops asio*), great horned owl (*Bubo virginianus*), whip-poor-will (*Caprimulgus vociferous*), belted kingfisher (*Megaceryle alcyon*), and red-bellied woodpecker (*Melanerpes carolinus*).

Increasing recreational activities in the sensitive habitats as envisioned in Alternative B may result in inadvertent disturbances to migrating, overwintering and breeding bird populations. The GMP should seek to minimize or eliminate entirely any disturbances to these federally-protected bird species. This is especially important in the case of colonial beach-nesting birds, grassland species, heron rookeries, wintering waterfowl, and marsh birds. At the ocean shores, human intrusions into beach nesting areas during the critical nesting season (April to August) should be prevented using a variety of methods, including protective fencing, posting, warden patrols, and public education. Public education and cooperative approaches with landowners are essential to successful protection of beach species in this area. When determined to be a problem, as it is at most mainland-connected nesting beaches, predator control and/or removal should be instituted. Those tasks and objectives of the piping plover recovery plan that are applicable to this area should be undertaken, including restoration or enhancement of degraded sites where appropriate. Additional development along the Rockaway barrier beach should be limited; existing erosion control policies and proposed erosion control projects need to be carefully planned and implemented in order to minimize impacts and existing and potential habitat for piping plover, and other beach strand species at Breezy Point.

Boat access to bay islands and saltmarshes should be avoided during critical marsh bird breeding periods. Overwintering waterfowl concentration areas should be avoided and sand bar habitats important to migrating shorebirds should be identified and managed to prevent boat landings during critical migration periods. Finally, large areas of Floyd Bennett Field should be maintained as grasslands and the grassland species they support protected by only considering compatible recreational activities in those areas.

CONCLUSION

It appears that Alternative B could have substantial, long-term impacts on federal trust wildlife resource such as threatened and endangered species and migratory birds. Of the alternatives analyzed in the GMP; Alternative C may be more compatible with protection of these resources.

The Draft GMP presents a preferred alternative that may affect federally-listed threatened or proposed species. Therefore, further consultation with the Service is necessary pursuant to section 7 of the ESA. Preliminary recommendations are provided above regarding information that will be necessary to initiate consultation. As recommended by the Service's NJFO, we encourage NPS to complete consultation prior to issuance of the final GMP/EIS.

We also note that for future reference, the Service will designate either the NJFO or the LIFO as lead office to serve as primary contact, and future correspondence will consist of combined comments from both offices. We will notify you upon that designation.

Thank you for the opportunity to provide comments on the Draft GMP. If you have any questions or require further assistance, please have your staff contact the Long Island Field Office at (631) 286-0485.

Sincerely,

David A. Stilwell
Field Supervisor

REFERENCES

Cohen, J.B., L.M. Houghton, and J.D. Fraser, 2007. Nesting Density and Reproductive Success of Piping Plovers in Response to Storm- and Human-Created Habitat Changes. *Wildlife Monographs* (173): 1–24.

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United States Department of the Interior

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In Reply Refer To:
2014-I-0027

MAR 10 2014

Jennifer Nersesian, Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

Dear Ms. Nersesian:

The U.S. Fish and Wildlife Service's (Service) New Jersey Field Office (NJFO) and New York Field Office (NYFO) have completed our review of the National Park Service's (NPS) proposed new General Management Plan (GMP) [draft issued July 2013 with a draft Environmental Impact Statement (EIS)] for Gateway National Recreation Area (Gateway) in New York and New Jersey. The NPS and the Service previously agreed that review of the GMP for effects to federally listed species would be conducted through informal consultation under Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA). However, upon completing our review of the GMP and the NPS's effects analysis, the Service has concluded that review under Section 7(a)(1) of the ESA is more appropriate.

Section 7(a)(2) of the ESA requires consultation on all Federal agency actions and programs that may affect listed species. However, Service policy states that, when there is insufficient project-specific information on an agency program or management plan to support a proper effects analysis, a 7(a)(1) programmatic review is appropriate (USFWS and NMFS 1998). Following our review of the GMP (as revised) and the effects analysis, the Service finds that the NPS's proposed adoption of the new GMP falls into this category (*i.e.*, of insufficient project-specific information) and therefore is more appropriately addressed by a Section 7(a)(1) programmatic review. This type of review outlines a "blueprint for conservation activities" during implementation of the GMP.

This letter concludes the Service's Section 7(a)(1) review of the new GMP, and provides the conservation framework for subsequent, project-specific 7(a)(2) consultations that will be conducted on all activities proposed at Gateway over the next 20 years under the new GMP.

GMP REVIEW HISTORY

November 1, 2013	The NJFO provided a letter with preliminary comments on the Draft GMP/EIS.

November 12, 2013	A conference call was held between NPS and Service management and staff to discuss the NJFO comment letter.
November 13, 2013	Service staff made a site visit to the Sandy Hook Unit of Gateway.
November 26, 2013	The NJFO received an NPS letter responding to our November 1, 2013 comments and providing a list of revisions to the GMP.
December 9, 2013	The NYFO provided a letter with preliminary comments on the Draft GMP/EIS.
December 11, 2013	The NJFO provided a letter with updated comments.
January 16, 2014	Service and NPS management met to discuss Service comments on the Draft GMP/EIS, and determined that formal consultation would not be necessary. Via e-mail, the NPS provided a list of revisions to the GMP.
January 23, 2014	A conference call was held between NPS and Service staff to discuss Service concerns.
January 23, 2014 – February 18, 2014	The Service provided technical assistance in the preparation of the NPS's effects analysis.
January 30, 2014	A conference call was held between NPS and Service staff to discuss Service concerns.
February 24, 2014	Via e-mail, NPS responded to several outstanding Service concerns and provided a list of revisions to the GMP.
March 4, 2014	The NPS provided its effects analysis pursuant to Section 7 of the ESA.

FEDERALLY LISTED SPECIES WITHIN GATEWAY

The Sandy Hook and Jamaica Bay Units of Gateway support important populations of the federally listed piping plover (*Charadrius melodus*) (threatened) and seabeach amaranth (*Amaranthus pumilus*) (threatened), and Gateway provides migratory stopover habitat for the rufa red knot (*Calidris canutus rufa*) that is currently proposed for listing as threatened. In addition, a population of the federally listed (threatened) northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) was re-established at the northern tip of Sandy Hook in 1994, but recent surveys have not detected any beetles and it is unclear if this population is still extant. Information regarding the status of these species within Gateway was provided in our November 1, 2013 and December 9, 2013 letters.

PROPOSED FEDERAL ACTION

The proposed action involves the adoption by NPS of a new GMP with a new vision for the management of Gateway. The new GMP is intended to "help park managers focus on what is most important in carrying out a new 20-year vision for Gateway and the mission of the NPS."

According to the effects analysis, the existing General Management Plan for Gateway was completed in 1979 (1979 GMP) and generally focused on providing recreational opportunities to the New York metropolitan area. Although the 1979 GMP recognized the degraded conditions of park resources and referenced the park's enabling legislation, the protection of federally listed threatened and endangered species was discussed in terms of "…identification and protection through appropriate vegetation and wildlife management programs." Tern-nesting sites were addressed as being "…protected from random access by installing signs and/or snow fences or by other management techniques." All beach strand (shorebird nesting) habitat was designated as "beach zone." Beach zone designation provided for a variety of recreational uses, with "…natural shoreline dynamics interrupted only as necessary to reduce erosion and maintain beach use in major public use areas." Following the Federal listing of the piping plover in 1986 and seabeach amaranth in 1993, park natural resource management evolved as a result of both formal and informal consultation with the Service, in an effort to achieve the goals of the regional plans for these species.

The NPS now proposes to adopt a new GMP and to select for its new management vision "Alternative B: Discovering Gateway—NPS Preferred Alternative." The summary vision of Alternative B is presented on pages 38 and 77 of the Draft GMP/EIS as follows: "This alternative provides the widest range of activities and most recreation opportunities in dispersed locations throughout the park. New connections would be forged with park lands and communities adjacent and nearby Gateway. This alternative offers the most instructional programming and skills development and draws people into the park to increase awareness and enjoyment of Gateway's historic resources and the natural environment. More convenient and affordable park access is developed through trail connections, bicycle infrastructure, public transit, and waterborne transportation. This alternative prioritizes joint management and operations for visitor services, orientation, programs, and facilities with New York City and other partners." In adopting Alternative B, the NPS is rejecting both the No Action alternative that would have continued the adaptive implementation of the 1979 GMP, and Alternative C: Experiencing Preserved Places—Environmentally Preferable Alternative that would have "increase[d] the visibility, enjoyment, and protection of coastal resources and focuse[d] resource management on beach and dune ecosystems and coastal defense landscapes."

The Draft GMP/EIS provides examples of the types of projects and management changes that may occur under Alternative B at the various park units (*e.g.*, new or expanded camping; new or expanded transportation options; increased recreational and educational activities; constructing dunes). However, no specific projects or management changes are proposed at this time. The NPS will initiate consultation with the Service prior to any proposed on-the-ground projects or management changes that may affect federally listed species, in accordance with Section 7(a)(2) of the ESA.

The Draft GMP/EIS also lays out a new set of management zones, which are "descriptions of desired conditions for park resources and visitor experience in different areas of the park." The management zones that will be designated under the new GMP include Marine, Recreation (including Community Activity and Active Beach Subzones), Natural (including Sensitive Resource Subzone), Historic, and Developed.

Revisions Since the Draft GMP/EIS

The NPS has provided several revisions to the text of the July 2013 Draft GMP/EIS in order to address Service concerns for listed species. The NPS has not provided a revised version of the GMP, but did provide written lists of text revisions via correspondence received on November 26, 2013, January 16, 2014, and February 24, 2014. The NPS's effects analysis, and the Service's review of the proposed action, both reflect the GMP with these revisions. A list of revisions provided by NPS is enclosed with this letter.

Conservation Measures

According to the Service's Consultation Handbook, conservation measures are actions to benefit or promote the recovery of listed species that are included by a Federal agency as an integral part of the proposed action; these actions will be taken by the Federal agency, and serve to minimize or compensate for project effects on the species under review (USFWS and NMFS 1998). Your February 24, 2014 e-mail lists the following conservation measures that will be added to the GMP.

- Continue to collect baseline data regarding disturbance to threatened and endangered species, such as data on disturbance levels from authorized activities, unauthorized intrusions, visitation levels, staffing levels.

- Continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change.

- Continue to consult with the Service on conservation measures for threatened and endangered species for site-specific planning efforts and natural resource management plans.

- Continue to work with the Service to update resource management plans for threatened and endangered species (such as the Shoreside Plan [*i.e.*, the 2007 Shoreside Threatened and Endangered Species Management Plan]) as needed to reflect changing conditions.

In addition, the effects analysis includes numerous conservation measures (enclosed) that the NPS has agreed to implement concurrent with implementation of the new GMP.

