



New York City Wetlands Strategy

MAY 2012



The City of New York
Mayor Michael R. Bloomberg

Cover Photo: Freshkills Park in Staten Island

Credit: NYC Dept. of Parks and Recreation

NEW YORK CITY WETLANDS STRATEGY

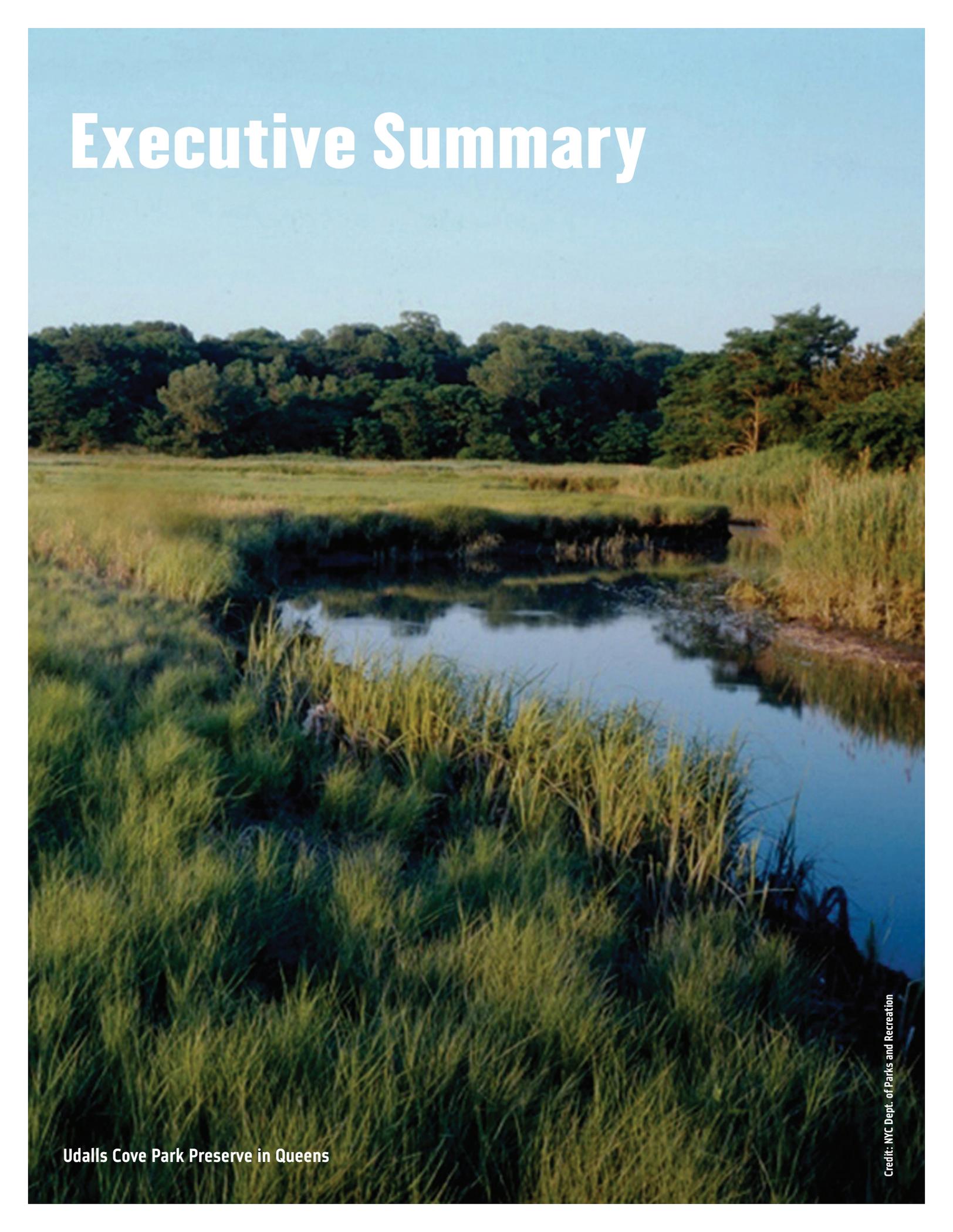
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A GREENER, GREATER NEW YORK

Executive Summary



Udalls Cove Park Preserve in Queens

Since 2002, the Bloomberg Administration has made the largest commitment to improving our waterways and waterfront of any administration in New York City's history. We have invested over \$9 billion to reduce discharges and to improve harbor water quality, and the water in New York Harbor is cleaner now than at any time in the last century. This investment in water quality infrastructure has set the stage for the recovery of ecological systems, including wetlands. Wetlands are an important component of PlaNYC's strategy for a greener, greater New York. That is why the Bloomberg Administration has worked with State and Federal agencies to invest over \$56 million to restore or create over 146 acres of wetlands.

Much of the New York City's natural waterfront consists of wetlands. Existing maps indicate that the range is between approximately 5,600 acres to a little over 10,000 acres, primarily in Jamaica Bay, Staten Island, and along Long Island Sound.

In the past century, roughly 85% of the coastal wetlands have been lost in the New York-New Jersey Harbor Estuary. Well over 90% of the freshwater wetlands in the city also have been lost. In addition, hundreds of miles of riparian corridor were taken over by development. Moreover, many wetland parcels have been significantly degraded due to human modifications to natural systems, industrial pollution, and changes to water and sediment quality. Although the Harbor is cleaner than it has been in a century, these other human-created or anthropogenic factors impair the quality of wetlands.

Nevertheless, the city's wetlands continue to provide important ecological, economic, and social benefits. Wetlands improve water quality by aiding in the retention of stormwater, sediment, and nitrogen and other nutrients. Wetlands are among the most biologically productive ecosystems in the world, supporting more plants and animals and producing more organic material than adjacent aquatic or upland areas. Wetlands also buffer the shore from oceanic storm surges and dissipate the destructive energy of local floods. Finally, wetlands attract wildlife for viewing

and otherwise enhance the enjoyment of parks and public spaces. These open spaces are particularly highly valued in our dense urban area.

To preserve and enhance the city's valuable wetlands, we must address multiple challenges. Wetlands are no longer being drained and filled like they were only a few decades ago. However, gaps in State and Federal regulations leave freshwater wetlands smaller than 12.4 acres vulnerable to development. When wetlands are legally permitted to be developed for projects that provide public benefits, the mitigation process in place in New York City typically encourages restoration projects that are small and do not maximize potential economies and ecologies of scale. There is also a lack of funding for wetlands programs and management efforts. And changes to the climate and rises in sea level further threaten wetlands areas. Underlying all of these challenges is a difficulty to make informed policy decisions due to a lack of data and tools such as up-to-date regulatory maps, accurate quality assessments, and necessary scientific information.

This New York City Wetlands Strategy seeks to address these challenges and builds on past planning efforts to provide a framework for strengthening the city's critical wetlands areas.

Our Plan

This strategy's analysis and other considerations have led the City to establish an overall goal and initiatives to achieve this goal by addressing four key areas: protection, mitigation, restoration, and assessment.

Our Goal

This wetlands strategy establishes the goal of no net loss of wetlands. But this strategy also recognizes that addressing the quantity of wetlands in New York City does not provide a clear enough picture. This strategy also establishes the goal to improve the quality of the city's remaining wetlands and maximize their ecological functions to the greatest extent possible.

Protection

1. Strengthen protection of vulnerable wetland parcels

The City will strengthen wetlands protection efforts. This strategy lays out several initiatives to improve the public management of wetlands parcels, which includes the transfer of more City-owned parcels to the Department of Parks and Recreation and the Department of Environmental Protection as recommended by the Wetlands Transfer Task Force (WTF). Upon the release of this strategy, the City will add 75 acres of parkland to the New York City Parks system through the transfer of 10 WTF parcels.

2. Increase wetlands acquisition efforts

The City will seek to acquire vulnerable privately-owned sites. In the last ten years, New York City Department of Parks and Recreation has acquired almost 300 acres of wetlands. The New York City Department of Environmental Protection has also acquired 325 acres of significant wetlands and adjacent areas for the Staten Island Bluebelt and is planning to acquire an additional 195 acres over the next 30 years. The City will work with local, State, and Federal partners to evaluate opportunities for additional wetlands acquisitions. Specific attention will be given to the privately-owned small freshwater wetlands parcels that are not protected by State or Federal regulations.

3. Update the Waterfront Revitalization Program to enhance wetlands protection

Also to increase protection, the Department of City Planning is currently undertaking a process to revise the Waterfront Revitalization Program, last updated in 2002. The WRP is the City's regulatory program for balancing potentially competing interests such as economic development, natural resources protection, and public access on the shoreline. Through the update of the WRP in 2012, the City will designate additional sites of ecological importance, offering greater protection to these resources.

Mitigation

4. Work with State and Federal partners to revise wetlands mitigation guidance

The City will work with State and Federal partners to evaluate changes to mitigation policy and to provide clear, transparent, and scientifically-sound guidelines. The City will seek to create a clear mitigation policy based on existing scientific information that includes guidance on requirements for types of mitigation, ecological criteria and assessment of impacts, amounts of compensation and replacement ratios, financial guarantees, monitoring and maintenance, and geographic service area. The City will also seek acceptance for creative approaches to enhance wetlands functions (such as debris removal and hazardous material remediation) that are suited to New York City's unique urban conditions.

5. Create a wetlands mitigation banking or in-lieu fee mechanism for public projects

The City will develop a mitigation banking or in-lieu fee mechanism for public projects. These are strategies for undertaking restoration projects that can then provide "credits" to multiple projects that require mitigation, at one or more locations carefully chosen and approved in advance by regulators. Both mechanisms provide numerous benefits over the current system by consolidating funding into larger projects that produce economies and ecologies of scale.

Restoration

6. Complete City-funded restoration projects

By the end of 2013, the City will work with State and Federal partners to complete investments of nearly \$48 million at 16 sites to restore and enhance nearly 122 acres of wetlands and adjacent habitat. This includes projects at Meadow Lake, Yellow Bar, Black Wall, and Rulers Bar in Queens; Paerdegat Basin and Calvert Vaux Park in Brooklyn; Inwood Park in Manhattan; Freshkills Park, Pralls Island, Crescent Beach, and Brookfield Landfill in Staten Island; and Pugsley Creek, Soundview Park, Tallapoosa, Turtle Cove, and further upstream along the Bronx River in the Bronx.

7. Create a natural areas conservancy

The City will combine public resources with philanthropic funding by creating a natural areas conservancy to support the restoration and management of public wetlands parcels throughout New York City. The conservancy will also raise funds, advocate for natural areas, promote sustained government investment, and engage with communities.

8. Work with State and Federal partners to complete and implement the Comprehensive Restoration Plan

The City will partner State, Federal, and other regional partners to complete the *Hudson-Raritan Estuary Comprehensive Restoration Plan* by revising the draft document by identifying and refining restoration and land acquisition opportunities. The City will also work with these partners to seek Federal funding for critical projects and develop implementation strategies.

Assessment

9. Improve wetlands mapping in New York City

The City will work with the State and other partners to turn existing preliminary wetlands mapping and analysis into a final wetlands regulatory map for New York City. New mapping will reflect changes in wetlands location and composition over the past 20 years and provide greater certainty to regulators and landowners alike.