SERVICE COMMENTS

The NPS has a long history of proactively managing listed species at Gateway under Section 7(a)(1) of the ESA, and of consulting with the Service under Section 7(a)(2). At Jamaica Bay, piping plover management at the Breezy Point Tip and at West Beach is guided by the 1989 Management Plan for the Threatened Piping Plover (*Charadrius melodus*), Breezy Point District,

while protections at Fort Tilden and Jacob Riis Park are at least as protective as Service guidelines for recreational activities (USFWS 1994). At Sandy Hook, management of listed species is guided by the 2007 Shoreside Plan. The Service recognizes the substantial benefits to listed species provided by the NPS's ongoing monitoring, management, and protection of listed species and their habitats at Gateway.

The Service also appreciates the cooperation of NPS in addressing our concerns with the July 2013 Draft GMP/EIS. The adopted GMP text changes (enclosed) substantially improve the document's clarity of message regarding the NPS's intent to balance expanded recreation at Gateway with the continuation of high levels of protections for listed species. The adopted conservation measures (enclosed) include important sidebars and consultation triggers that will guide future projects and management changes under the new GMP. The Service anticipates that the designation of Natural Zones and Sensitive Resource Subzones will benefit listed species in many portions of the park. Listed species will also benefit from the above-mentioned conservation measures, which will continue NPS's adaptive implementation of ongoing management practices aimed at protecting these species. In addition, listed species will benefit from provisions in the new GMP for a proactive approach to mitigate and adapt to the effects of climate change over the next 20 years.

However, the Service has a few outstanding concerns.

1. The Service remains concerned that the selected vision statement (from Alternative B, quoted above) has not been revised to include any mention of conserving listed species or other natural resources. However, we concur that the text changes made throughout the GMP (enclosed) do provide adequate context for Alternative B to ensure that park managers will continue to balance expanded recreation with natural resource protections over the next 20 years.

2. We remain concerned that, based on GPS data from the past 10 years, more than 40 percent of recent piping plover nests in Sandy Hook were located in areas that will be designated Recreation Zone or Active Beach Subzone. We also remain concerned that the NPS has declined to adopt any conservation measures to expressly address the likelihood that increasing human use of the park (including, but not limited to, establishment of new Recreation Zones; the expansion of transportation options; the expansion and/or introduction of camping; and anticipated increases in overall visitor ship) will reduce the effectiveness of existing NPS policies, practices, and enforcement efforts aimed at protecting listed species. However, the effects analysis states, "It is anticipated that additional conservation measures will be needed to offset expected increases in visitor ship. Knowing the challenges associated with current intensity of use, it is likely that adverse effects would increase to levels where additional conservation measures would be required in the nesting areas adjacent to recreational beaches [at Sandy Hook and Jamaica Bay-Fort Tilden], as well as at the northern tip of Sandy Hook." Thus, the Service anticipates that, through future consultations, NPS will adopt adequate conservation measures to address these likely adverse effects from any proposed actions that would expand park uses or increase visitor ship.

3. We remain concerned that the following statement on page 338 of the Draft GMP/EIS has not been revised, "The dunes at Fort Tilden (which have been overwashed and eroded by Hurricane Sandy) would be restored and remain in relatively natural condition subject to natural coastal processes . . ." The Service disagrees that anthropogenic dune building is consistent with natural coastal processes. In fact, artificial dune and beach construction impede natural processes of shoreline movement (cross-island sediment transport by overwash), thereby slowing or preventing the natural formation of highly suitable overwash-created habitats essential for the recovery of piping plovers (Cohen *et al.* 2007; Elias *et al.* 2000) and other beach-dependent species. High-quality habitats for piping plovers that are created by overwash include sparsely vegetated upper beach foredune habitats, dune blowouts (breaks in the dunes, often formed during storms), over-wash fans (over-topping of dunes and landward transport of sand), and interdunal swales (Strauss 1990). However, the effects analysis includes a conservation measure for Sandy Hook and Jamaica Bay-Fort Tilden to, "Initiate early Section 7 (ESA) consultation for proposed projects that involve beach / dune manipulation, mechanized sand movement (redistribution), installation of sand fencing, and work that would affect native vegetation." Thus, the Service anticipates that, through future consultations, NPS will fully evaluate adverse effects to listed species from any proposed dune building; we anticipate formal consultation would be necessary since the central purpose of a constructed dune (impeding overwash) is itself a significant adverse effect to listed species.

4. We are concerned with the wording of the following conservation measure, from the effects analysis, for Sandy Hook and Jamaica Bay-Fort Tilden, "In beach strand areas where threatened and endangered species are known to occur, beach camping will not be permitted during the [piping plover] breeding season (March 15 through September 1)." We commend NPS for adopting this and other measures that are likely to prevent the most severe adverse effects to listed species from any new or expanded camping at Gateway. However, in park units that support listed species, beach camping anywhere during the breeding season could preclude these species from colonizing new areas, and could make enforcement (*e.g.*, of buffers around occupied habitats) more difficult. We understand NPS's intent is to prohibit beach camping during the breeding season throughout those units that support listed species, but this conservation measure has not been revised accordingly. Also, the conservation measures do not specify the buffer distances that will be implemented around listed species' habitats for inland (non-beach) camping, and do not specify how access to species' habitats from camp sites will be controlled or enforced. However, the effects analysis also includes a conservation measure that, "Camp sites will be appropriately sited to avoid impacts to threatened and endangered species and will be determined through future consultation." Thus, the Service anticipates that our remaining concerns will be addressed through future consultations should any new or expanded camping be proposed anywhere in Gateway.

5. We wish to clarify some statements in the effects analysis that seem to confuse the avoidance or minimization of adverse effects (*e.g.*, from proposed actions) with beneficial effects. For example, the effects analysis states that NPS anticipates beneficial effects at Sandy Hook and Jamaica Bay-Fort Tilden from "the careful and appropriate siting of recreational activities and trails." While we concur that careful siting is important to minimize adverse effects, such a conservation measure would not – of itself – provide a beneficial effect. According to the Consultation Handbook, beneficial effects are "contemporaneous positive effects without any adverse effects to the species" (USFWS and NMFS 1998). We do recognize a key beneficial

effect of the new GMP; namely, the NPS commitment to continue adaptive implementation of existing policies, practices, and enforcement efforts aimed at protecting listed species.

Despite the outstanding concerns listed above, the Service concurs that the NPS's new GMP, as revised, together with the enclosed conservation measures, constitute an adequate conservation and consultation framework for federally listed species under Service jurisdiction. This concurrence is based largely on the GMP revisions and conservation measures (both enclosed) adopted by the NPS. If additional information on federally listed species becomes available, or if the conservation measures or revised language of the GMP (enclosed) should change, this concurrence may be reconsidered.

This letter concludes the Service's Section 7(a)(1) programmatic review of the new GMP. This letter does NOT constitute programmatic Section 7(a)(2) consultation, make any 7(a)(2) effects determinations, or cover any specific project or management change. Your February 24, 2014 e-mail states, "In order for the GMP to be adaptive to changing conditions, the NPS would regularly review the status of threatened and endangered species and revise conservation measures as needed. Any plans or actions that include changes to the types, levels or locations of visitor use that may cause (or contribute to cumulative) impacts to [t]hreatened and [e]ndangered [s]pecies would be subject to [Section 7(a)(2)] consultation with U.S. Fish and Wildlife Service. Future [GMP] implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, will include conservation measures for threatened and endangered species, following appropriate review and consultation with U.S. Fish and Wildlife Service. Conservation measures will include, but not be limited to, those identified in this plan (*e.g.*, see Common to All, page 62, camping, page 70 and references to Shoreside Plan throughout). Future implementation of the GMP involving change in management practices or policies will also undergo review and consultation to avoid and minimize adverse effects to threatened and endangered species."

We appreciate the cooperation of NPS engaging in this 7(a)(1) programmatic review to address our concerns for the new GMP for Gateway, and look forward to continuing our cooperative relationship to manage and protect federally listed species at this park. Please contact Wendy Walsh at (609) 383-3938, extension 48, if you have any questions regarding threatened or endangered species.

Sincerely,

Eric Schrading
Field Supervisor

Enclosures
NPS revisions to the July 2013 Draft GMP/EIS
Conservation measures included in the NPS Effects Analysis

References Cited:

Cohen, J.B., L.M. Houghton, and J.D. Fraser, 2007. Nesting Density and Reproductive Success of Piping Plovers in Response to Storm- and Human-Created Habitat Changes. *Wildlife Monographs* (173): 1–24.

Elias, S.P., Fraser, J.D., and P.A. Buckley. 2000. Piping Plover Brood Foraging Ecology on New York Barrier Islands. *Journal Wildlife Management*. 64(2): 346-354.

Strauss, E. 1990. Reproductive Success, Life History Patterns, and Behavioral Variation in Populations of Piping Plovers Subjected to Human Disturbance (1982-1989). Ph.D. Dissertation. Tufts University, Medford, MA. 143 pp.

U.S. Fish and Wildlife Service. 1994. Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Altantic Coast to avoid Take under Section 9 of the Endangered Species Act. Northeast Region, Hadley, Massachusetts. 19 pp. + Tables. http://www.fws.gov/northeast/pipingplover/pdf/recguide.pdf [Accessed March 7, 2014]

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf [Accessed March 7, 2014].

cc via email:
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NJFO:ES:WWalsh:wlw:3/10/2014
P:\Shared Staff Docs\Wendy\2014-I-0027_20140310.wlw.doc

Enclosure: Revisions to the July 2013 Gateway National Recreation Area Draft General Management Plan/Environmental Impact Statement Provided by the National Park Service in Correspondence Received November 26, 2013, January 16, 2014, and February 24, 2014

*Indicates an earlier revision was superseded by the version received on February 24, 2014.
**Omitted from the February 24, 2014 list, but NPS has not indicated a withdrawal of these changes.

**Pg 23, Servicewide Laws and Policies section
Endangered Species Act is listed, no additional text recommended

Pg 29-30, Related Plans, National Park Service Plans
Add the Shores ide Plan (2007) to list of plans under Related Plans section.
'The Shoreside Species of Concern Conservation Plan (2007), Sandy Hook provides specific management goals and performance indicators for each of the Special Status Species, activities to reduce impacts to natural resources from human disturbance (such as symbolic rope fencing with posts and signs around bird nesting areas), prohibition of certain recreation activities during nesting season (kite flying, kite surfing, fireworks), an updated Integrated Predation Management Program, habitat enhancement opportunities, and an updated biological monitoring program.'

Pg 46, Management Zones-
Clarify that existing laws would continue regardless of zoning.
'Management zoning does not preclude NPS law and policy.'

Pg 48, Recreation Zone, Recreation and Visitor Experience -Add-
'Visitor access and recreational use would be compatible with existing plans for managing Threatened and Endangered Species.'

Pg 48, Marine Zone, Recreation and Visitor Experience- Add-
'Access and recreational use would be limited or restricted within certain sensitive marine areas, such as Spermaceti Cove.'