10. Monitor tidal wetlands and analyze the potential impacts of sea level rise

To maintain healthy urban wetlands in the face of sea level rise, the City will evaluate which wetlands are vulnerable and how to improve the resilience of these areas through restoration or protection efforts. The City will install additional Surface Elevation Tables (SETs) to measure and monitor wetlands changes. The City will identify opportunities for the inland migration of wetlands as sea level rises and determine data needs and seek funding to conduct horizontal marsh migration analyses.

11. Assess the conditions and functions of New York City wetlands

The City will assess the conditions and functions of wetlands to set appropriate priorities and improve management and protection efforts. The City will implement tidal rapid assessments on their properties to help better characterize conditions and impacts.

12. Develop a research agenda to address wetlands challenges

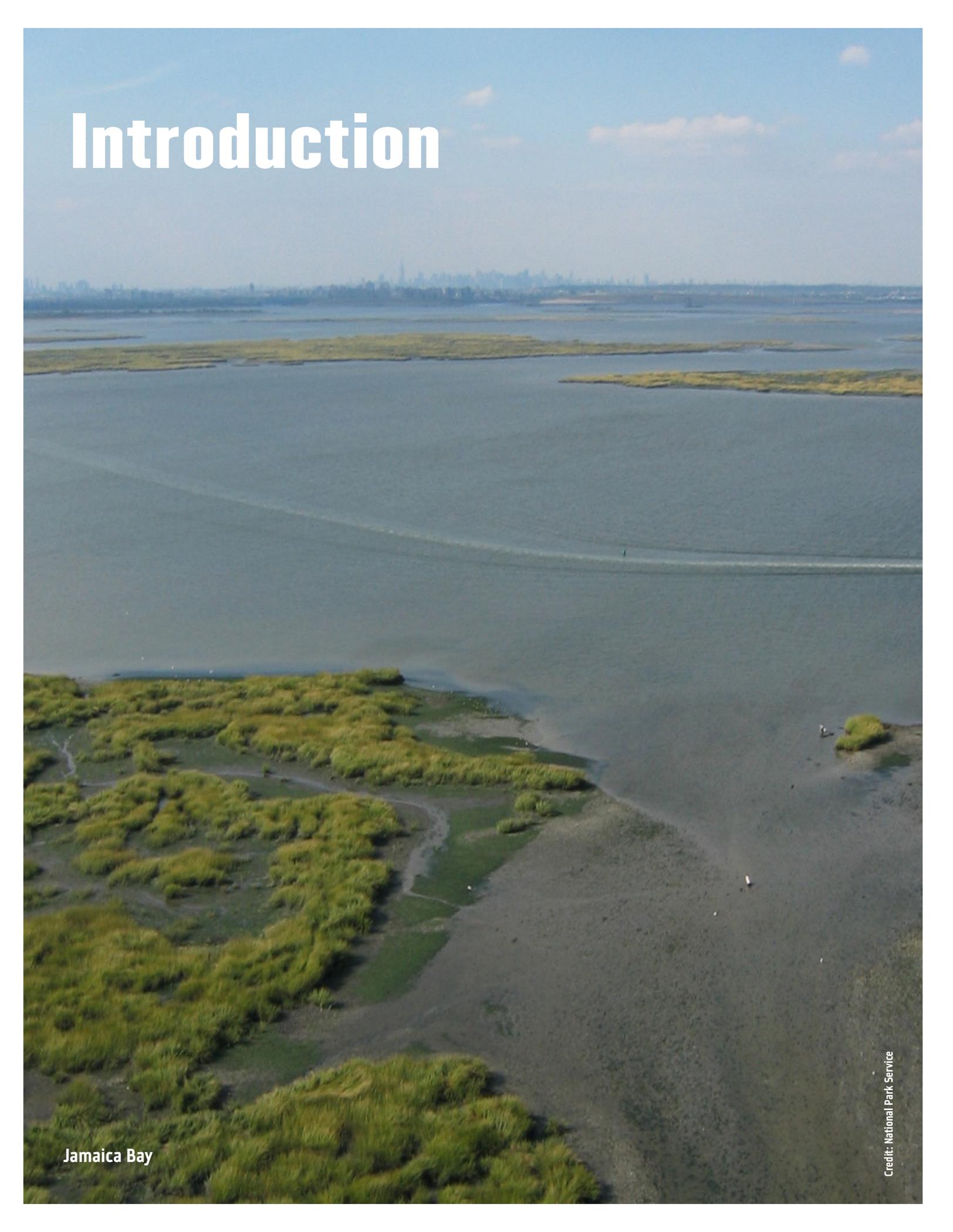
The City will undertake scientific research to understand the causes of habitat degradation and to facilitate a coordinated approach toward corrective actions, thereby enhancing restoration success and sustainability. The City will continue to work with State, Federal, academic, and environmental partners throughout the region to develop and implement a research agenda to address wetlands challenges.

Implementation

By implementing this wetlands strategy, the City will improve wetlands protection, restore the functions of important wetlands, and improve the mitigation process. The City is committed to implementing this strategy by continuing its strong collaboration with State and Federal agencies, key non-profit organizations, and other important stakeholders.

The City will track the implementation of this wetlands strategy by reporting on the progress of these initiatives in existing progress reports, such as the annual report for PlaNYC. As required by Local Law 31 of 2009, the City will submit a report on the wetlands strategy to the Mayor and Speaker of the City Council no later than April 22, 2015 and no later than every fourth year thereafter. In addition to reporting on the initiatives of the City's wetlands strategy, the City will develop a reporting mechanism for wetlands indicators. By 2015, the City will provide metrics on wetland acres created, restored, and enhanced, as well as the number of sites where assessments and monitoring have occurred.

Introduction

An aerial photograph of Jamaica Bay, showing a vast expanse of water with several narrow channels and larger islands. The foreground is dominated by lush green wetlands with intricate patterns of water and land. In the distance, the New York City skyline is visible under a clear blue sky with a few wispy clouds.

Jamaica Bay

Much of New York City's natural waterfront consists of wetlands, the biologically-rich area where water and land meet. Wetlands improve water quality and sequester carbon dioxide. They control floods, capture stormwater runoff, and moderate storm surges. They provide habitat for local and migratory birds, fish and other wildlife. These unique, ecologically-rich areas also present a unique opportunity for New Yorkers to observe wildlife and to undertake other quiet, contemplative recreation.

When Henry Hudson first entered the New York-New Jersey Harbor Estuary in 1609, he was greeted with a breathtaking and amazing display of ecological diversity and natural beauty that is difficult to imagine when entering the Harbor Estuary today. Yet despite the significant loss of historical wetlands and streams, New York is still home to many critical natural areas in Jamaica Bay, on Staten Island, and along Long Island Sound.

Wetlands are an important component of the City's vision for a greener, greater New York, and over the past two decades, the City has steadfastly protected, acquired, and restored wetland habitats, generally as part of publicly-owned parkland. PlaNYC, released in 2007 and updated in 2011, recognizes the importance of wetlands and establishes several initiatives to further improve protection and restoration. PlaNYC committed to a study to identify where existing regulations are not protecting New York City's remaining wetlands as a first step in the development of a comprehensive policy. In 2009, the City published *New York City Wetlands: Regulatory Gaps and Other Threats*, which described the pertinent gaps in Federal and State regulations and recommended the exploration of policy options for the City to fill those gaps. This wetlands strategy builds on that white paper by examining all threats to wetlands and proposing policies to address them.

This wetlands strategy also builds on several other recent City planning and policy efforts. In 2007, the City released the *Jamaica Bay Watershed Protection Plan* (JBWPP) to evaluate the current and future threats to the Bay and establish strategies to address water quality, restoration ecology, stormwater management, and public education and outreach. Also in 2007, the City released a report of the Wetlands Transfer Task Force (WTF) recommending transfer of City-owned wetlands to the New York City Department of Parks & Recreation (DPR) and the New York City Department of Environmental Protection (DEP) for protection and management. And in March 2011, the City released *Vision 2020: New York City Comprehensive Waterfront Plan*, which establishes a goal and initiatives to restore degraded natural waterfront areas and protect wetlands and shorefront habitats.

This strategy also recognizes the important role of our State and Federal partners and seeks to advance efforts already underway in collaboration with multiple agencies and environmental organizations. A shift in thinking over the past 20 years has led to an increasing recognition of the importance of regional planning for habitat protection and restoration. Municipal and state boundaries, of course, have no impact on the flow of water and the movement of species. Ecosystems benefit from regional cooperation and coordination and the pooling of information and financial resources.

The City has actively participated in the New York-New Jersey Harbor & Estuary Program (HEP), a partnership of Federal, State, and local governments, environmental organizations, and other stakeholders focused on protecting and restoring healthy waterways. With support of the HEP, the U.S. Army Corps of Engineers (Army Corps) and the Port Authority of New York and New Jersey (Port Authority) produced the *Hudson-Raritan Estuary Comprehensive Restoration Plan* (CRP), a master plan for ecosystem protection, acquisition, and restoration. The City is an active partner in developing the final CRP and is seeking additional opportunities to combine our efforts with those of our State and Federal partners.

This wetlands strategy is written in accordance with Local Law 31 of 2009 (see Appendix C). Signed by Mayor Bloomberg on May 26, 2009, this law requires the City to create strategies to conserve, protect, enhance, stabilize, restore, and expand wetlands and associated buffer areas. The law also calls for a strategy to:

- Avoid and minimize wetlands losses and achieve no net loss of wetlands;
- Standardize and improve the management of wetlands and associated buffer areas; and
- Balance wetlands protection with other, competing land uses that are in the public interest.

In particular, this wetlands strategy focuses on the protection of the remaining, generally small and vulnerable, wetlands parcels. *New York City Wetlands: Regulatory Gaps and Other Threats* found that existing Federal and State regulations protect New York City's tidal wetlands and its large freshwater wetlands. However, freshwater wetlands smaller than 12.4 acres are not protected by State law and are vulnerable to determinations that they are outside of the scope of Federal protection. This strategy advances the City's understanding of the quantity and ownership of these vulnerable wetlands and proposes strategies that will enhance overall ecological values and systems.

Context



Alley Pond Park in Queens

Credit: NYC Dept. of Environmental Protection

Functions and Benefits of Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, and similar areas. Wetlands have a unique position at the interface of terrestrial and aquatic ecosystems, and their assorted characteristics include stands of vegetation that are adapted to flooded conditions and shallow, multi-channeled bodies of water that buffer waves and wind.

In New York City, wetlands were once considered wastelands to be converted to other uses. Only recently has the importance of wetlands in densely populated urban areas been recognized. Although many of the city's wetlands have been fragmented or degraded, many continue to provide important ecological, economic, and social services.

Wetlands aid in the retention of stormwater, sediment, and nitrogen and other nutrients. By catching stormwater in wetlands, less runoff is channeled into catch basins leading into the separate and combined sewer systems or the city's surface waters. In addition, sediment, nutrients, and other pollutants from adjacent impervious surfaces are filtered by wetland plants and microorganisms, thus reducing the concentrations and frequency of nutrient-rich runoff into nearby surface waters.