**Pg 49, Natural Zone, Recreation and Visitor Experience- Add-
'Visitor access and use would be in accordance with existing plans for managing Threatened and Endangered Species. Park managers will continue established measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closure (to dogs for example), buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education.'

*Pg 52, Recreation Zone, Natural Resources
After last line in 2nd paragraph 'Species of special concern and their habitats would be managed to support species requirements'
Add-

'Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education.'

*Pg 53, Natural Zone, Natural Resources
Add- 'Park managers will continue with established measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closure (to dogs for example), buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education.'

Pg 59
Section will include list of conservation measures. Text will be forthcoming.

*Pg 62 [February 24, 2014 e-mail from Superintendent Nersesian]
FWS requested a summary of conservation measures, potentially within the Common to All Section. NPS believes the requested information can be added to the existing Chapter 2: Management Alternatives, Common to All Section, Table 2-2, Summary of Natural Resource Conditions, page 62. The following text will be included:
'Examples of Future Actions-

- Continue to collect baseline data regarding disturbance to threatened and endangered species, such as data on disturbance levels from authorized activities, unauthorized intrusions, visitation levels, staffing levels
- Continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change
- Continue to consult with USFWS on conservation measures for threatened and endangered species for site specific planning efforts and natural resource management plans
- Continue to work with USFWS to update resource management plans for threatened and endangered species (such as the Shoreside Plan) as needed to reflect changing conditions.'

*Pg 69
Multiple Day Experience Section, Camping –
Add as separate paragraph:
'The initial camping recommendations within the GMP/EIS would require further analysis, site planning, consultation and compliance. Camp sites would be appropriately sited to avoid impacts to threatened and endangered species and will be determined through future consultation. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to Threatened and Endangered Species and other resources. Educational materials concerning Threatened and Endangered Species will be provided at camp site areas. In areas of the Park, that have Threatened and Endangered Species, beach camping will not be permitted during breeding season (March 15-September 1). The Park will provide conservation measures for Threatened and Endangered Species, such as providing symbolic fencing with posts

and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season.'

*Pg 81, Jamaica Bay Unit, Resource Management
2nd paragraph, after 4th line,
Add-
'Conservation measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season will continue across all management zones, as needed.'

Pg 87, Jamaica Bay Wildlife Refuge
Add-
'Monitoring and protection measures for migrating birds would continue to be a priority.'

Pg 91, Breezy Point Tip
Add-
'Monitoring and protection measures for threatened and endangered species would continue to be a priority. Protection measures for threatened and endangered species, such as providing symbolic fencing with posts and signs around nesting birds, establishing buffer zones, and prohibiting certain recreational activities during breeding season will continue.

Pg 91, Sandy Hook Unit, Overview
Add as separate paragraph-
'Preservation and protection of threatened and endangered species would continue through monitoring and enforcement and would be balanced with additional recreational opportunities. The existing monitoring and protection measures for threatened and endangered species would continue to be a priority and could occur throughout all management zones'

Pg 92, Sandy Hook, Marine Zone
Add-
'Within certain Marine Zone areas, access may be restricted, such as Spermaceti Cove waters'.

Sandy Hook Zoning Map changes [between Pg 91 and 92]:

North Tip-
Sensitive Resource subzone will be significantly increased to include the vast majority of the north tip. A natural zone will be mapped over the existing fishing access trail (this was approved in 2007 Shoreside EA) and along the shoreline. The Natural Zone will allow for access for appropriate recreational uses, such as nature study, walking, fishing, outside of breeding season. It should be clarified, that the monitoring and enforcement measures outlined in the Shoreside Plan (2007) would continue not only in the Sensitive Resource Snbzone, but thronghont all management zones, regardless.

Spermaceti Cove-

Sensitive Resource subzone will be mapped over Spermaceti Cove and the adjaccnt lands, in keeping with Shoreside Plan

South Beach Areas-
Natural zone will be mapped and Recreation zone removed, south of Beach Area B. The Recreation Zone, as currently mapped, between Band D is to provide maximum flexibility for park management to adjust to changing shoreline conditions.

North Beach to Gunnison Beach-
Active Beach Subzone, will be removed between North Beach and Gunnison and replaced with
Recreation Zone. North Beach and Gunnison Beach will remain Active Beach Subzone.

*Pg 130
Add-
'Future implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, will adhere to conservation measures for Threatened and Endangered Species. Camp sites will be appropriately sited to avoid impacts to Threatened and Endangered Species and will be determined through future consultation. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to Threatened and Endangered Species and other resources.'

*Pg 132
Add-
'Transportation infrastructure projects will be sited in areas, to the greatest extent possible, that were previously disturbed, to minimize impacts to resources. Trails and access will be defined, controlled, and appropriately signed to lead people away from Threatened and Endangered Species locations. The initial proposed infrastructure options (ferry, shuttle, multi-use pathways), will require further analysis, site planning, consultation and compliance.'

*Pg. 563 [February 24, 2014 e-mail from Superintendent Nersesian]
In order to clarify that future actions will require consultation, the following has been added to the existing text under Chapter 5: Consultation and Coordination, Environmental Quality Review and Consultations, Section 7 Consultation, page 563:
'In order for the GMP to be adaptive to changing conditions, the NPS would regularly review the status of threatened and endangered species and revise conservation measures as needed. Any plans or actions that include changes to the types, levels or locations of visitor use that may cause (or contribute to cumulative) impacts to Threatened and Endangered Species would be subject to consultation with U.S. Fish and Wildlife Service. Future implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, will include conservation measures for threatened and endangered species, following appropriate review and consultation with U.S. Fish and Wildlife Service. Conservation measures will include, but not be limited to, those identified in this plan (e.g., see Common to All, page 62, camping, page 70 and references to Shoreside Plan throughout). Future implementation of the GMP involving change in management practices or policies will also undergo review and consultation to avoid and minimize adverse effects to threatened and endangered species.'

Enclosure: Conservation Measures Included in the National Park Service Effects Analysis for the New (2014) General Management Plan for Gateway National Recreation Area

SANDY HOOK UNIT

Disturbance

1. Camp sites would be appropriately sited to avoid impacts to threatened and endangered species and will be determined through future consultation. (GMP/EIS, pg 132)

2. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to threatened and endangered species and other resources. (GMP/EIS, pg 132)

3. Educational materials concerning threatened and endangered species will be provided at camp site areas. (GMP/EIS, pg 132)

4. In beach strand areas where threatened and endangered species are known to occur, beach camping will not be permitted during the breeding season (March 15 through September 1). GMP/EIS, pg 69).

5. Transportation infrastructure projects will be sited in areas, to the greatest extent possible, that were previously disturbed, to minimize impacts to resources. Trails and access will be defined, controlled, and appropriately signed to lead people away from threatened and endangered species locations. The initial proposed infrastructure options (ferry, shuttle, multi-use pathways), will require further analysis, site planning, consultation and compliance. (GMP/EIS pg 132)

6. Future implementation projects resulting in site specific plans, such as expanded camping and transportation infrastructure, will adhere to conservation measures for threatened and endangered species. Camp sites will be appropriately sited to avoid impacts to threatened and endangered species and will be determined through future consultation. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to threatened and endangered Species and other resources. (GMP/EIS, pg. 130).

7. Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education.(Final GMP/EIS multiple locations throughout document).

8. Park managers will continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change. (GMP/EIS, pg 62)

9. Park managers will continue to consult with USFWS on conservation measures for threatened and endangered species for site specific planning efforts and natural resource management plans. (GMP/EIS, pg 62

10. Park managers will continue to work with USFWS to update resource management plans for threatened and endangered species (such as the Shoreside Plan) as needed to reflect changing conditions. (Final GMP/EIS, pg 62)

11. Park managers will continue to collect baseline data regarding disturbance to threatened and endangered species, such as data on disturbance levels from authorized activities, unauthorized intrusions, visitation levels, staffing levels. (Final GMP/EIS pg 62)

12. Preservation and protection of threatened and endangered species would continue through monitoring and enforcement and would be balanced with additional recreational opportunities. The existing monitoring and conservation measures for threatened and endangered species would continue to be a priority and could occur throughout all management zones.

13. Beach access points will be monitored for possible disturbances to piping plover and other shorebird nesting locations. Conservation signage at and near access locations will be maintained and/or expanded as needed. Proximity to threatened and endangered species beach nesting areas will be a primary consideration when planning future campground expansions and/or new campsite locations. New or expanded camping areas will be carefully sited relative to shorebird nesting habitat.

Habitat

1. In the Natural Zone and Sensitive Resource Subzone, current resource management practices would be maintained, and protection, research, and monitoring of sensitive habitat like the beach habitat complex on the northern tip and Spermaceti Cove would be increased (Final GMP/EIS, p. 92).

2. Invasive exotic vegetation removal will be priority of natural resource management within the Natural Zone and Sensitive Resource Subzone, thereby providing additional piping plover breeding habitat and allowing for seabeach amaranth germination.

3. Beach grooming is limited (raking and mechanized trash removal) to Active Beach Sunzones.

4. Initiate early Section 7 (ESA) consultation for proposed projects that involve beach / dune manipulation, mechanized sand movement (redistribution), installation of sand fencing, and work that would affect native vegetation.

5. In Natural Zones and Sensitive Resource Subzones that support threatened and endangered species, natural resource management will be focused on providing breeding habitat for piping plover and other beach nesting shorebirds. The sSensitive Resource Subzone in the northern tip of Sandy Hook was expanded to include all natural features that will encourage piping plover nesting and foraging with minimal human disturbance.

6. Threatened and endangered species and habitat are protected to the greatest extent possible and other particularly sensitive species and biotic communities are closely monitored and protected (GMP/EIS, pg 62).

Predation

1. The park will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as continuing with predation management program as indicated in the Shoreside Plan.

2. The park will continue to review the effectiveness of monitoring and removing feral cats, and revise as conditions change. "Smart" fox removal will continue on an as-needed basis, as a management tool to protect shorebird nests from predation. The park will review data and observations to explore the efficacy of removing other predators, such as crows, gulls, and ghost crabs.

JAMAICA BAY UNIT – FORT TILDEN

Disturbance

1. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to threatened and endangered species and other resources. (GMP/EIS, pg 132)

2. Educational materials concerning threatened and endangered species will be provided at camp site areas. (GMP/EIS, pg 132)

3. In beach strand areas where threatened and endangered species are known to occur, beach camping will not be permitted during the breeding season (March 15 through September 1). GMP/EIS, pg 69).

4. Future implementation projects resulting in site specific plans, such as expanded camping, will adhere to conservation measures for threatened and endangered species. Camp sites will be appropriately sited to avoid impacts to threatened and endangered species and will be determined through future consultation. Access and trails to/from camp site areas will be defined, controlled, and signed, to limit disturbance to threatened and endangered species and other resources. (GMP/EIS, pg. 130).

5. Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education.(Final GMP/EIS multiple locations throughout document).

6. Park managers will continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change. (GMP/EIS, pg 62)

7. Park managers will continue to consult with USFWS on conservation measures for threatened and endangered species for site specific planning efforts and natural resource management plans. (GMP/EIS, pg 62

8. Park managers will continue to work with USFWS to update resource management plans for threatened and endangered species (such as the Shoreside Plan) as needed to reflect changing conditions. (Final GMP/EIS, pg 62)

9. Preservation and protection of threatened and endangered species would continue through monitoring and enforcement and would be balanced with additional recreational opportunities. The existing monitoring and conservation measures for threatened and endangered species would continue to be a priority and could occur throughout all management zones.

10. Beach access points will be monitored for possible disturbances to piping plover and other shorebird nesting locations. Conservation signage at and near access locations will be maintained and/or expanded as needed. Proximity to threatened and endangered species beach nesting areas will be a primary consideration when planning future campground expansions and/or new campsite locations. New or expanded camping areas will be carefully sited relative to shorebird nesting habitat.

11. Continue monitoring of key beach access points at Fort Tilden and Breezy Point Tip for possible disturbances to piping plover and other shorebird nesting locations. Maintain sufficient signage at and near access locations.

Habitat

1. Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season (kite flying, kite surfing, fireworks) and visitor education (numerous pages, GMP/EIS, 2014)

2. Invasive exotic vegetation removal will be priority of natural resource management within the Natural Zone.

3. Beach grooming (raking and mechanized trash removal) is not permitted within the Natural Zone.

4. Initiate early Section 7 (ESA) consultation for proposed projects that involve beach / dune manipulation, mechanized sand movement (redistribution), installation of sand fencing, and work that would affect native vegetation.

5. Threatened and endangered species and habitat are protected to the greatest extent possible and other particularly sensitive species and biotic communities are closely monitored and protected (GMP/EIS, pg 62).

Predation

1. Adherence to the Tilden carry-in, carry-out trash policy will be closely monitored.
The park proposes to increase monitoring and removal of feral cats, especially within the vicinity of natural zones and sensitive resource subzones. The park will review data and field observations to explore the efficacy of removing or discouraging other predators, such as crows. gulls, and ghost crabs.

2.The park will continue to collect baseline data regarding disturbance to threatened and endangered species, such as data on disturbance levels from authorized activities, unauthorized intrusions, visitation levels, staffing levels (GMP/EIS pg 62)

3.The park will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as continuing with predation management program.

JAMAICA BAY UNIT - BREEZY POINT TIP

Disturbance

1. Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season and visitor education.(GMP/EIS multiple locations throughout document).

2. Park managers will review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change.

3. Park managers will continue to work with USFWS to update resource management plans for threatened and endangered species as needed to reflect changing conditions. (GMP/EIS, pg 62)

4. Natural resource biologists and technicians will monitor and map nests and individuals, and record the results of measures contributing to and including reproductive success

Habitat

1. Park managers will continue established conservation measures to protect and enhance habitat for wildlife and species of concern, such as providing symbolic fencing with posts and signs around nesting birds, predator removal, closures, buffer zones, prohibition of certain recreational activities during breeding season and visitor education.

2. Invasive exotic vegetation removal will be priority of natural resource management within the Natural Zone and Sensitive Resource Subzone, thereby providing additional piping plover breeding habitat and allowing for seabeach amaranth germination.

3. Habitats will be maintained, protected and enhanced through monitoring and restoration projects.

4. Threatened and endangered species and habitat are protected to the greatest extent possible and other particularly sensitive species and biotic communities are closely monitored and protected (GMP/EIS, pg 62).

Predation

1. Adherence to the carry-in, carry-out trash policy will be closely monitored to minimize predator-attracting trash.

2. The park proposes to increase monitoring and removal of feral cats, and other areas where threatened and endangered species may be adversely effected by cat predation.

3. Park managers will continue to review the effectiveness of conservation measures for threatened and endangered species and adapt and revise the conservation measures as conditions change. .(Final GMP/EIS, pg 62)

Section 106 of the National Historic Preservation Act

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

New York State Office of Parks,
Recreation and Historic Preservation

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September 30, 2013

Suzanne McCarthy
Acting Superintendent
National Park Service
Gateway National Recreation Area
210 New York Ave
Staten Island, NY 10305

Re: NPS
Gateway National Recreation Area (GATE)
Kings, Queens and Richmond County
13PR04069

Dear Ms. McCarthy,

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the submitted documents in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include other potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental quality Review Act (New York Environmental Conservation Law Article 8).

With the potential of over 800 historic resources within GATE, it is nearly impossible for us to comment on the proposed GMP for each area of the park without in-depth consideration given to these numerous historic resources located throughout each area of the park. The NPS has proposed a Programmatic Agreement (PA) to assist us in carrying out the concepts within the GMP and we look forward to a draft of this document.

Even with the challenge of reviewing this document in a short time, we are able to offer a number of comments. Of the three alternatives proposed, we concur that Alternative A – "No Action" provides for the continuance of current management practices for historic resources and would result in significant adverse effects to many of GATE's historic resources. Of concern is that both Alternatives B and C appear to formalize the informal practices of today by allowing some historic resources to decay by establishing Ruins Subzones. This would allow the natural decay of these National Register listed or eligible properties resulting in significant adverse effects by potentially losing the qualities and character-defining features that made these properties eligible in the first place.

When evaluating Alternative B and C, we note they are similar in many aspects. Our opinion is to prefer Alternative C as it provides for greater historic resource preservation and protection. In Alternative C the historic zones are larger and the potential benefits to historic resources by stabilization, preservation, restoration and limited adaptive re-use are greater than those proposed in Alternative B.

There are many complex pressures being put upon these historic resources and GATE in general. Consisting of primarily coastal properties the potential impacts of climate change, changes is sea-level and storms have the potential to significantly impact the park and the historic resources and we agree that a GMP and PA should continue to address these challenges.

An Equal Opportunity Employer/Affirmative Action Agency

At this time, we cannot concur with the "Fundamental Resources" identified in Appendix B of the report. We are unclear as to what criterion was used to determine resources as fundamental and what treatment would be afforded fundamental resources. We are confused as to why all the historic resources at the National Register listed Floyd Bennett Field and Jacob Riis Park Historic District are not noted as fundamental. In addition, we note that Batteries Ayres, Berry, Richmond and Upton at Fort Wadsworth were all considered to be fundamental resources with national significance but were designated for "ruins". Since these resources are of national significance stabilization must be considered when exploring alternative treatments.

In reviewing the information for Floyd Bennett Field National Register Historic District (Update and Boundary Expansion) in Figure 3-11, we note the boundaries do not match the ones provided to us by the NPS (and the boundaries listed in our State Register of Historic Places). Our boundary map includes the U.S. Marine Corps property which is excluded from Figure 3-11. If there has been a boundary change, the NPS has not notified our office of this change. While we prefer Alternative C, in general, we are concerned that under this alternative Floyd Bennett Field's cultural landscape would be the Municipal Airport Era, implying that development outside this era would be incompatible with the period of significance and removed. It is not clear what resources may be impacted by this plan but it is important to note that the period of significance for Floyd Bennett Field spans from 1928 to 1945 and includes not just the municipal airport era structures but later military properties as well. It is not appropriate to simply remove listed properties.

In general, it is good to see that the GMP includes stabilization and preservation of a number of historic resources that are significant and require treatment or they will be lost. Any properties/resources proposed for treatment (including being placed in a ruins subzone) will require our review and comment individually prior to any action taken. The physical condition and eligibility of resources should be re-evaluated as each resource comes up for treatment. Given the vastness of this park and variety of resources, any specific project plans will need to be reviewed by our office.

If you have any questions, I can be reached at (518) 237-8643, ext. 3282.

Sincerely,



Beth A. Cumming
Historic Site Restoration Coordinator
e-mail: Beth.cumming@parks.ny.gov

cc: D. Avrin – NPS
D. Uschold – NPS
D. Saunders – NJ SHPO

via e-mail only

**PROGRAMMATIC AGREEMENT AMONG THE
NEW YORK STATE HISTORIC PRESERVATION OFFICE,
NEW JERSEY STATE HISTORIC PRESERVATION OFFICE
AND
GATEWAY NATIONAL RECREATION AREA,
NATIONAL PARK SERVICE
FOR IMPLEMENTATION OF THE GENERAL MANAGEMENT PLAN**

WHEREAS, the National Park Service (NPS) manages and administers the Gateway National Recreation Area (GATE) as a unit of the National Park System and is responsible for preserving, restoring, maintaining, and interpreting the historic properties of the park unimpaired for the enjoyment of future generations; and

WHEREAS, GATE includes the Jamaica Bay and Staten Island units of the park in Queens, Richmond and Kings Counties in New York and the Sandy Hook unit in Monmouth County, New Jersey. Historic sites within New York include Ft. Tilden, Floyd Bennett Field, Jacob Riis Park and Miller Army Air Field National Historic Districts along with Battery Weed, Fort Tompkins Quadrangle, the Endicott Era Batteries at Fort Wadsworth, and the USCG Station Far Rockaway, among others. Historic sites within New Jersey include the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District, Sandy Hook Light National Historic Landmark, and the Fort Hancock Life Saving Station, among others; and

WHEREAS, the National Historic Preservation Act of 1966 (as amended) governs the treatment of archeological and historic properties; that NPS recognizes its responsibilities in executing provisions of Sections 110 and 106 of that Act; and that *Director's Order 28* outlines NPS policy in regard to the preservation and treatment of archeological, cultural and historic properties within the park; and

WHEREAS, in 2008 the National Park Service entered into a Nationwide Programmatic Agreement (Nationwide PA) with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers to carry out its Section 106 responsibilities with respect to the management of park areas; and

WHEREAS, the Nationwide PA encourages development of park-specific programmatic agreements to supplement the provisions of the Nationwide PA; and

WHEREAS, the NPS is currently preparing a General Management Plan/Environmental Impact Statement (GMP/EIS) for GATE; and

WHEREAS, the effects of the GMP/EIS on historic properties cannot be fully evaluated at this time and will require further evaluation and consultation as the GMP/EIS is implemented, though the GMP/EIS preferred alternative establishes a "ruins" concept and GATE has determined implementation of the ruins concept will have an adverse effect on historic properties and this PA will guide the Section 106 process as the GMP/EIS is implemented and as the decisions regarding management of historic properties designated as ruins are made; and

WHEREAS, the NPS has consulted with the New York State Office of Parks, Recreation and Historic Preservation (NY SHPO) and the New Jersey Department of Environmental, Historic Preservation Office (NJ SHPO) and they have agreed to participate in the development and execution of this PA; and

WHEREAS, the NPS has invited the Delaware Nation, Delaware Tribe of Indians and Stockbridge-Munsee Community and to participate in the development of this PA, and while they are not participating in the development of the PA the NPS will continue to consult with them during implementation of the GMP; and

WHEREAS, the NPS has consulted with the Advisory Council on Historic Preservation (ACHP) and invited them to participate in the development of this PA. and they have declined to participate; and

Draft

WHEREAS, the NPS has informed the public throughout the development of the GMP/EIS and made the draft GMP/EIS available to the public for review and comment and will provide additional opportunities for public input through the Section 106 process as the GMP/EIS is implemented, and

WHEREAS, the NPS, in consultation with the NY and NJ SHPOs, will identify additional consulting parties for inclusion in the Section 106 process as the GMP/EIS is implemented; and

NOW, THEREFORE, GATE, the NY SHPO, the NJ SHPO mutually agree that the NPS will carry out its Section 106 responsibilities with respect to implementation of the GATE GMP/EIS in accordance with the following guidelines:

STIPULATIONS

I. **REVIEW OF UNDERTAKINGS:** During the implementation of the GATE GMP/EIS, GATE will follow the Section 106 review process described in the Nationwide PA, particularly sections III and IV. Undertakings will be reviewed according to one of two processes: Streamlined Review or Standard Review.