Wetlands also buffer the shore from oceanic storm surges and dissipate the destructive energy of local floods. The expected sea-level rise and increased storm frequency associated with climate change will make this function even more important in the future.

Wetlands are among the most biologically productive ecosystems in the world, supporting more plants and animals and producing more organic material than adjacent aquatic or upland areas. The productivity of wetlands is often compared to tropical rainforests and coral reefs. This vegetation provides important habitat for fish and wildlife and forms the base of a rich food pyramid. In New York, more than two-thirds of shellfish, fish, and crustaceans harvested commercially and recreationally depend on these tidal wetlands during part of their life cycle. Locally, more than half of threatened or rare species depend on wetlands for some part of their life cycle.

Wetlands also attract wildlife for viewing and otherwise enhance the enjoyment of parks and public spaces. Wetlands are destinations for educational programming demonstrating the scientific method, using the field as laboratory, studying natural history, and other hands-on learning. They provide cultural and aesthetic values to local residents as well. These open spaces are particularly highly valued in our dense urban area.

While a number of wetlands definitions are used by Federal, state and local government agencies, most definitions recognize wetlands according to their vegetation, soils, and/or hydrology. Federal and state wetland classification systems recognize two main types of wetlands, tidal and freshwater (non-tidal) wetlands.

- Tidal wetlands include estuarine intertidal flats (mudflats, sand bars, and beaches), estuarine emergent wetlands (vegetated flats), or low salt marshes that are flooded on a daily basis, and high salt marshes in intermittently flooded tidelands.
- Freshwater wetlands include emergent, scrub-shrub and forested wetlands, or marshes, wet meadows, vernal pools, ponds, and intermittently inundated floodplains.

Existing Conditions

Urbanization has contributed to the drastic decline in New York City wetlands from pre-colonial times. The dredging of channels and the construction of bulkheads, pierheads, and hardened shorelines have significantly altered tidal wetlands, shoreline, sub-surface and aquatic habitats, and hydrology. Today, the city's high marsh areas and accessible low marshes are either completely filled or confined to narrow strips in the landscape. The upland edges have been filled and hardened for urban development.

In the past century, roughly 85% of the coastal wetlands have been lost in the New York-New Jersey Harbor Estuary. Well over 90% of the freshwater wetlands in the city have been lost. In addition, hundreds of miles of riparian corridor were taken over by development. Streams were filled or piped underground, and higher order streams were straightened and disconnected from their floodplains.

Locations

New York City's largest remaining wetland complexes are found in Jamaica Bay, on Northwest Staten Island, and along the Upper East River and Western Long Island Sound.

Jamaica Bay

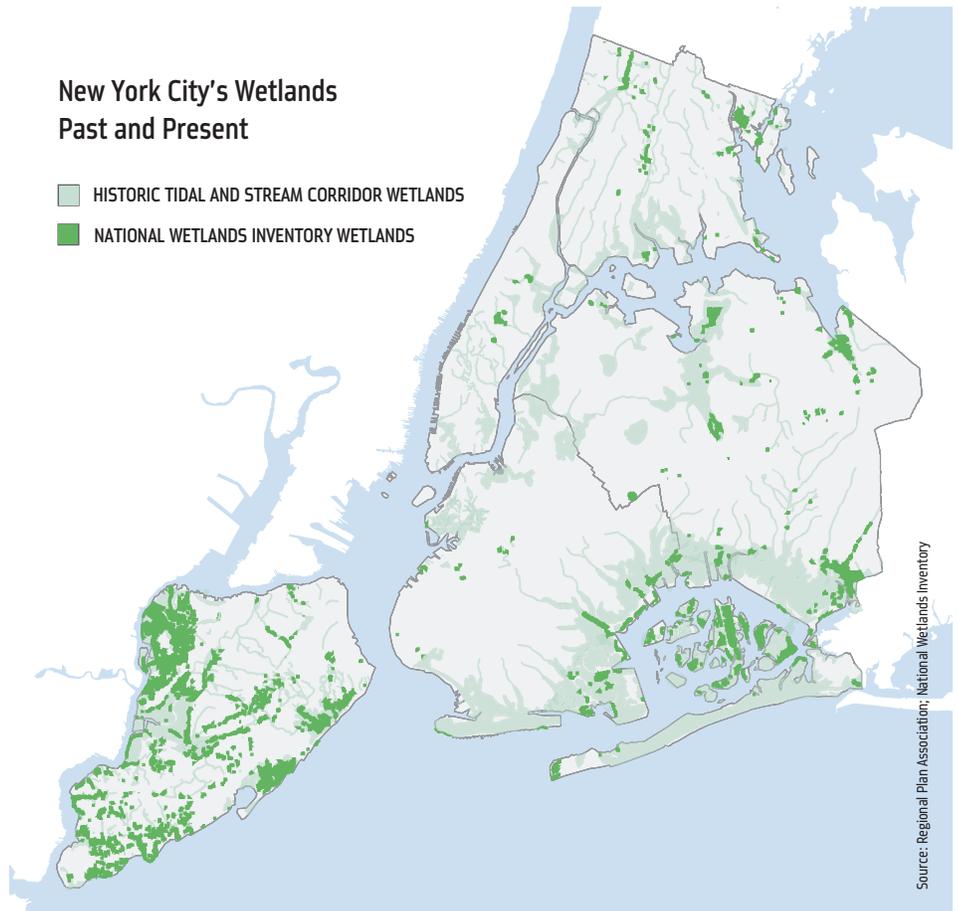
Jamaica Bay, located in Brooklyn and Queens, is one of the most productive ecosystems in the northeastern United States. It contains the largest tidal wetland complex in the metropolitan area as well as coastal woodlands, maritime shrub lands, grasslands, freshwater wetlands, brackish marsh, estuarine tributary and island salt marsh, and open water. A little over half of the Bay is in the Jamaica Bay unit of Gateway National Recreation Area, which includes the Jamaica Bay Wildlife Refuge—the only national wildlife refuge accessible by subway.

The Bay is an important habitat for wildlife. It is home to more than 100 species of fish, a number of endangered species (including the peregrine falcon, piping plover, and the Atlantic Ridley sea turtle), and 214 “species of special concern.” More than 325 species of birds have been sighted in the Bay, which serves as an important stop-over point on the Atlantic Flyway migration route for nearly 20 percent of the birds on the continent.

One of the most serious issues facing Jamaica Bay is the rapidly accelerating rate of marsh fragmentation and loss. The rapid decline of Jamaica Bay's iconic marsh islands can be attributed to many factors. Hardening of the coastline, pollution, alterations due to dredging, sediment deprivation, tidal changes, sea level rise, and the loss of freshwater tributaries have all contributed to wetland degradation, with marshland loss accelerating in the last 20 years. Lakes, ponds, and vernal pools have been drastically changed by filling, dredging, shoreline armoring, and hydrologic manipulation.

New York City's Wetlands Past and Present

-  HISTORIC TIDAL AND STREAM CORRIDOR WETLANDS
-  NATIONAL WETLANDS INVENTORY WETLANDS



Northwest Staten Island

Northwest Staten Island is a diverse landscape of natural habitats and industrial areas. This area may boast the most diverse array of wetland types in the city, including salt and freshwater meadows, spring-fed ponds, forested swamps, creeks, and salt marshes. Wooded upland areas abut tidal complexes, supporting avian species, amphibians, reptiles, and mammals.

Northwest Staten Island became known as the “Harbor Herons Complex” in the 1990s when waterbird populations showed a notable increase in the area. “Harbor Herons” was a blanket term given to a group of avian species that captured public attention. They include the great egret, snowy egret, black-crowned night heron, great blue heron, and glossy ibis. Once considered rare sightings in the New York Harbor area, these waterbirds have become common as water quality has improved over the last 30 years. Other vibrant avian populations also occupy the area and nearby wooded areas and swamps with tidal and freshwater wetlands are prime foraging sites for shorebirds.

Upper East River and Western Long Island Sound

The north shore of Queens and the southeastern shore of the Bronx, along the Upper East River and Long Island Sound contain pockets of salt marsh along inlets, coves, and islands. This is despite sections of armored riprap that retain hundreds of acres of fill. On the south side of the Sound, in Queens, significant salt marshes exist at Alley Pond Park and Udalls Cove. Meadow and Willow Lakes, Little Neck Bay, Pelham Bay Park, and North/South Brother Islands also contain important fish and wildlife habitat.

Thousands of acres of salt marsh, tidal channels, and mud flats once characterized the Bronx shoreline, on the north side of the Upper East River. Most of these areas were filled in by the 1950s. Existing tidal wetlands are concentrated in Pelham Bay Park along Goose Creek Marsh on the Hutchinson River.

Summary of Existing Mapped New York City Wetland Acreages

Area by Ownership (acres)	DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC)			NATIONAL WETLANDS INVENTORY (NWI)		
	Tidal	Freshwater	Total	Tidal	Freshwater	Total
Under Public Ownership	3,057	1,660	4,717	3,160	1,077	4,237
Under Private Ownership	225	781	1,006	463	335	798
Not Located on Tax Lots	4,106	305	4,411	394	164	558
Total	7,388	2,746	10,134	4,017	1,576	5,593

Source: NYC Dept. of Parks and Recreation; NYS Dept. of Environmental Conservation; National Wetlands Inventory

Other Wetlands

Most of the remaining freshwater wetlands in New York City, including ephemeral wetlands and small kettle ponds, are found in large parks, including Van Cortlandt Park in the Bronx and Alley Pond Park and Forest Park in Queens. Staten Island's Greenbelt Park System and its multiple parks along the South Shore, such as Blue Heron and Arbutus, contain the largest number and most diverse array of remaining freshwater wetlands in the city. Many freshwater wetlands are also found within DEP's Bluebelt system on Staten Island.

Quantity

The wetlands and riparian systems in New York City vary widely in size, type and condition. Current estimates of wetland areas in the City come from New York State Department of Environmental Conservation (DEC) wetland maps and from U.S. Fish and Wildlife Service National Wetland Inventory (NWI) maps. The results from these maps vary greatly due to the dates the data were collected and the methodology used (see Appendix A). The major discrepancies between the two sets of wetlands maps indicate that the present quantity of wetlands in New York City is not well known.

The wetlands maps from DEC, which are the official regulatory maps for New York City, count 7,388 acres of tidal wetlands and 2,746 acres of freshwater wetlands for a total of 10,134 acres of wetlands. The tidal wetlands were originally mapped in 1974 and the freshwater wetlands were mapped over an eight-year period beginning in 1987. DEC freshwater wetlands maps were completed in 1987 for Staten Island; 1988 for Brooklyn, the Bronx, and Manhattan; and 1995 for Queens.

Another source of information on the location, size, distribution, and type of wetlands is provided by the National Wetland Inventory program. According to the NWI maps, the city has 4,017 acres of tidal wetlands and 1,576 acres of freshwater wetlands for a total of 5,593 acres. The most recent NWI mapping, conducted in 1999 and 2004, occurred in Staten Island, Brooklyn, and Queens, the boroughs with the greatest number and acreage of wetlands. The NWI mapping for Manhattan and the Bronx was conducted in 1970.