A. **Streamlined Review**:

1. In order to qualify for streamlined review, undertakings must meet three criteria:
    a) The undertaking must fall under one of the sixteen categories of activities eligible for streamlined review, listed in section III C of the Nationwide PA.
    b) Identification and evaluation of properties within the undertaking's area of potential effect (APE) must have already occurred, and the SHPO(s) must have concurred with all eligibility/ineligibility determinations.
    c) GATE's Section 106 coordinator, in consultation with the park CRM team, as defined in section I B of the Nationwide PA, must review the undertaking and the determination of effect must be no adverse effect upon properties listed on or eligible for the National Register of Historic Places (historic properties).
2. If the undertaking meets all of these criteria, GATE will document compliance with the Nationwide PA and report on the actions in the annual report to each SHPO required by section III B (5)(d) of the Nationwide PA.
3. Actions that do not meet all three criteria will follow the standard review process.

B. **Standard Review**:

1. The standard review process is described in 36 CFR Parts 800.3 through 800.6.
2. As appropriate, GATE will work with the NY SHPO and/or NJ SHPO to identify parties other than those who are signatories to this agreement that may have an interest in properties that could be affected by undertakings undergoing the standard review process.

II. **TREATMENT OF HISTORIC PROPERTIES IDENTIFIED AS RUINS**: Within the designated Ruins Subzones and through the priority banding, the GATE GMP/EIS identifies certain resources as "ruins." Within the GMP/EIS, properties designated as ruins are defined as "Structures in poor condition… that may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resources." These structures, and in some cases their associated landscapes, will be allowed to decay naturally, be stabilized for safety, fenced off to limit public access, or demolished. Cumulatively, and in most cases individually, these actions will have an adverse effect upon historic properties.

Draft

A. Upon execution of this PA and completion of the GMP/EIS Record of Decision (ROD) process, GATE will initiate consultations with the NY and NJ SHPOs, and interested federally-recognized tribes to complete the Section 106 process for implementation of the ruins concept. This process will formalize and document the decisions made regarding the treatment of specific historic properties designated as ruins.

B. GATE will work with the NY and NJ SHPOs to identify additional consulting or interested parties as appropriate and establish a process for public involvement.

C. Consultation on the treatment of historic properties designated as ruins will include input on final decisions regarding which properties will be designated as ruins. As stated in the GMP/EIS the priority banding (including the "ruins" designation) may be updated as the result of new or better information and further consultation.

D. Consultations on the ruins concept will be initiated within one year of the ROD and will be organized in three efforts corresponding to GATE's three units. While consultation efforts will pertain to the three units of GATE separately, final decisions regarding treatment of historic properties will need to incorporate decisions being made across the park.

E. Treatment decisions for historic properties identified as ruins may include demolition, natural decay, minor stabilization, fencing the properties, or other viable options identified during consultation.

F. Treatments resulting in further damage or loss of historic properties, such as natural decay and demolition, will be mitigated by such efforts that might include documentation, interpretation or other measures to be determined during the consultation process.

G. No historic property designated as a ruin will undergo demolition or destructive action prior to consultation regarding the treatment of that particular property.

III. ADMINISTRATIVE STIPULATIONS:

A. Amendment: At any time, signatories to this Agreement may determine whether revisions or amendments to this Agreement are needed. If signatories to this Agreement determine that revisions or amendments are needed, the signatories will consult to consider such amendment, and upon the unanimous decision of all signatories, such amendments will be implemented.

B. Failure to Carry Out Terms of this Agreement: In the event that NPS does not carry out the terms of this Agreement, GATE will comply with the terms of the Nationwide PA, or 36 CFR Section 800.3 through 800.6 as applicable with regard to individual undertakings that otherwise would be covered by the terms and provisions of this Programmatic Agreement.

C. Termination: Signatories to this agreement may request termination of this agreement by providing ninety (90) calendar days' notice to all signatory and concurring parties, provided that the parties will consult during the period prior to termination to seek agreements on amendments or other actions that would avoid termination. In the event of termination, the NPS will follow the procedures in the Nationwide PA or 36 CFR Section 800.3 through 800.6.

D. Duration: This agreement will terminate 20 years from the date of its execution. During the term of the PA, the NPS will review the PA every 5 years and consult with the signatories of the PA to evaluate the progress and effectiveness of the PA.

E. Anti-Deficiency: All actions taken by GATE in accordance with this PA are subject to the availability of funds, and nothing in this PA shall be interpreted as constituting a violation of the Anti-Deficiency Act.

Draft

Execution of this PA by GATE and the NY and NJ SHPOs and implementation of its terms evidence that GATE has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

NEW YORK STATE HISTORIC PRESERVATION OFFICE

By:_____ Date:_____

NEW JERSEY STATE HISTORIC PRESERVATION OFFICE

By:_____ Date:_____

NATIONAL PARK SERVICE, GATEWAY NATIONAL RECREATION AREA

By:_____ Date:_____

Draft

Agency Comment Correspondence

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

OCT 18 2013

Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

Dear Mr. Superintendent:

In accordance with our responsibilities under the National Environmental Policy Act, (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the Gateway National Recreation Area (GNRA) - Draft General Management Plan (GMP)/Environmental Impact Statement (EIS); CEQ No. 20130230. Transmittal of this letter was delayed by the government shutdown from October 1-16, 2013.

The draft EIS was prepared by the National Park Service. Gateway National Recreation Area covers more than 40 square miles in New York and New Jersey. The park covers 27,025 acres and extends into adjacent waters, including the Atlantic Ocean, Jamaica Bay, Raritan Bay, and Upper and Lower New York Bay. The first GMP for GNRA was finished in 1979. Since then, new park issues and new ideas regarding park management have emerged that are not addressed in the 1979 GMP, warranting the need for a new management plan. Additionally, many of the recommendations made in the 1979 GMP are no longer appropriate due to changing conditions and circumstances in the recreation area.

The draft GMP/EIS proposes three management alternatives. Alternative A is the "no action" alternative; alternatives B and C are action alternatives. Alternative A serves as a baseline for comparing the impacts of implementing the action alternatives. Alterative B is referred to as "Discovery Gateway" and is the NPS preferred alternative. It provides the widest range of activities and most recreation opportunities in dispersed locations throughout the park. Alternative C is referred to as "Experiencing Preserved Places." It provides the most opportunities for independent exploration and "wild" experiences that immerse visitors into natural areas and historic sites and landscapes.

EPA commends the National Park Service for developing a thorough and detailed EIS that addresses management of GNRA by balancing the ecological health of GNRA with improvements to the visitor experience. Key issues such as climate change, sea level rise, water quality enhancements, and sustainability within the park are addressed in detail.

EPA defers to the expertise of the National Park Service in regard to the selection of the preferred alternative. EPA rates the EIS as an "LO – Lack of Objection." Thank you for the opportunity to comment on the draft EIS for the Gateway National Recreation Area - Draft

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General Management Plan/Environmental Impact Statement. Should you have any questions regarding this letter, or for further assistance with technical assistance in one of EPA's program areas, please feel free to contact Stephanie Lamster at 212-637-3465.

Sincerely,

Judy-Ann Mitchell, Chief
Sustainability and Multimedia Programs Branch
Clean Air and Sustainability Division

MONMOUTH COUNTY PLANNING BOARD
FREEHOLD · NEW JERSEY

VINCENT DOMIDION
Board Chairman

EDWARD SAMPSON, PP, AICP
Director of Planning

01 October 2013

Jennifer T. Nersesian, Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

RE: 2013 Draft General Management Plan & EIS Review
Gateway National Recreation Area

Dear Ms Nersesian:

The Monmouth County Planning Board appreciates the opportunity to comment on the 2013 Draft General Management Plan and EIS for Gateway National Recreation Area. Attached please find our official comment letter on that document. We are also pleased that the Fort Hancock 21st Century Federal Advisory Committee was appointed to seriously consider the future of the important Fort Hancock Historic Area within the context of Gateway National Recreation Area as a whole. Fort Hancock has National Landmark Status and could be an excellent catalyst for future economic growth. We look forward to hearing more about the potential public-private partnerships that could develop from the Requests for Expressions of Interest (REI) for the Fort Hancock facilities. I would like to express my most sincere gratitude to Freeholder Lillian Burry, a member of the Fort Hancock 21st Century Federal Advisory Committee, and Peter McCarthy, NPS Sandy Hook Unit Coordinator, for providing County staff with an invaluable opportunity to tour the Sandy Hook Unit and learn more about both the Fort Hancock REI and the Draft General Management Plan.

Very truly yours,

Vincent Domidion

Vincent Domidion II, Chairman
Monmouth County Planning Board

c: Freeholder Lillian Burry
Teri O'Connor, County Administrator
Kevin Burke, Deputy County Administrator
Edward Sampson, PP/AICP, Director, Monmouth County Division of Planning
Joseph Barris, PP/AICP, Assistant Director, Monmouth County Division of Planning
Joseph Ettore, PE, County Engineer
John Cuifo, Director, Monmouth County Department of Economic Development
Paul Gleitz, Park Planner, Monmouth County Park System
Randall Gabrielan, Executive Director, Monmouth County Historical Commission
Peter McCarthy, Unit Coordinator, Gateway National Recreation Area, Sandy Hook Unit

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MONMOUTH COUNTY PLANNING BOARD
FREEHOLD · NEW JERSEY

VINCENT DOMIDION
Board Chairman

EDWARD SAMPSON, PP, AICP
Director of Planning

01 October 2013

Jennifer T. Nersesian, Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

RE: 2013 Draft General Management Plan & EIS Review
Gateway National Recreation Area

Dear Ms Nersesian:

The Sandy Hook Unit of Gateway National Recreation Area is located in Monmouth County, New Jersey. We are keenly aware of issues surrounding the management of a 21st Century urban park; the realities, both of the economic and physical environment, that surround coastal facilities after Superstorm Sandy; and the need to carefully plan a forward vision for the valuable historic and natural resources that exist today in such limited supply in this urban environment. The Monmouth County Planning Board's adopted County Master Plan has a series of goals, objectives and policies, many of which are applicable to the management of the Sandy Hook Unit. In 2009, the County Planning Board responded to a NPS visioning exercise by encouraging the consideration of our County goals as they apply to planning for the future of Gateway National Recreation Area in general and to the Sandy Hook Unit in particular. Our review of the 2013 Draft General Management Plan for Gateway National Recreation Area found that many of our 2009 recommendations and concerns were addressed, particularly through Alternative B.

The Draft General Management Plan and EIS were discussed at the 16 September 2013 meeting of the Monmouth County Planning Board. The Fort Hancock 21st Century Federal Advisory Committee's upcoming Request for Expressions of Interest for redeveloping historic structures in the Sandy Hook Unit's Fort Hancock Historic District was also considered. The County Planning Board supports the efforts of the NPS to seek new public-private partnerships as a sound economic approach to the preservation of the historic facilities. Priority must be given to saving them while it is still possible and we encourage the NPS to continue to stabilize the buildings while partners are being sought. Draft General Management Plan Alternative B appears to offer the broadest opportunity for partnerships that would promote adaptive reuse of the existing structures.

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The variety of transportation linkages discussed, particularly in Alternative B, are promising. Connections to surrounding communities could provide services that would enhance both the visitor experience and the local economy. Easy access to overnight accommodations and restaurants in the neighboring communities could encourage Gateway visitors to extend their stay beyond the typical day trip. The County would welcome the opportunity to discuss forming connections between Gateway and County Park facilities. Mount Mitchill Scenic Overlook provides stunning views of Sandy Hook and the New York Skyline and is home to a moving 9-11 memorial. Huber Woods Park and the Henry Hudson Trail offer excellent hiking and biking opportunities that could compliment trails at the Sandy Hook Unit. Hartshorne Woods Park is home to Battery Lewis, another piece of the New York Harbor defense system that included the batteries housed within the three Gateway units, and could expand the related historic programming offered at Gateway.

In conclusion, the Monmouth County Planning Board supports Alternative B of the Draft General Management Plan as the preferred option offering the most opportunities for park redevelopment, fruitful partnerships, and economic growth, while protecting the valuable natural and historic resources.

If you have any questions or require additional information, please contact Linda Brennen, Supervisor of the County Planning Division's Environmental and Sustainability Planning Section at 732-431-7460 or via email at Linda.Brennen@co.monmouth.nj.us.

Very truly yours,

Vincent Domidion

Vincent Domidion II, Chairman
Monmouth County Planning Board

c: Freeholder Lillian Burry
Teri O'Connor, County Administrator
Kevin Burke, Deputy County Administrator
Edward Sampson, PP/AICP, Director, Monmouth County Division of Planning
Joseph Barris, PP/AICP, Assistant Director, Monmouth County Division of Planning
Joseph Ettore, PE, County Engineer
John Cuifo, Director, Monmouth County Department of Economic Development
Paul Gleitz, Park Planner, Monmouth County Park System
Randall Gabrielan, Executive Director, Monmouth County Historical Commission

NYC Parks

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City of New York
Parks & Recreation

The Arsenal
Central Park
New York, NY 10065
www.nyc.gov/parks

Wednesday, Oct 2, 2013

Ms. Suzanne McCarthy
Acting Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, NY 10305

Re: DPR Comments on Gateway National Recreation Area 2013

Dear Ms. McCarthy:

The New York City Department of Parks & Recreation (DPR), on behalf of the City of New York, commends National Park Service's (NPS) development of the 2013 General Management Plan (GMP) for Gateway National Recreation Area. The GMP is the structured planning process by which the long-term vision of all national parks is set; the document serves as a roadmap with guiding principles for how NPS operates the park. The existing GMP for Gateway dates from 1979, and we have been presented with an extraordinary opportunity to collaborate with NPS to create a new GMP that offers a fresh, updated and dynamic vision for the park which can meet the current needs of the New Yorkers and beyond. In New York City, where opportunities for interaction with natural areas is limited, the City sees Gateway National Recreation Area as an opportunity for millions of New Yorkers to benefit more fully from the best of National Parks. President Obama, in launching the America's Great Outdoors initiative in 2011, squarely placed the focus on developing a 21st century conservation and recreation agenda that values great urban parks along with partnerships with local communities and local government. Gateway National Recreation Area is the perfect place to make this happen. In the Jamaica Bay Unit of the park for example, City and Federal parkland abut each other, and are often contiguous; our partnership seeks to better align our management and operations of our combined parklands to enhance environmental preservation as well as elevate the park visitor experience. Resulting from the process of several years of discussion, the City and NPS memorialized our partnership through a Cooperative Management Agreement signed in July 2012, which embodies our commitment to work with NPS to ensure that Gateway is both a natural and community resource.

DPR supports the GMP "Preferred Alternative" for Gateway National Recreation Area. This long-term vision for the park reflects the importance of providing visitors from New York City and beyond with compelling and varied park programming and activities and enhancement of the ecological importance of the site. Local urban communities will have the option for active recreation- potentially through new water-based activities, increased camping and accommodations, expanded hiking trails, better greenway connections, and interactive learning activities to foster greater appreciation for the natural environment. The vision paves the way for visitors to experience passive recreation - allowing for the possibility of flexible open spaces intended to provide community gathering spaces for picnics and events, and encouraging exploration of wild, undeveloped natural areas. The Preferred Alternative emphasizes scientific and research focus on Jamaica Bay and resiliency efforts which in the wake of Hurricane Sandy takes on critical importance for the future sustainability of the park and surrounding lands and communities. Focus on restoring wetlands and other ecological functions within Gateway will help increase the resiliency of Jamaica Bay and New York City; protected habitat will likewise contribute to a balanced ecosystem. Moreover, the Preferred Alternative is one that strikes an important balance between enhancing natural areas and updating the vision for the park to meet

NYC Parks

the needs of park users for the 21st century. With the implementation of the Preferred Alternative, New Yorkers and visitors will have the opportunity to experience the special historic, cultural and natural places that make up Gateway National Recreation Area, and learn about the historic structures, along with flora and fauna that live within and are part of our nation's heritage. Ultimately, the Preferred Alternative presents a fresh, dynamic and updated roadmap for the park which prioritizes connecting park users to the natural environment with the goal of encouraging greater stewardship, awareness, appreciation and preservation of the park for the use of future generations.

Thank you for the opportunity to comment on the plan.

Best,

Alyssa Cobb
Assistant Commissioner

The Port Authority of New York and New Jersey

PEPC Project ID: 16091, Document ID: 54826, Correspondence: 187
Author Information

Name:	Christopher R. Zeppie
Organization:	Port Authority of NY & NJ
Address:	Office of Environmental & Energy Programs 225 Park Avenue South New York, NY 10003 USA

Correspondence Text

Comments: October 21, 2013

Ms. Jennifer T. Nersesian, Superintendent
Gateway National Recreation Area
210 New York Avenue
Staten Island, New York 10305

RE: Gateway National Recreation Area - Draft General Management Plan - Environmental Impact Statement - July 2013

Dear Ms. Nersesian:

The Port Authority of New York and New Jersey's comments regarding the Gateway National Recreation Area - Draft General Management Plan - Environmental Impact Statement follow. The Port Authority has reviewed the Gateway National Recreation Area (GNRA) - Draft General Management Plan/Environmental Impact Statement (GMP/EIS) with particular interest as the GNRA facilities are close to Port Authority facilities (John F Kennedy International Airport (JFK) is adjacent to the Jamaica Bay Wildlife Refuge) and changes in the operation of these facilities has the potential to positively or negatively impact Port Authority facilities.

While the Port Authority does not endorse the selection of a particular alternative (A, B or C) our comments are directed to the importance of continuing the ongoing collaborative partnership with the National Park Service - Gateway National Recreation Area (NPS-GNRA), and other NPS partners and stakeholders in the region. Specific attention to mitigation for potential impacts to Port Authority facilities is our primary concern in commenting on the EIS.

Notably absent from the EIS is any reference or discussion of cooperation and collaboration between the Port Authority of New York & New Jersey the National Park Service. We believe that the continued success of the National Park Service in operating the tremendous resource that is Gateway National Recreation Area helps the region to thrive. Likewise, JFK brings upwards of 25,000,000 people to our region annually, contributing about $30.6 billion in economic activity. We welcome discussions to further our collaboration and ensure another 50 years of concurrent operations, during the GMP EIS process.

Finally, congratulations on your recent appointment as superintendent of GNRA. We look forward to working with you to continue balancing enhancement of this spectacular natural area with operation of our gateway to New York City - JFK.

Sincerely,

Christopher R. Zeppie
Director, Office of Environmental & Energy Programs
Port Authority of NY & NJ
225 Park Avenue South, 12th Floor
New York, NY 10003

- --

Port Authority of New York & New Jersey Comments on the Gateway National Recreation Area - Draft General Management Plan - Environmental Impact Statement - July 2013

Airport/Gateway Compatibility

In a number of locations in Chapters Three and Four, the Draft GMP/EIS recognizes the presence of John F. Kennedy International Airport (JFK) adjacent to the Jamaica Bay Unit of Gateway. JFK, which has been in operation since 1947, is recognized as the premier U.S. gateway for passengers and cargo. The potential synergies between JFK and Gateway are recognized in the Draft GMP/EIS, for example, in the role that JFK can play in bringing increased visitation to Gateway (p. 528). The challenges presented by the proximity of JFK to Gateway are also recognized to some extent, for example, in the discussion of changes made to the Bay historically to accommodate the airport (p. 152). The alternatives presented in the Draft GMP/EIS could result in changes that are relevant to the safety of operations at the airport. We would like to highlight several potential issues, as follows: Birds and Wildlife Strike Hazard As described in Chapter Two, Alternative B would involve the widest range of activities and most recreational opportunities throughout the park. Increased visitation and human presence within the park could lead to an increase in birds (and other wildlife that serve as prey bases for birds), through an increase in litter and visitors feeding birds. Depending on location, the increase in birds could present an increased wildlife strike hazard to aircraft using JFK. We request that NPS take steps to minimize litter within the park and include educational information for visitors regarding the potential safety impacts of feeding birds and other wildlife, and actively enforce those regulations. Implementation of Alternative B or C would lead to construction of additional buildings, signs, and other structures within the park. These structures could increase perching and roosting opportunities for birds, leading to a potential increase in wildlife strike hazard. We request that NPS incorporate anti-perching and other bird-deterring features into the designs of structures build near JFK.

Chapter Two (p. 130) and Chapter Four (p. 353 and others) refer to a proposed anaerobic digester and composting facility at Floyd Bennett Field, which is less than five miles from JFK. Depending on the feedstock used in the digester, the facility design, and other factors, the facility could attract birds, presenting a potential wildlife strike hazard at JFK. FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants on or Near Airports, states that off-airport composting operations should not be located closer than what is called for by airport design requirements, which in the case of JFK, is five miles. The Port Authority supports the use of innovative means of reducing waste disposal to landfills, including composting. Given the potential for increased safety hazards at JFK, however, we ask that NPS coordinate with the Port Authority and FAA regarding any proposed composting or anaerobic digester within five miles of JFK.