The NWI includes wetlands primarily larger than 0.25 acres, and identifies hundreds of acres of freshwater wetlands and salt marsh in New York City that are not mapped or regulated by DEC. Freshwater wetlands maps by DEC cover wetlands 12.4 acres (5 hectares) or greater plus those wetlands that are smaller than 12.4 acres as designated by DEC as being of "unusual local importance. Approximately 36 wetlands complexes in New York City were granted this designation in the 1980s under a provision of the State Conservation law.

Even though the NWI freshwater wetland maps include smaller parcels not counted by DEC, the NWI maps show a significantly lower amount of freshwater wetlands (1,170 fewer acres) than the DEC maps. This may be partially due to the more recent vintage of the NWI maps, which would reflect any loss in wetlands areas in the intervening years.

This difference in quantity could also be due to the difference in protocol. NWI maps were created based on what was visible from aerial photography with the sample areas ground-truthed based on

wetland vegetation, soils and hydrology, while DEC maps were based on compiled knowledge of conditions at a site. DEC maps incorporate a variety of information sources, such as various types and seasons of aerial photography, soil surveys, elevation data, other wetlands inventories, and some field verification.

These reasons do not necessarily explain why NWI maps also show a significantly lower amount of tidal wetlands (3,371 fewer acres) than DEC maps, as vegetated tidal wetlands are easier to discern with NWI's methods of analyzing photographs. However, DEC tidal maps account for unvegetated shoals and mudflats that are not reflected in the NWI tidal wetland maps.

To better understand wetlands loss and the accuracy of existing wetlands maps, the City compared the NWI and DEC wetlands maps with impervious area maps of New York City created by the University of Vermont Spatial Analysis Laboratory. This analysis shows that citywide, about 1% of tidal wetlands mapped by both DEC and NWI has been developed or paved. This analysis also indicates that about 4% of the freshwater wetlands mapped by DEC are hard built surfaces today, and about 6% of the freshwater wetlands mapped by NWI may also be impervious. For the freshwater wetlands that are mapped by NWI but not regulated by DEC, the rate of wetland loss to impervious area is about 10%, while it is 20% for just those parcels on private lands. This suggests that wetlands on private property are more vulnerable than those on public land.

Public Ownership of New York City Wetlands Mapped by the National Wetlands Inventory

AREA BY ENTITY (ACRES)	TIDAL WETLANDS	FRESHWATER WETLANDS	TOTAL
New York City Department of Parks and Recreation	1,483	721	2,204
New York City Department of Environmental Protection	18	96	114
New York State Department of Environmental Conservation	142	46	188
United States National Park Service	1,448	71	1,519
Other Public Agencies	69	143	212
Total Public Ownership	3,160	1,077	4,237

Source: NYC Dept. of Parks and Recreation; National Wetlands Inventory

Preliminary Survey of Wetland Areas

In September 2010, the City produced preliminary maps of existing wetlands in New York City based on an analysis of high resolution QuickBird satellite imagery and 30 years of Landsat satellite imagery (see Appendix B). While these maps are preliminary and require further refinement and analysis, they represent an important step in evaluating alternative methods and technologies to assess wetland coverage within New York City.

To help with this refinement, this year DEP received the completed Quality Assurance/Quality Control review of the optical remote sensing Light Detection and Ranging (LiDAR) imagery flown for the entire City in April 2010. The incorporation of this data into the preliminary wetlands survey will improve the accuracy of the maps but will still require additional refinement and representative field verification.

While this type of evaluation for determining wetland coverage is relatively new, DEC has shown interest in further evaluating this mapping technology. The City will meet with DEC to advance this technology. We will also continue to meet with DEC, other appropriate agencies, and academic institutions to increase the usefulness of these maps.

Ownership

In New York City, the vast majority of mapped wetlands are publicly owned. For DEC-mapped wetlands, 781 acres (approximately 28%) of freshwater wetlands and just 225 acres (approximately 3%) of tidal wetlands are privately owned. For NWI-mapped wetlands, 335 acres (approximately 21%) of freshwater wetlands and 463 acres (approximately 12%) of tidal wetlands are privately owned.

Three main public agencies own the majority of wetlands in New York City: DPR, DEP, and the National Park Service (NPS).

Department of Parks and Recreation

Of 29,000 acres of DPR parkland, 2,204 acres (1,483 acres of tidal and 721 acres of freshwater) are mapped as wetlands by NWI. These include significant areas such as Pelham Bay Park in the Bronx, Marine Park in Brooklyn, Baisley Pond and Alley Pond Park in Queens, and multiple parks in Northwest Staten Island.

Many City-owned natural areas with habitat and ecological value are protected through DPR's Forever Wild program. DPR has designated 51 areas within the City's park system as Forever Wild preserves, including many natural waterfront sites. The Forever Wild program, which encompasses 1,799 acres of wetlands mapped by the NWI, provides guidance for management and recommendations for preservation, but affords no legal protection for wetlands.

Department of Environmental Protection

DEP owns 114 acres of wetlands mapped by NWI. Most of these wetlands areas are in the Bluebelt system in Staten Island. The Bluebelt is a stormwater management system for approximately one third of Staten Island's land area. The program preserves natural drainage corridors, including streams, ponds, and other wetland areas. Preservation of these wetland systems allows them to perform their functions of conveying, storing, and filtering stormwater.

National Park Service

Within Jamaica Bay, the National Park Service owns a large quantity of wetlands. Originally a sanctuary protected by DPR, since 1972 a large portion of Jamaica Bay has been part of the National Park Service's Gateway National Recreation Area, including the uplands, wetlands and waters south of the Belt Parkway in Brooklyn and Queens, and most of the island marshes. The NPS owns 1,519 acres of wetlands mapped by the NWI. Of those, approximately 95% are tidal wetlands.

Quality

While New York City still contains valuable wetland areas that provide critical ecological services, the overall conditions of these areas vary in quality. Many wetland parcels have been significantly degraded due to human modifications to natural systems, industrial pollution, and changes to water and sediment quality. Within the harbor, most streams and creeks have been eliminated by filling, redirected through storm



Jamaica Bay features wetlands parcels owned by the New York City Department of Parks and Recreation, the National Park Service, and other public agencies

Credit: © 2011 Google, Data SIO, NOAA, U.S. Navy, NGA, GEBCO

sewers, or altered by channelization. Although the Harbor is cleaner than it has been in a century, these other human-created or anthropogenic factors impair the quality of wetlands.

Wetlands in New York City provide high habitat value for many rare and sensitive plants and animals. Rare dragonflies and sensitive salamander species are found in streams, emergent wetlands, and seeps. Staten Island wetlands are home to the largest population of the New York State-threatened southern leopard frog and eastern mud turtle in the state. The egrets and herons of the Harbor Herons complex are well known, but other birds of concern such as grebes, rails, and salt marsh sparrows nest in freshwater wetlands and salt marshes.

Within city limits, vernal pools, or seasonal depressional wetlands that lack a permanent above ground outlet, support vibrant invertebrate communities and, in a few places, also support amphibians such as spotted salamanders, wood frogs, and

Fowler’s toads. These amphibian species are rare in the city as they require both fish-free, temporary ponds for breeding and surrounding natural uplands, where they spend the majority of their lives. Due to habitat fragmentation and degradation, most historic populations of vernal pool-breeding amphibians have been extirpated. However, both pools where amphibians are no longer present, and rapidly-drying pools that naturally exclude amphibians, can add significantly to biodiversity by supporting complex invertebrate communities. These invertebrates provide an important food source for birds, turtles, and other wildlife. Vernal pools with differing lengths of standing water, and therefore different assemblages of species, can be found throughout the city’s natural areas.

Measuring the habitat value, quality, and condition of wetlands is more difficult, requiring on-the-ground data collection. Due to a lack of systematic quantitative assessment of wetlands of different types and in all five boroughs, the overall condition of wetlands in New York City is not well known.

Regulations

The City of New York has general regulatory jurisdiction over land use within its boundaries. However, wetlands are governed by a mix of Federal, State and local regulatory programs. These overlapping jurisdictions create multiple levels of protection that apply to many of the city’s wetlands. Unlike some municipalities, New York City does not have its own wetland regulatory guidelines or ordinances.

Federal Regulations

The principal Federal law governing wetlands is comprised of the 1972 amendments to earlier statutes that are collectively known as the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act, or CWA). The purpose of the CWA is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The CWA does not distinguish between tidal and freshwater wetlands.



Four Sparrows Marsh in Jamaica Bay

Section 404 of the CWA contains the “dredge and fill” program administered by the Corps under the oversight of the U.S. Environmental Protection Agency (EPA). The CWA prohibits the placement of fill into or the excavation or dredging of material into “waters of the United States” without an Army Corps permit. Certain wetlands have been considered “waters of the United States” and thus within the permit requirement.

Other relevant Federal laws include:

- National Environmental Policy Act (NEPA), which requires an assessment of the environmental impact of all permits and other major Federal actions; and
- Coastal Zone Management Act (CZMA), which requires state coastal management plans and provides for state review of Federal actions to ensure consistency with those plans

State Regulations

New York State has adopted separate statutes for the protection of tidal and freshwater wetlands. Those statutes potentially regulate more area than Federal law, as they extend protections to buffer areas that are adjacent to wetlands. However, the statutes require that the DEC identify and map individual wetlands before they can be regulated.

The Tidal Wetlands Act of 1973 is codified in Article 25 of the New York Environmental Conservation Law (ECL) and is implemented through DEC regulations. There is no acreage threshold for jurisdiction under the Tidal Wetlands Act, meaning that all tidal wetlands are regulated regardless of size. The Tidal Wetlands Act also regulates adjacent areas up to 300 feet upland of the wetland boundary except in New York City, where the buffer area is limited to 150 feet. Tidal wetlands maps are inventoried and maintained in DEC Regional Offices. In reality, the extent of tidal wetlands is subject to frequent change, as the coast is a dynamic ecosystem.