The Draft GMP/EIS includes multiple references to habitat maintenance and restoration. The Port Authority

supports NPS efforts to improve the ecological health of Jamaica Bay. We request that NPS work with the Port Authority to understand the relationship between improved habitats in areas near the airport and potential wildlife strike hazards, to try to minimize potential safety impacts and mitigate those hazards whenever possible.
Obstructions to Navigation Chapter Four (pp. 350-351, for example) refers to a proposed multi-modal transportation hub, hotel, wetlands center, and other visitor facilities at Floyd Bennett Field. Based on this description, it does not appear that the GMP would result in the construction of any obstructions to air navigation. However, we request that NPS consult with the Port Authority and FAA regarding proposed new construction or alterations in portions of the park near JFK, and in particular, submit a FAA ?"Form 7460" for any proposed construction or alteration of more than 200 feet in height.

Solar Installation Chapter Two (p. 86) and Chapter Four (p. 339) mention the potential for solar installations at the former Pennsylvania Avenue and/or Fountain Avenue landfills, which are southwest of JFK. The Port Authority supports the increased use of solar power and is actively pursuing installation of solar photovoltaic systems at its facilities. However, the FAA has raised concerns regarding the potential glare impacts of solar installations on safe aircraft navigation. Off-airport solar installations would be subject to FAA review only if the installation required the submittal of a Form 7460 (see prior comment). However, we request that the NPS coordinate with us and FAA regarding any proposed major solar installations near JFK.

Soundscape There are a number of references to soundscape in the Draft GMP/EIS. The GMP/EIS recognizes that Gateway is located within an urban environment and refers to human-created noise sources heard within the park, including aircraft. However, the Draft GMP/EIS also cites the Director's Order to restore degraded soundscapes to natural conditions whenever possible, and there are a number of references to "quiet" as a desired condition in Chapter Two of the Draft GMP/EIS. We maintain that it is not possible to eliminate aircraft noise over Gateway or return the sound environment near JFK to what it was prior to the existence of the airport. We request that the GMP/EIS make a clearer distinction between areas of the park that can be restored to their natural soundscape and those (including the areas near JFK) that cannot.

Climate Change and Sea Level Rise
How do the management strategies for climate change incorporate sea level rise? There are several references to the protection of equipment and facilities within the 100-year floodplain and facilities at risk of storm surge. The Port Authority recommends reviewing the New York City Panel on Climate Change "Climate Risk Information 2013," which was released in June 2013. The best available sea level rise estimates for our area are established in this document, and are being used by New York City for planning purposes. The document recommends elevating critical infrastructure 2.5 feet above the 100-year floodplain.
The terms below, which are used on page 56 of Chapter 2:
• Critical systems
• Critical facilities
• Flood zones
• Storm surge zones
. . . should be defined to enhance the clarity of the GMP EIS.
The management plan notes that the park would allow "natural processes to continue unimpeded, except when health and safety or the park's fundamental resources and values are threatened." How will the park respond if action is needed within the park to protect critical transportation and other assets outside the park? Future coastal storms combined with sea level rise may increase vulnerability for critical assets and communities such as Canarsie, JFK airport, and parts of Staten Island if the park allows natural processes to continue unimpeded. Will the park respond proactively to these risks if necessary?

Other Comments
Chapter Three (p.162) includes a statement regarding "toxic runoff" from JFK, and cites as a reference the "Hudson-

Raritan Estuary Comprehensive Restoration Plan," which was developed by the Port Authority and U.S. Army Corps of Engineers. Although there are general statements regarding runoff and water quality in the Restoration Plan, there are no specific references to toxic runoff from JFK in the document. The only discharge from JFK is stormwater runoff; discharge from all outfalls is regulated through the New York State Pollution Discharge Elimination System Permit under the Clean Water Act and are in compliance with the permit. The Port Authority respectfully requests that NPS strike this unsubstantiated statement from the Draft GMP.

Chapter Three (p. 262) also includes a statement about loud JFK aircraft flights over Jamaica Bay. We recognize that, as Jamaica Bay is directly south of JFK, aircraft flying over the Bay are at low altitudes. We would like to point out, however, that there have been a number of advances that have led to quieter aircraft nationwide (including those using JFK), and the overall cooperation and collaboration between the Port Authority of New York & New Jersey the National Park Service

We believe the Port Authority and NPS-GNRA could benefit from exploring where opportunities may exist to support our mutual goals; for the NPS-GNRA in promoting their facilities as an important and attractive recreational resource and destination in the region and for the Port Authority providing first rate transportation facilities that allow travelers to get to their destinations with ease. The Port Authority would like to collaborate with NPS to increase interest of airport patrons to natural and cultural attributes of the Gateway National Recreation Area including especially, the Jamaica Bay unit.

Appendix D: Defining Visitor and Commercial Services

The park welcomes visitors to park lands for a broad array of appropriate and meaningful activities. This includes traditional NPS activities or uses such as hiking and kayaking, as well as appropriate, but not necessary services such as horse boarding and boat slip rental which may be provided by third parties.

Throughout the GMP, the term "visitor" refers to all persons accessing the park. For purposes of the GMP, "visitor services" and "commercial services" are interchangeable and do not imply the use of any specific legal authority. Visitor or commercial services can encompass any activity or service that occurs in a park for which compensation is made to a third party (lodging, boat rentals, guided tours, food vendors, etc.). Those third party operators offer services to park visitors which are not provided directly by the government. They can also help increase the use of, enjoyment by, and visibility of the park within the community.

In order to determine if a visitor or commercial service should be provided in the park, the NPS must evaluate "necessary" and "appropriate" considerations. "Appropriate" criteria help answer the question, "Can the park authorize this service without compromising the reason it is a unit of the national park system?" "Necessary" criteria help answer the question, "Why is this service important for the park and does the park need to prescribe how this service operates in the park?"

"Necessary" services are those services that would or could be offered by the Service, but can also be provided by a third party. Ferry service to Statue of Liberty, which is the only way in which a visitor can visit the Statue of Liberty National Monument, is one example of a "necessary" visitor or commercial service. Such visitor operations are critical to and an extension of the park. Because they are "necessary" to visitor enjoyment, the park is required to dictate how and when such visitor or commercial services must operate.

If a service is deemed "appropriate" but not necessary, the park must still evaluate the service's impact on visitor experience but the service itself is not required. Appropriate visitor or commercial services must be compatible with the park mission and values, but the park does not dictate how and when such services are operated. They are services that are not necessarily an extension of the park, but a nice complement to or independent of any services otherwise available. A day care facility in a park owned building is a good example of an appropriate use that is not necessary.

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Acronyms and Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMP	Final Collection Management Plan
CSO	combined sewer outflow
DO	dissolved oxygen
EA	environmental assessment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
FDNY	New York City Fire Department
GMP/EIS	New Vision for a Great Urban Park: Gateway National Recreation Area General Management Plan and Environmental Impact Statement
HARP	Historic Aircraft Restoration Project
IMT	Incident Management Team
JBWR	Jamaica Bay Wildlife Refuge
JBSRC	Jamaica Bay Science and Resilience Center
LCS	List of Classified Structures
LEED	Leadership in Energy and Environmental Design
mg/L	milligrams per liter
mR/h	milliroentgens per hour
MTA	Metropolitan Transportation Authority
MUP	multi-use pathway or path
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NJDEP	New Jersey Department of Environmental Protection
NGO	non-governmental organization
NJ Transit	New Jersey Transit
NOAA–Fisheries	National Oceanic and Atmospheric Administration–Fisheries
NPNYHC	National Parks of New York Harbor Conservancy
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NYC Greenway	New York City Greenway
NYC Water Trail	New York City Water Trail
NYCDEP	New York City Department of Environmental Protection
NYCDOT	New York City Department of Transportation
NYCDPR	New York City Department of Parks and Recreation
NYDEC	New York Department of Environmental Conservation
OSV	over-sand vehicle
PMDA	primary market drawing area
ppt	parts per thousand
SHPO	state historic preservation officer
SSA	sole-source aquifer (EPA designation)
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
VMT	vehicle miles traveled
WPA	Works Progress Administration
WPCP	wastewater pollution control plants

Glossary

accessibility. Occurs when individuals with disabilities are able to reach, use, understand, or appreciate NPS programs, facilities, and services, or to enjoy the same benefits that are available to persons without disabilities.

accession. Official acquisition, entered into the documented collection of a museum.
anadromous. Fish that migrate from saltwater to freshwater rivers or creeks to spawn.

anaerobic. Without oxygen.

anoxic event. Occurs when the oceans become completely depleted of oxygen below the surface levels.

aquifer. A body of permeable rock or sediment capable of storing or transmitting water.

backcountry. Primitive, undeveloped portions of parks.

barbette. A protective circular armor feature around a cannon or heavy artillery gun.

battery. A defensive structure containing all features and appliances necessary to support and serve a number of cannons.

benthic. Bottom habitat in water bodies.

benthos. All the organisms that live on the bottom of a water body or in the bottom sediments.

best management practices. Practices that apply the most current means and technologies available to not only comply with mandatory environmental regulations, but also maintain a superior level of environmental performance. See also, "sustainable practices/principles."

bight. A bend or curve in the shoreline (nautical term).

boreal waters. Located in northern regions of the continent.

brackish. A mix of saltwater and freshwater.

breech-loading weapon. A weapon in which the round is loaded by opening a plug at the base of the gun tube.

cantonment. A camp, usually of large size, where men are trained for military service; military quarters.

casemate. A chamber within a fortification built with overhead cover, and therefore resistant to bombs or high-angled shell fire; an armored compartment for artillery on a rampart.

Class I. Visibility area.

Class II. Visibility area. Gateway National Recreation Area is a Class II visibility area.