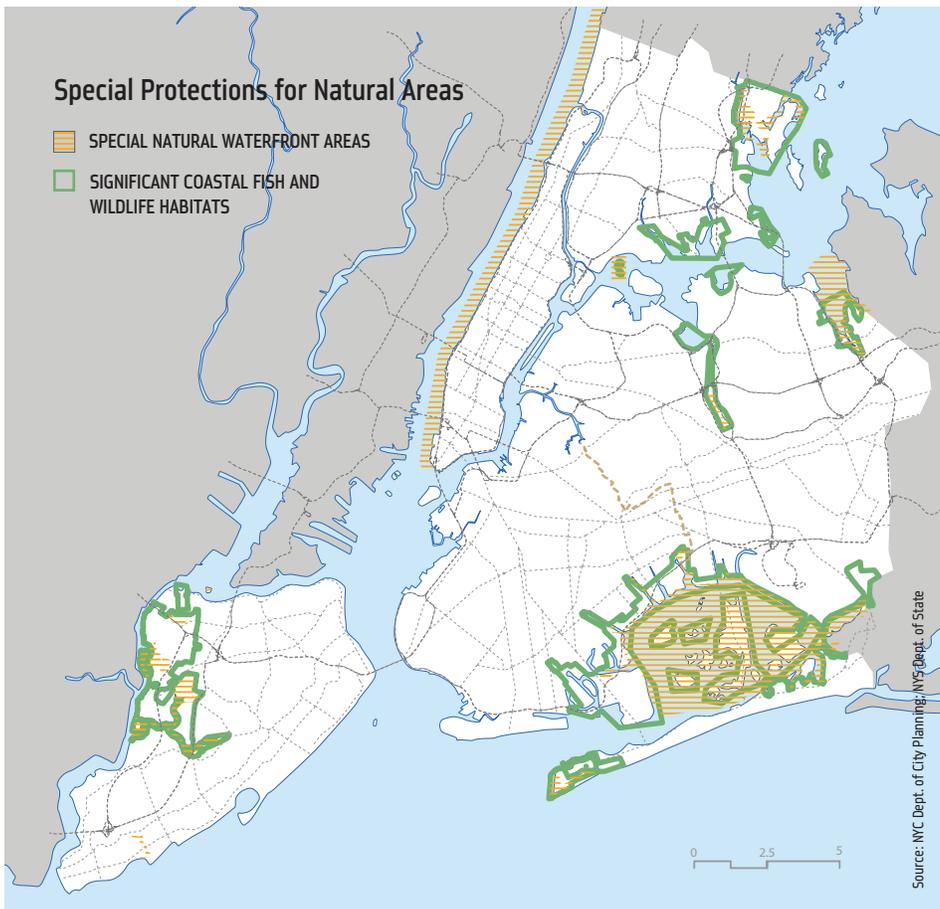
The Freshwater Wetlands Act of 1975 (FWA) is codified in ECL Article 24 and is implemented through DEC regulations. Freshwater wetlands must be 12.4 acres (5 hectares) or greater to be regulated under the Freshwater Wetlands Act. In individual cases DEC has argued that smaller wetlands are hydrologically connected through surface waters and thus can be aggregated to exceed the 12.4 acre threshold. The only explicit exception to the acreage threshold is for smaller wetlands that the DEC designates as having “unusual local importance.” Localities and citizens can petition the DEC to designate individual freshwater wetlands. Article 24 of the Freshwater Wetlands Act also authorizes DEC to regulate 100 foot buffer areas adjacent to regulated freshwater wetlands.

For the protections of the FWA to take effect, the DEC must first map the wetlands, provide notice to the owners of the affected wetlands, provide an opportunity for a public hearing on the accuracy of the maps, make appropriate changes to the maps, and file the maps with all local governments. The DEC maintains official regulatory maps of wetlands. Since wetlands grow and recede, DEC is authorized to change the maps, subject to the same notice and hearing procedures.

The original wetlands maps for New York City were filed between 1987 and 1995. None have been amended. If the accuracy of the City’s preliminary wetlands survey can be improved, then this technology could be used to update the State’s regulatory maps on a more frequent basis to account for natural and anthropogenic changes.

Local Regulations

New York City owns many wetlands but does not have a stand-alone wetlands protection statute or regulation. Rather, the City’s wetland policies are outlined in the Waterfront Revitalization Program (WRP), which implements the City’s coastal planning obligations delegated by New York State under the CZMA, and the City Environmental Quality Review (CEQR) Manual, which implements the City’s environmental review law.



The WRP is the City’s principal coastal zone management tool. As originally adopted in 1982 and revised in 1999, it establishes the City’s policies for development and use of the waterfront. It also provides the framework for evaluating the consistency of all discretionary actions in the coastal zone with those policies. When a proposed project is located within the coastal zone and requires a local, State, or Federal discretionary action, the project’s consistency with the policies and intent of the WRP must be determined before the project can move forward.

The WRP designates “Special Natural Waterfront Areas” (SNWAs), which are given a higher level of protection for having “particular natural habitat features that should be considered in connection with any waterfront activity.” Three SNWAs have been designated: the Northwest Staten Island Harbor Herons Area, Jamaica Bay,

and East River Long Island Sound. In addition, the WRP recognizes “Ecological Complexes” that encompass both the waterfront and upland areas that hold a “variety of important resources.” Two areas fall under the Ecological Complex category: the South Shore of Staten Island and the Riverdale section of the Bronx.

WRP Policy 4 explicitly calls for the City to prevent the net loss of wetlands. Policy 4 also states that “public investment should not interfere” with the habitat functions within a particular wetland area and that “fragmentation or loss of habitat areas within the SNWAs should be avoided and could be the basis for a determination of inconsistency with the WRP.”

With particular focus on the SNWA, Policy 4 seeks to protect and restore the ecological quality of these habitats by avoiding activities that would contribute to “permanent adverse changes” and fragmentation of

these areas. The policy states that ecological complexes should be restored and protected and careful consideration should be given to indigenous plants, rare ecological communities, vulnerable species, and sites designated as Significant Coastal Fish and Wildlife Habitats.

Under CEQR, discretionary actions of the City must be evaluated for the potential to affect natural resources (Chapter 11 of the CEQR Manual), including freshwater wetlands, tidal wetlands, and associated buffer areas, and for consistency with public policies (Chapter 4 of the CEQR Manual), including those policies set forth in the WRP. The WRP contains the City’s policies pertaining to freshwater wetlands, tidal wetlands, and associated buffer areas (Policy 4), which provide guidance in evaluating a project’s potential affect on those natural resources and accordingly, City discretionary actions must be reviewed for consistency with those policies. For those actions which are determined to be inconsistent with the policies of the WRP consideration should be given to alternatives that could make the project consistent with the WRP policies. Where changes that would eliminate inconsistency are not practicable or feasible, consideration is given, by the lead agency conducting the CEQR review, as to whether the inconsistency is of such a degree as to be significant. When a project would result in a significant adverse impact related to inconsistencies with the WRP, those impacts must be mitigated to the greatest extent practicable.

In practice, this evaluation is generally limited to Federal and State-regulated wetlands and buffer areas. Wetland plant and animal species that are known to be threatened, rare, endangered, or otherwise sensitive or worthy of protection are also given individual consideration. However, there is wide discretion in how these evaluations are treated and how vulnerable species are protected.

Mitigation Policy

The goal of mitigation is to replace, at the same level or better, the lost ecological functions and associated values (i.e. the economic and social benefits) of adversely affected wetlands.

When permits are issued that allow disturbances to wetlands or their adjacent areas, regulatory agencies will often require mitigation to compensate for wetland loss. The ratio of compensation may range from requiring the same area of wetland enhancement or creation as the amount to be filled (ratio of 1:1), or, much more commonly, may require a greater amount of compensation (a ratio of 2:1, 3:1, or more). Larger mitigation ratios compensate for the problem that it is difficult to construct wetlands, particularly freshwater wetlands, to achieve the same ecological function as existing functioning wetlands. Other special requirements may be part of a project's specific permit conditions, including the type and location of wetlands.

After attempts to avoid and minimize filling are exhausted, regulatory programs require that any remaining wetlands losses must be replaced through compensatory mitigation.

Mitigation is widely recognized as a useful policy tool. Depending on how and where wetlands are defined and delineated, mitigation can serve as an effective way to offset losses and to protect a regulatory regime that might otherwise become embroiled in compensatory takings or other litigation. However, for mitigation to be effective, additional regular follow-up monitoring work must be performed to ensure the mitigation project is successful and wetland functions are returning.

The establishment of human-created or improved wetlands is a maturing field. Under the best circumstances a restored, enhanced, or created wetland may take years to be as productive as a natural, undisturbed wetland. Some wetland types



Fresh Kills in Staten Island

are also much more easily constructed or restored than others. For example, salt marsh reconstruction is generally successful if the appropriate elevation is achieved, while freshwater swamp forest and emergent wetlands have a more complex hydrology, making them more difficult to successfully design and construct. Accordingly, in mitigation decisions the preservation of existing wetlands is preferred over the restoration of degraded wetlands, and restoration is generally preferred over the creation of new wetlands.

Mitigation can take place on the site of the permitted filling activities or off-site. One off-site strategy is in-lieu fee mitigation, which allows wetland loss to be mitigated by paying a fee to a fund that then aggregates payments to larger restoration projects. Another off-site option, mitigation banking, encourages large-scale wetland restoration projects to generate “credits” that can be transferred to compensate for wetland loss within a predetermined area.

Federal Mitigation Rules

Compensatory mitigation was first mentioned in 1980, when the EPA published guidelines for the Section 404 program. Mitigation became a key part of the Federal program after 1989 when it became national policy to have “no net loss” of wetlands. The commitment to no net loss of wetland functions and values was adopted in a 1990 memorandum of agreement between the Army Corps and EPA and then in the Water Resources Development Act of 1990.

In 2008, EPA and the Army Corps issued regulations governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters. They clarify the requirements for compensatory mitigation and require the use of enforceable permit conditions, performance standards, and third party agreements. They initiate a watershed approach to mitigation, whereby both authorized impacts and mitigation are considered on a watershed scale rather than on a project-by-project basis, to the extent appropriate and practicable. The regulations also incorporate principles of ecological restoration and landscape ecology, by, for example, specifying detailed factors for determining ecological suitability for mitigation project sites.

State Mitigation Rules

New York State has not adopted statutes or regulations that authorize off-site mitigation banks for those wetlands within its jurisdiction.

In at least 22 other states, statutory or regulatory authority has resulted in state mitigation banks, private wetland mitigation banks, or mitigation banks for the sole use of state transportation authorities. For on-site mitigation, New York State recommends mitigation at a ratio of at least one acre of new or restored wetland for every acre filled or impacted. The State also recognizes that it often will be necessary to implement higher mitigation ratios to fully compensate for lost wetland acreage and functions.

Public Ownership of NYC Wetlands Mapped Only by the National Wetlands Inventory

AREA BY ENTITY	ACRES
New York City Department of Parks and Recreation	271
New York City Department of Environmental Protection	14
Other City of New York Agencies	47
New York State Department of Environmental Conservation	16
Port Authority of New York and New Jersey	41
Other State of New York Agencies	2
United States National Park Service	67
Total Public Ownership	458
Total Private Ownership	106
Not Located on Tax Lots	73
Total	637

Source: NYC Dept. of Parks and Recreation; National Wetlands Inventory

Challenges to Wetlands Protection

Given the fragmented nature of our wetlands and riparian systems, there are many political, logistical, and educational challenges to enhancing wetlands. These challenges include a lack of protection from development for small freshwater wetlands parcels, the degraded condition of some wetlands and the on-going stressors from surrounding urban watersheds, the way that Federal and State mitigation requirements are enforced in practice, the lack of sustainable funding sources for wetlands, and the effects of climate change.

Development Threats

Wetland loss has occurred in New York City for a variety of reasons, but development and fill has been a primary cause. The historic pace of dredge and fill activity in wetlands has been slowed by Federal and State regulations in recent decades. Most upland conversions occurred prior to the 1970s before wetlands came under the jurisdiction of the Army Corps and (together with wetlands adjacent areas) the DEC.

One study of Jamaica Bay estimates that 1,174 acres were lost from 1900 to 1974 due to filling for development, airports and landfills. As applied in New York City, current Federal and State policies result in limited fill activity in wetlands and adjacent areas under certain circumstances. However, some wetlands parcels are still vulnerable to development.

Local oversight through relevant City laws – the CEQR process, the WRP, and the Uniform Land Use Review Procedure – does not apply to all development activities that might affect wetlands. These multifaceted programs are not exclusively or even principally directed toward wetlands protection.

The WRP and CEQR requirements do not necessarily apply to all City or private actions that affect tidal or freshwater wetlands. Nondiscretionary actions, or those of a limited scope, generally classified as CEQR Type II actions, are not reviewed for consistency. Accordingly, projects are not addressed in the WRP/CEQR process if they are not in the coastal zone, are built “as of right,” involve only ministerial government action, or are on the Type II list. Actions that are not subject to any of the above procedures include those affecting freshwater wetlands outside of the coastal zone, issuance of a building permits for as-of-right construction or any Type II action under CEQR, and purely private actions not involving any local or State agency approval or funding.

The true number of unprotected wetlands parcels in New York City is not precisely known, but only a small area is subject to development pressure. The NWI maps provide the best estimate for current wetlands, particularly for small freshwater wetlands that are not regulated by DEC. According to the NWI dataset, there are approximately 637 acres of freshwater wetlands in New York City that are not mapped by DEC (see Appendix A). Of these properties, 458 acres are owned by public agencies (City, State,

and Federal), and 73 acres are mapped as right of way, which effectively means that they are under public control due to land use regulations. Of these 458 acres of public-owned wetlands, the majority are owned by DPR (271 acres), DEP (14 acres), NPS (67 acres), the Port Authority (41 acres), DEC (16 acres), and multiple City agencies (47 acres).

Approximately 106 acres of freshwater wetlands mapped by NWI but not regulated by DEC are privately-owned, meaning they are not protected by State or Federal regulations. These 106 acres exist on 1,027 City tax lots. This represents less than 7% of the total amount of freshwater wetlands mapped by NWI and less than 2% of all wetlands mapped by NWI.

Of the privately-owned freshwater wetlands mapped by NWI but not mapped by DEC, approximately 69 acres exist on tax lots greater than 0.25 acres. As the NWI maps primarily map wetlands over 0.25 acres, this indicates that many of the parcels smaller than 0.25 acres may be connected to DEC-regulated wetlands or covered by State regulations, either as part of the 100-foot buffer area or because the area would be recognized by DEC during a field-based wetland delineation (provided the applicant pursues a permit). These 69 acres of small privately-owned freshwater wetlands not mapped by DEC exist on 83 tax lots, of which 19 tax lots contain wetlands larger than one acre. Of these 83 tax lots, 65 are on Staten Island, and they account for approximately 51 acres.

Pollution

Sediment and pollutants, such as excess nutrients and metals, are another threat to wetlands. Untreated stormwater runoff can slowly fill wetlands and degrade habitat. To a degree, wetlands can absorb and filter these pollutants, as aptly demonstrated by the Bluebelt system on Staten Island, where engineered wetlands absorb and filter street runoff. However, if pollutants exceed the carrying capacity of wetlands, then ecological functions will diminish over time.

Mitigation Challenges

When the filling or development of wetlands is permitted, applicants are typically required to mitigate those impacts through the restoration or creation of wetlands at the same location or in another location. This is an important component of wetlands regulations, as there are times where it is necessary to develop wetlands for important public infrastructure or key economic development projects that provide critical public benefits. However, New York State's current mitigation system presents many complex challenges.

Wetlands mitigation in New York State requires restoration at the site of the disturbance or at a nearby location. This system often is not practical in New York City. In an urban setting, it can be difficult to achieve the goals of development and environmental restoration on a single parcel. The system also leads to sub-optimal outcomes as it encourages restoration projects that are small, expensive, and of lesser habitat value. These significant flaws mean that the public is not getting the greatest benefit from the money spent.

The conventional wisdom has been that on-site mitigation provides better compensation for lost wetlands functions. More recent studies have re-examined these assumptions in light of the well-documented failures of on-site mitigation programs. Those studies have concluded that while wetlands' hydrologic functions should be replicated as closely as possible, habitat functions may be better replicated off-site where wetlands can be larger, less fragmented, and more removed from the disrupting activities of human society. In addition, there are fewer wetlands available for mitigation. Federal regulators encourage the use of alternative mitigation mechanisms such as in-lieu fee mitigation or mitigation banking.



Arlington Marsh Cove in Staten Island

Credit: Carter Strickland

The current mitigation system also provides challenges to permit applicants who often encounter regulatory hurdles, delays, and uncertain outcomes that can hinder their ability to maintain their properties or create new housing, businesses, or open space. The maritime industry, which relies on the waterfront and waterways and routinely needs to build and maintain structures in and at the edge of waterbodies, is particularly affected by challenges in the permitting process.

Funding

The maintenance, stewardship, and restoration of wetlands and natural areas require significant financial resources. Protection and restoration in New York City is particularly expensive.

Cost-effective opportunities for restoration are increasingly difficult to find today. The high costs (and sometimes environmental impacts) of fill removal, site constraints, limited space, and competition for land are all contributing factors. Recent costs for wetlands restoration projects in New York City have had an average restoration cost of nearly \$500,000 per acre (see restoration project tables on page 29).

Currently there is no dedicated funding mechanism for restoration projects. The City has funded restoration efforts using general operating funds as part of mitigation for landfill closures or other capital projects. Federal and State governments

and non-profit groups have also provided grants for restoration projects. Maintenance and management are underwritten by general appropriations, as external sources of funding are not generally available for these essential functions.

Recent Federal funding for wetlands restoration has been authorized primarily on a project-by-project basis, and no stable funding source exists. A main vehicle for Federal funding has been the federal Water Resources Development Act (WRDA) administered by the Army Corps. WRDA, originally authorized in 1974, has been renewed nine times, but not since 2007.

Federal wetland restoration and protection efforts in New York Harbor are underfunded in relation to other major estuaries. For example, EPA's FY 2011 budget included significant funding for ecosystem restoration work around the Great Lakes (\$300 million), Chesapeake Bay (\$63 million), and Puget Sound (\$20 million). Similarly, the Department of the Interior's FY 2011 budget increased restoration investments for such treasured landscapes as the California Bay-Delta region (\$155 million), the Everglades (\$75 million), Chesapeake Bay (\$32 million), and the Gulf Coast (\$27 million). A goal for the New York-New Jersey Harbor Estuary should be to have meaningful funding levels that are commensurate with funds committed to other regions and that recognize the significant ecological importance of the Harbor.

Climate Change Projections for New York City¹

	BASELINE 1971-2000	2020s	2050s	2080s
Air Temperature²	55°F	+ 1.5 to 3°F	+ 3 to 5°F	+ 4 to 7.5°F
Precipitation²	46.5 in	+ 0 to 5%	+ 0 to 10%	+ 5 to 10%
Sea Level Rise^{2,3}	NA	+ 2 to 5 in	+ 7 to 12 in	+ 12 to 23 in
Rapid Ice-Melt Sea Level Rise⁴	NA	+ 5 to 10 in	+ 19 to 29 in	+ 41 to 55 in
Number of Days Per Year With Temperature Over 90°F	14	23 to 29	29 to 45	37 to 64
1-in-100 Year Flood to Reoccur, On Average⁵	once every 100 years	once every 65 to 85 years	once every 35 to 55 years	once every 15 to 35 years

- 1 Based on 16 Global Climate Models (GCMs) (7 GCMs for Sea Level Rise) and three emissions scenarios. Baseline is 1971-2000 for temperature and precipitation and 2000-2004 for sea level rise. Data from National Weather Service (NWS) and National Oceanic and Atmospheric Administration (NOAA). Temperature data are from Central Park; precipitation data are the mean of the Central Park and La Guardia Airport values; and sea level data is from the Battery at the southern tip of Manhattan (the only location in NYC for which comprehensive historic sea level rise data are available).
- 2 Projections represent the middle 67% of values from model-based probabilities; temperatures ranges are rounded to the nearest half-degree, precipitation to the nearest 5%, and sea level rise to the nearest inch.
- 3 The model-based sea level rise projections may represent the range of possible outcomes less completely than the temperature and precipitation projections.
- 4 Rapid ice-melt scenario is based on acceleration of recent rates of ice melt in the Greenland and West Antarctic Ice sheets and paleoclimate studies.
- 5 Does not include the rapid ice-melt scenario.

Source: New York City Panel on Climate Change

Managing and maintaining wetlands is also expensive. There are costs associated with maintaining these valuable areas regardless of the level of human visitation. Many wetlands require restoration of their hydrologic regime and native vegetation. Any boardwalks, benches, piers, and observation areas must be kept clean and in good repair. Adequate security and enforcement helps ensure public safety and prevents illegal dumping and off road vehicles.

Achieving successful management and long-term restoration goals will require additional funding. To continue and increase restoration efforts, the City must strengthen partnerships with other government and local entities. The City will also need to develop innovative funding mechanisms that can enhance natural areas while also providing other environmental or public benefits. If the New York Harbor is to remain an ecologically vibrant region, a steady and dedicated stream of funding is necessary. Local professionals must also take a coordinated and scientific approach to restoration that does not neglect important restoration opportunities.

Climate Change and Sea Level Rise

Wetlands, like other fragile habitats and the biodiversity they nurture, are further threatened by the impacts of climate change and sea level rise. The City has worked with leading scientists and climate change experts through the New York City Panel on Climate Change (NPCC) to better understand the overall threat from climate change. The NPCC projects a sea level rise of two to five inches by the 2020s, Seven to 12 inches by the 2050s, and 12 to 23 inches by the 2080s. Under a scenario of rapid land-based ice melt, sea level rise could be 41 to 55 inches by the 2080s.

Sea level rise will cause the zone of wetlands-appropriate elevations to migrate inland. Depending on the vertical shore profile, a three foot sea level rise would cause the shore to retreat horizontally by as much as 50 to 100 yards. A key question is whether this natural inland migration can occur in the highly urbanized upland edges of New York City's tidal wetlands.

Development before the adoption of Federal or State regulations often occurred directly up to or on wetlands, leaving no transition area. Even development of upland adjacent areas that took place after Federal or State wetland regulations may not have left much transition area for inland migration. While State law requires a 150-foot transition area in New York City, and 300 feet elsewhere; however, in practice permitted fill activity has been allowed much closer to the wetland boundary.

Even where some inland migration is possible, or where wetlands will otherwise tolerate sea level rise, other effects of climate change will pose a threat. For example, more extreme weather events, including greater storm surges and higher waves, will increase erosion and harm wetlands. Another hurricane like the 1960 hurricane that swept through the New York City area could scour out shallow sediments all the way to (and over) seawalls, coastal roads and other hard shoreline surfaces, and cause significant damage to coastal wetlands.

Our Plan

Pelham Bay in the Bronx

Credit: NYC Dept. of Parks and Recreation

Since 2002, the Bloomberg Administration has made the largest commitment to improving our waterways and waterfront of any administration in the city's history. We have invested more than \$9 billion to reduce discharges and to improve harbor water quality, and the water in New York Harbor is cleaner now than at any time in the last century. This investment in water quality infrastructure has set the stage for ecological recovery, including wetlands.

PlaNYC established a goal to improve the quality of our waterways to increase opportunities for recreation and restore coastal ecosystems. The initiatives contained within this wetlands strategy are critical components that will help us achieve this goal.