Craftsman style. The Craftsman style, or the American Arts and Crafts movement, is an American domestic architectural, interior design, landscape design, applied arts, and decorative arts style and lifestyle philosophy that began in the last years of the **19th century.** As a comprehensive design and art movement, it remained popular into the 1930s. However, in decorative arts and architectural design it has continued with numerous revivals and restoration projects through present times.

cultural resource. An aspect of a cultural system that is valued by or significantly representative of a cultural or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes.

deciview. A measurement of visibility. One deciview represents the minimal perceptible change in visibility to the human eye.

deferred maintenance. Maintenance that was not performed when it should have been, and therefore, is delayed. Continued deferment of maintenance results in deficiencies. Deferred maintenance is the cost to repair an asset's deficiencies.

demersal. Swimming near the bottom of the body of water.

developed area. An area managed to provide and maintain facilities (e.g., roads, campgrounds, housing) serving visitors and park management functions. Includes areas where park development or intensive use may have substantially altered the natural environment or the setting for culturally significant resources.

disappearing carriage. A gun mount designed to raise the gun to firing position above the parapet by means of a counterweight, and use the force of recoil to carry the gun back to its loading position below the parapet.
distal. Farthest from the main body.

earthwork. A military construction formed chiefly of earth, used in both defensive and offensive operations.

echinoderm. A type of marine invertebrate; includes starfish.

endangered. A species in danger of extinction through all or a significant portion of its range.

environmentally preferred alternative (or environmentally preferable alternative). Of the action alternatives analyzed, the one that would best promote the policies in section 101 of the National Environmental Policy Act. This is usually selected by the planning team members. The Council on Environmental Quality encourages agencies to identify an environmentally preferable alternative in the draft environmental impact statement or environmental assessment, but only requires that it be named in the record of decision.

ephemeral. Lasting for a short time.

eutrophication. Excess nutrient loading in a water body.

floodplain. An area of land that is subject to natural flooding from an adjoining waterway.

fundamental resources and values. Those features, systems, processes, experiences, stories, scenes, sounds, smells, or other attributes determined to warrant primary consideration during planning and management because they are critical to achieving the park's purpose and maintaining its significance. A fundamental value, unlike a tangible resource, refers to a process, force, story, or experience, such as such as an island experience, the ancestral homeland, wilderness values, or oral histories.

fundamental resources. Fundamental resources are defined as those considered fundamental to maintaining the park's purpose and significance.

garrison. The troops permanently assigned to a military post.

gateway community. A community that exists in close proximity to a unit of the national park system whose residents and elected officials are often affected by the decisions made in the course of managing the park, and whose decisions may affect the resources of the park. Because of this, there are shared interests and concerns regarding decisions. Gateway communities usually offer food, lodging, and other services to park visitors. They also provide opportunities for employee housing, and a convenient location to purchase goods and services essential to park administration.

geomorphological processes. Processes that relate to the origin and development of landforms.

groin. A low wall or other rigid barrier built out into the sea from a beach to reduce erosion, trap sand, or direct a current for scouring a channel.

groundwater. Subsurface water in the saturated zone in which pore spaces are completely filled with water.

heritage asset. A term defined by the Federal Accounting Standards Advisory Board, as "property, plant, and equipment that are unique for one or more of the following reasons: historical or natural significance; cultural, educational, or artistic (for example, aesthetic) importance; or significant architectural characteristics."

historic property. Cultural resources listed on or determined eligible for listing in the National Register of Historic Places.

hypoxic. Low in oxygen.

indicators of user capacity. Specific, measurable physical, ecological, or social variables that can be measured to track changes in conditions caused by public use, so that progress toward attaining the desired conditions can be assessed.

indigenous. Native.

issue. Some point of debate that needs to be decided. For general management planning purposes, issues can be divided into "major questions to be answered by the general management plan" (also referred to as the decision points of the general management plan) and the "National Environmental Policy Act issues" (usually environmental problems related to one or more of the planning alternatives).

lithic. Made of stone.

littoral drift. Transport of sand or other materials along a coastline by longshore current.

macrofauna. Organisms retained on 1-millimeter (European standard) or 0.5-millimeter sieves.

management concept. A brief, statement of the kind of place the park should be (a "vision" statement).

management zone. A geographical area for which management directions have been developed to determine what can and cannot occur in terms of resource management, visitor use, access, facilities or development, and park operations. Each zone has a unique combination of resource and social conditions and a consistent management direction. Different actions are taken by the National Park Service in different zones.

management zoning. The application of management zones to a park unit. The application of different type of zones and/or size of zones will likely vary in different alternatives.

National Historic Landmark. Nationally significant properties in American history and archeology; recognition established through the Historic Sites Act of 1935; official list maintained by the National Park Service on behalf of the U.S. Secretary of the Interior.

National Register of Historic Places (National Register). The official list of historically significant national, state, and local districts, sites, buildings, structures, and objects maintained by the National Park Service on behalf of the U.S. Secretary of the Interior; established through the National Historic Preservation Act of 1966.

nearshore zone. The area of open water from the mean low-water line offshore to the 66-foot depth contour line.

nektonic. Marine and freshwater organisms that can swim freely (generally independent of currents).

New York Bight. A great expanse of shallow ocean between Long Island to the north and east and the New Jersey Coast to the south and west.

ordnance. Artillery pieces and the equipment used to maintain and fire them.

parade. A regular place of assembly for reviews of troops.

parapet. In coastal defense, a wall of concrete or masonry that protects the cannon and those manning it.

park partner. any state or local government (or subdivision thereof), public or private agency, organization, institution, corporation, individual, or other entity which is engaged in helping to ensure the protection, enhancement and enjoyment of the park's natural, cultural and recreation heritage.

passerine. Perching or songbird.

phytoplankton. Minute, free-floating aquatic plants.

plankton. Minute, free-floating aquatic plants and animals.

programmatic camping. Definition needed.

rampart. A type of defensive wall.

rapid-fire gun. A gun that can be loaded and fired with great rapidity because of a single-motion breech mechanism; such guns also usually employ fixed ammunition, avoiding the need to load the propellant and the projectile separately.

raptor. Comes from the Latin root that means "to seize and carry away," and is assigned to any bird that kills with its feet.

Raritan Bay. A bay bounded on the northwest by New York's Staten Island; on the west by Perth Amboy, New Jersey; on the south by the Raritan Bayshore communities of Monmouth County, New Jersey; and on the east by Sandy Hook Bay.

S1. Typically 5 or fewer occurrences.

S2. Typically 6–20 occurrences.

S3. Typically 21–100 occurrences.

scarp. A steep slope formation.

sedentism. Living in one place in a settled manner, often in groups.

semidiurnal. Occurring approximately every half day.

shell midden. Refuse piles from shucking shellfish. An indication of sea harvesting on a community scale.

sherds. Fragments, usually of ceramics.

shorebird. A bird that uses the coastal shore for feeding, resting, or nesting.

species of special concern. A species likely to become a threatened species.

storm surge. The abnormal rise of water generated by the winds of a storm, over and above that from predicted astronomic tides.

Strategic Arms Limitation Talks (SALT). Refers to two rounds of bilateral talks and corresponding international treaties involving the United States and the Soviet Union—the Cold War superpowers—on the issue of armament control. There were two rounds of talks and agreements: SALT I and SALT II.

surfmen. Used to describe members of the United States Lifesaving Service. "Surfman" is also currently the highest qualification in the United States Coast Guard for small boat operations.

threatened. A species likely to become an endangered species within the foreseeable future through all or a portion of its range.

trophic level. A group of organisms that occupy the same position in a food chain.

waterbird. A swimming or wading bird, particularly the group of herons, ibises, and other wading species.

waterfowl. Wild game birds, such as ducks or geese, that swim.

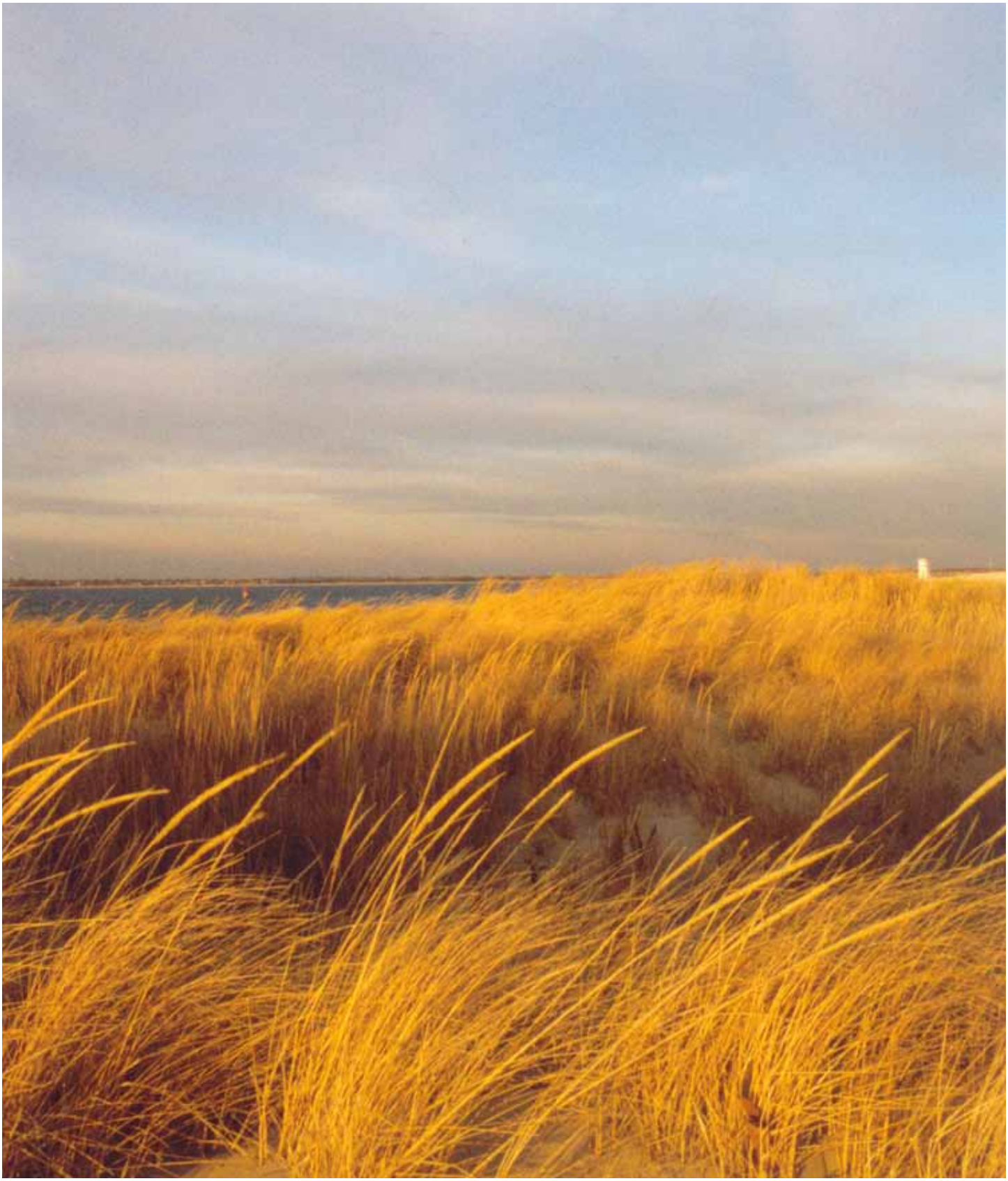
Yoruba. The Yorùbá religion comprises the traditional religious and spiritual concepts and practices of the Yoruba people whose homeland is Southwestern Nigeria and the adjoining parts of Benin and Togo. The Yorùbá religion is formed of diverse traditions and has no single founder. Yoruba religious beliefs are part of itan, the total complex of songs, histories, stories and other cultural concepts that make up the Yorùbá society.

zooplankton. Minute, free-floating aquatic animals.

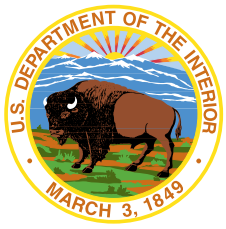
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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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