This wetlands strategy establishes the goal of no net loss of wetlands. But this strategy also recognizes that addressing the quantity of wetlands in New York City does not provide a clear enough picture. This strategy also establishes the goal to improve the quality of the city's remaining wetlands and maximize their ecological functions to the greatest extent possible.

To achieve our goals, this wetlands strategy establishes a framework to address four key areas: protection, mitigation, restoration, and assessment. We will protect wetlands by improving public management of wetlands parcels, seeking to acquire vulnerable privately-owned sites, and enhancing the City's Waterfront Revitalization Program. We will improve wetlands mitigation by partnering with State and Federal agencies to enhance mitigation guidance and establish a mitigation banking mechanism for public projects. We will restore wetlands by completing nearly \$48 million of ongoing projects, establishing a natural areas conservancy, and partnering with the Army Corps and other regional partners to implement the *Comprehensive Restoration Plan*. Finally, we will assess wetlands to fill critical knowledge and data gaps. We will improve wetlands mapping, develop a wetlands research agenda, evaluate ecological functions of existing wetlands, and study the impacts of climate change and sea level rise.

This strategy outlines these important initiatives, but it also must be read with other City plans and commitments to create better conditions for wetlands. PlaNYC, the *NYC Green Infrastructure Plan*, *Vision 2020: New York City Comprehensive Waterfront Plan*, and the *Waterfront Action Agenda* include many complementary commitments to improve water quality and the health of our ecosystems.

We are upgrading our wastewater treatment plants to increase their capacity and improve the quality of the water they discharge. We will complete \$770 million worth of upgrades at the Bowery Bay, Tallman Island, and Wards Island wastewater treatment plants to reduce nitrogen discharges into the East River by more than 50%. We will also reduce the nitrogen discharged into Jamaica Bay by nearly 50% over the next 10 years.

We are making cost-effective "grey infrastructure" investments such as upgrading and constructing new detention facilities and pumping stations. Over the next 20 years, we will invest \$2.9 billion to construct grey infrastructure projects that reduce the amount of untreated water discharged into our waterways.

We are also making a transformative investment in green infrastructure that captures or detains stormwater before it can enter and overwhelm the sewer system. We will design, build, and maintain stormwater source controls, or small installations that control stormwater where it meets impervious surfaces. In 2010, we launched the *NYC Green Infrastructure Plan*. It will supplement traditional approaches with a \$1.5 billion public investment over 20 years to improve water quality by making the city greener and more permeable. This investment, paired with targeted cost-effective grey infrastructure, will reduce combined sewer overflows (CSOs) by 40%. Green infrastructure will not only improve the quality of our waterways. It will also clean the air, lower energy demand, reduce carbon emissions, increase species habitat and property values, and reduce the city's vulnerability to the impacts of climate change.

We are investing millions of dollars in actively restoring the wetlands of Jamaica Bay. These efforts, encompassed within DEP's *Jamaica Bay Watershed Protection Plan*, include habitat restoration in and along Jamaica Bay and a comprehensive strategy by DEP to improve water quality while creating productive ecological areas.

We are also expanding the Staten Island Bluebelt Program, which purchases land to preserve it for surface water management purposes. Since the early 1990s, we have relied upon wetlands and natural areas in our Bluebelt system in Staten Island to convey, filter, and store stormwater runoff, thereby eliminating the need for costly storm sewer systems. Using natural systems in place of traditional sewers has saved taxpayers \$80 million in infrastructure costs, raised property values, and restored damaged habitats. The Bluebelt system is a successful model of a cost-effective sustainable stormwater management strategy that provides multiple benefits in addition to improving water quality. In Staten Island, we will expand the Mid-Island Bluebelt to Oakwood Beach, New Creek, and South Beach. We will also expand the use of this approach in parts of Queens and other boroughs where it is cost-effective and there is sufficient space.

All of these improvements will allow New Yorkers and our visitors to access areas that have been off limits to recreational use for decades. They also demonstrate our commitment to preserving a clean and healthy harbor ecosystem for future generations.

Protection

INITIATIVE 1

Strengthen protection of vulnerable wetland parcels

Gaps in State and Federal regulations leave freshwater wetlands smaller than 12.4 acres vulnerable to development. That is why the City has evaluated options for increasing regulatory protection, including creating a local wetland regulatory scheme that would protect these smaller freshwater.

Unlike other states that preempt all local regulation, New York State's wetlands statutes recognize several alternatives for local regulation of wetlands. In New York State, municipalities can enact independent wetlands protection and management ordinances if they are at least as protective as State law. In practice, this means that municipalities can enact freshwater wetlands laws that protect wetlands less than 12.4 acres in size through a local permitting regime.

Local legislation would be required to establish a permitting authority, a review procedure for permitting decisions, and a system for monitoring and enforcing permit requirements. In addition, a local permitting program would require additional resources to identify remaining wetlands, create regulatory maps, process permit applications, and enforce permit conditions.

Local wetland protection ordinances are common in many nearby municipalities and counties (e.g. Westchester and Suffolk Counties). Such local ordinances may, under State law,

“...assume regulatory authority over State-designated wetlands from the DEC pursuant to Article 24 of the ECL by adopting local laws which incorporate specific provisions set by the State. To assume this authority, local governments must demonstrate to the State



The South Richmond Bluebelt on Staten Island

Credit: NYC Dept. of Environmental Protection

adequate technical, administrative and enforcement capabilities to carry out the State program.”

For example, Westchester County has developed a model ordinance for use by municipalities within that county. The model ordinance, as well as actual ordinances enacted by towns within Westchester, requires permits for most activities on or around wetlands that are smaller than the State threshold. The permits are reviewed by a special board or reviewing authority and can include mitigation requirements.

Any policy discussion must take into account whether the number and acreage of unprotected wetlands would justify a program. The discussion must also consider the costs and benefits of protecting otherwise vulnerable wetlands from development and fill. There are also opportunity costs of spending finite municipal resources on one policy when another might be more cost-effective. Moreover, any restriction on land use has to be weighed against the need for housing, education, municipal services, parks, and other public needs that require land.

The City has determined that the benefits of creating a new local wetland protection ordinance to protect a relatively small number of wetlands would not outweigh the costs of establishing and enforcing a new regulatory regime. As noted earlier, the vast majority of small unprotected

freshwater wetlands are publicly owned. Fewer than 100 acres of freshwater wetlands, approximately 2% of all wetlands in the city, are privately owned.

Many of the unprotected publicly-owned freshwater wetlands were previously evaluated for additional protection through the Wetlands Transfer Task Force (WTTF). In 2005, the City formed the WTTF to inventory City-owned wetlands and determine the technical, legal, environmental, and economic feasibility of transferring these wetlands to the jurisdiction of DPR or DEP for protection and management.

The WTTF completed its work in 2007 and issued a report pursuant to Local Law 83. More than 1,000 City-owned properties totaling over 700 acres were identified. The WTTF recommended the transfer of 82 City-owned wetlands properties to DPR and the study of an additional 111 “special review” properties for transfer.

By December 2011, DPR had assessed all of the “special review” properties. Nine properties, for a total of approximately 96 acres, have already been transferred to DPR. DPR has also initiated requests to transfer 10 additional parcels, for a total of approximately 76 acres. When these additional transfers are complete, a total of approximately 172 acres out of approximately 628 acres, or 27%, of the parcels recommended for transfer to DPR or designated as “special review” will be protected as City parkland.

Status of Wetlands Transfer Task Force Recommendations by Acreage

BOROUGH	STATUS	SPECIAL REVIEW	TRANSFER TO DPR	TRANSFER TO DEP	TRANSFER TO DOT	TRANSFER TO EDC	TOTAL (ACRES)
Staten Island	Recommended	50.6	127.2	12.2	0.2	95.7	285.9
	Transferred	0.0	1.9	7.9	0.0	0.0	9.8
	Pending	0.1	0.0	3.8	0.0	0.0	3.9
	Remaining	50.5	125.3	0.5	0.2	95.7	272.2
Queens	Recommended	46.9	63.3	0.0	0.0	0.0	110.2
	Transferred	6.5	8.7	0.0	0.0	0.0	15.2
	Pending	0.4	10.3	0.0	0.0	0.0	10.7
	Remaining	40.0	44.3	0.0	0.0	0.0	84.3
Bronx	Recommended	258.6	64.9	0.0	0.0	0.0	323.5
	Transferred	78.9	0.0	0.0	0.0	0.0	78.9
	Pending	0.0	64.9	0.0	0.0	0.0	64.9
	Remaining	179.7	0.0	0.0	0.0	0.0	179.7
Brooklyn	Recommended	16.9	0.0	0.0	0.0	0.0	16.9
	Transferred	0.1	0.0	0.0	0.0	0.0	0.1
	Pending	0.0	0.0	0.0	0.0	0.0	0.0
	Remaining	16.8	0.0	0.0	0.0	0.0	16.8
Totals	Recommended	373.0	255.4	12.2	0.2	95.7	736.5
	Transferred	85.5	10.6	7.9	0.0	0.0	104.0
	Pending	0.5	75.2	3.8	0.0	0.0	79.5
	Remaining	287.0	169.6	0.5	0.2	95.7	553.0

Source: NYC Dept. of Parks and Recreation; NYC Dept. of Environmental Protection

The remaining 72 parcels recommended for transfer to DPR require further actions. These actions include boundary surveys, signing and securing property, removing existing debris, and performing other clean-up work at the sites. These sites are still currently managed by the Department of Citywide Administrative Services, the New York City Economic Development Corporation, the New York City Department of Housing Preservation and Development, or other City agencies.

The feasibility and timing of future transfers will depend on a variety of legal, regulatory, funding, and construction issues. DPR's policy is not to accept additional lands unless funds are identified to pay for their maintenance. Since maintenance and management funding is limited, DPR has been reluctant to accept transfer of isolated, small, and dispersed wetlands that require significant, ongoing resource obligations in excess of their hydrologic or habitat functions. The City has placed a hold so that no City-owned wetlands properties can be transferred without the knowledge of DPR.

The City will continue to evaluate opportunities to fund the necessary improvements that are required for future transfers to DPR.

Of special note are three properties at Arlington Marsh on Staten Island. The City remains eager to complete these partial transfers; however, as the WTTF has reported, the project to expand the New York Container Terminal calls for related work to occur that will affect the adjacent properties. The City has recently reaffirmed its intent to complete the transfer of Arlington Marsh to DPR in both the *Waterfront Action Agenda*, released March 2011, and the *Working West Shore 2030* plan, released June 2011.

The WTTF also recommended that 76 of the City-owned freshwater wetlands properties on Staten Island, totaling about 12 acres, be transferred to the DEP Bluebelt Program. Of those properties, 62 were officially transferred in October 2011 for two reasons: these parcels expressly play a role in stormwater management (a legal

responsibility of DEP rather than DPR), and they have a fee-based funding structure associated with them that DPR does not have. Of the remaining 14 properties, DEP will seek jurisdiction for nine of them. The other five properties are not adjacent to existing Bluebelt holdings and, therefore, not suitable for inclusion in the system.

INITIATIVE 2 Increase wetlands acquisition efforts

The City will seek opportunities to acquire more wetlands parcels.

DPR has made a concerted effort not only to acquire and protect, but also to restore City wetlands and their adjacent areas. While DPR wetland acquisitions have tended to be properties already in City ownership, several have been private holdings. Since 2002, DPR has acquired nearly 300 acres of natural lands. Of those, Staten Island acquisitions accounted for nearly 220 acres. Approximately half of DPR's

Wetlands Transfer Task Force Parcels Already Transferred to or Requested by the New York City Department of Parks and Recreation

BOROUGH	WTTF ASSESSMENT AREA	BLOCK	LOT	FORMER JURISDICTION	ACRES	DESCRIPTION
WTTF Parcels Already Transferred to the New York City Department of Parks and Recreation						
Bronx	Eastchester Bay	5409	40	SBS	62.42	Assigned to Locust Point Marina
Bronx	Harlem River	2356	2	SBS	3.97	Commonly referred to as the proposed "Velodrome Site"
Bronx	Hunts Point	2777	901	JOINT	12.5	Assigned to Barreto Point Park
Brooklyn	Coney Island	6944	500	DCAS	0.06	Assigned to Calvert Vaux Park
Staten Island	Sweet Brook	5632	4	DCAS	1.91	Wooded parcel near the Sweet Brook Bluebelt
Queens	Edgemere 2	15675	126	DCAS	0.27	Adjacent to Michaelis-Bayswater Park
Queens	Edgemere 2	15675	200	DCAS	8.41	Adjacent to Michaelis-Bayswater Park
Queens	Broad Channel	15326	20	DCAS	3.06	Formerly "Schmitt's Marina," now Sunset Cove
Queens	Broad Channel	15327	10	DCAS	3.45	Formerly "Schmitt's Marina," now Sunset Cove
TOTAL					96.06	
WTTF Parcels Requested for Transfer by the New York City Department of Parks and Recreation						
Bronx	Hudson River	5929	970	SBS	64.87	Adjacent to Riverdale Park
Staten Island	Arbutus/Wolfe's	6441	90	DCAS	0.10	Adjacent to Blue Heron Park
Queens	Edgemere 2	15749	2	DCAS	8.42	Adjacent to Michaelis-Bayswater Park
Queens	Edgemere 2	15749	60	DCAS	0.88	Adjacent to Michaelis-Bayswater Park
Queens	Edgemere 2	15749	69	DCAS	0.51	Adjacent to Michaelis-Bayswater Park
Queens	Edgemere 2	15749	70	DCAS	0.02	Adjacent to Michaelis-Bayswater Park
Queens	Edgemere 2	15749	125	DCAS	0.43	Adjacent to Michaelis-Bayswater Park
Queens	Idlewild	13808	1	DCAS	0.09	Adjacent to Idlewild Park
Queens	Idlewild	13808	5	DCAS	0.24	Adjacent to Idlewild Park
Queens	Spring Creek	11455	8	DCAS	0.04	Adjacent to Spring Creek Park
TOTAL					75.60	

Source: NYC Dept. of Parks and Recreation

acquisitions have included tidal wetlands, with some interior freshwater wetlands and associated woodlands.

DPR has acquired many important natural area sites since 2002, including:

- Staten Island: Blue Heron Park, Long Pond Park, Lemon Creek Preserve, Wolf's Pond Park Preserve, Crescent Beach Park, Arden Heights Woods, Saw Mill Creek Preserve, Reeds Basket Willow Swamp Preserve, and Ocean Breeze
- Queens: Powell's Cove, Udalls Park Preserve, Alley Pond Park, and Broad Channel wetlands.
- Brooklyn: Paerdegat Basin Park
- The Bronx: Soundview Park, South Brother Island, and Pugsley Creek Park

DEP has also already acquired 325 acres of significant wetland and adjacent areas for the Staten Island Bluebelt and is planning to acquire an additional 195 acres over the next 30 years. The watersheds benefiting from Staten Island Bluebelt stormwater management projects include Richmond Creek, Sweet Brook, Blue Heron/Seguine Pond, Arbutus Creek, Wolfe's Pond, Lemon Creek, Sandy Brook, Mill Creek, Jack's Pond, and Wood Duck Pond. The new Mid-Island Bluebelt system will acquire wetland and adjacent areas within the Oakwood Beach, New Beach, and South Beach sections of Staten Island.

Several Federal, State, and City initiatives, including the *New York State Open Space Plan* and HEP, have identified a number of specific New York City wetlands as priority or acquisition sites. The 2006 HEP "Priority Acquisition and Restoration Sites" list

includes approximately 20 sites in New York City that likely contain wetlands. Unfortunately, Federal wetlands acquisition programs in general and the HEP program in particular are underfunded and not reliable sources for major acquisition efforts.

The City will work with local, State, and Federal partners to evaluate opportunities for additional wetlands acquisitions. Specific attention will be given to the privately-owned small freshwater wetlands parcels that are not protected by State or Federal regulations. DEP will evaluate private parcels on Staten Island that may be candidates for future inclusion in the Bluebelt program. The City will also seek to strengthen its partnerships with groups such as The Nature Conservancy and the Trust for Public Land to increase opportunities for future wetlands acquisitions.



Mitigation

INITIATIVE 4 Work with State and Federal partners to revise wetlands mitigation guidance

Opportunities for wetland mitigation occur frequently in New York City. However, the regulatory process for mitigation could be improved to reflect the unique conditions here.

Regulatory reviews of projects for New York City should recognize that the city's dense urban setting might call for a different approach to the protection and enhancement of natural resources than is used in less-developed areas. In other parts of the state, the waterfront is generally characterized by a range of low-density uses and parks on large tracts of land. An appropriate approach for New York City is to recognize a variety of ecological opportunities and to use the development process to improve environmental conditions.

Mitigation is a helpful tool in wetlands management. However, there has been a number of problems with past mitigation programs. The lack of effective oversight also constitutes a significant gap in existing regulatory protections. A 2005 report of the U.S. Government Accountability Office (GAO) found that a low percentage of mitigation projects were monitored for compliance and a low percentage of those projects achieved required mitigation ratios. Of the mitigations required, about 75% were actually implemented. Half of those ultimately comply with permit requirements, and 20% overall achieve some measure of functional equivalence with lost wetlands.

The practical problems with requiring numerous small mitigation projects have led the Army Corps and EPA to conclude that on-site mitigation is less promising than mitigation banking and other efforts that create or restore larger wetland areas.

INITIATIVE 3 Update the Waterfront Revitalization Program to enhance wetlands protection

The Waterfront Revitalization Program (WRP) is the City's formal policy for balancing economic development, natural resources protection, and public access on the shoreline. When a proposed project in the coastal zone requires a local, State, or Federal discretionary action, a determination of the project's consistency with the policies and intent of the WRP must be made before the project can move forward. The Department of City Planning (DCP) is currently working to revise the WRP, which was last updated in 1999. This process will be underway throughout 2012 as proposed revisions must go through public review and approval.

Currently, the WRP identifies three coastal areas with regionally significant ecological resources as Special Natural Waterfront Areas (SNWAs): Jamaica Bay, East River/Long Island Sound, and Northwest Staten Island.

To promote the City's goals for protecting and restoring coastal wetlands and other ecosystems, DCP is proposing to designate additional sites of ecological importance in the City's WRP. The proposed revisions

identify 99 additional sites beyond the boundaries of the SNWAs as Recognized Ecological Complexes. These areas include, among others, the Bronx River, Gravesend Bay, Northern Manhattan, portions of the Arthur Kill shoreline, portions of the Raritan Bay shoreline, the Staten Island Greenbelt, and the Staten Island South Shore Bluebelts. This mapping was based on a review of science-based local and regional restoration plans. The identified sites are clusters of natural resources, though smaller and more fragmented than the SNWAs and often interspersed with developed sites. Many are substantially environmentally-deteriorated and require an active approach to restoration.

The proposed WRP policy for projects located at one of these sites is to require to the extent practicable, design features which promote restoration opportunities as identified in one of several plans. The plans include *Hudson-Raritan Estuary Comprehensive Restoration Plan*, the Trust for Public Land and NYC Audubon's *Buffer the Bay* and *An Islanded Nature*, the *New York State Open Space Plan*, the NYC Audubon's *Natural Areas Initiative*, the *Jamaica Bay Watershed Protection Plan*, and the *Bronx River Intermunicipal Watershed Protection Plan*.

The 2008 *Federal Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* rejected a preference for on-site compensatory mitigation, as its failure rate is quite high, favored large-scale, off-site projects. The rule is based on findings that mitigation banks and similar pooling arrangements can create economies of scale, and are easier to track. They create habitat of sufficient size, are supported by trust funds, and are more easily turned over to non-profits or other entities for management and stewardship.

The challenges with mitigation projects nationally are consistent with the experience of New York City, where the vast majority of wetlands mitigation projects are small (usually less than an acre) and conducted on-site. An internal analysis of mitigation required for City projects since 2002 indicates a median required amount of mitigation of approximately 0.25 acres. Further, mitigation requirements in practice have ranged from one acre of mitigation per acre of impact (a ratio of 1:1) up to 3 acres of mitigation per acre of impact (a ratio of 3:1).

The wetlands mitigation process in New York City should be improved to replace lost wetlands while making it easier for public institutions and private developers to comply with environmental requirements. Now that techniques and practices for mitigation and large-scale restoration have evolved, the City should adapt its approach to wetlands mitigation. The City can create many valuable acres of habitats while sustaining economic growth and a vibrant waterfront with incentives for investment and job creation.

DEC's requirements for wetlands mitigation are outlined in a series of guidance documents. DEC's *Freshwater Wetlands Regulation Guidelines on Compensatory Mitigation* was produced in 1993 and is currently available on DEC's website. These guidelines establish a priority to first avoid and then minimize project impacts. DEC's preferred order of compensatory mitiga-



tion is wetland restoration, then creation, and finally enhancement. DEC states a clear preference for compensatory mitigation to be in-kind and on-site. DEC requires that mitigation proposals should be based on plans containing clear specific detail, short- and long-term goals, and measurable performance criteria. Also, DEC states that mitigation preferably should be completed prior to starting the permitted project or concurrently with it.

DEC's tidal wetlands mitigation requirements are not posted on its website and generally not publicly-available. Its guidelines for tidal mitigation are outlined in an internal memo from 1986 and a draft memo from 1995 that was never finalized. The mitigation process in New York City should be improved to increase transparency and provide more clear guidance.

The City is working with DEC, the Army Corps, and other key stakeholders to evaluate changes to mitigation policy. The City will work with State and Federal partners to provide clear, transparent, and scientifically-sound guidelines.

The City will seek to advance the State's mitigation policy to ensure greater predictability in the permitting process and improved protection and restoration of sensitive wetland habitats. The City will seek to create a clear mitigation policy based on existing scientific information that includes guidance on requirements for types of mitigation, ecological criteria and assessment of impacts, amounts of compensation and replacement

ratios, financial guarantees, monitoring and maintenance, and geographic service area. The City will also seek acceptance for creative mitigation approaches (such as debris removal and hazardous material remediation) that are suited to New York City's unique urban conditions.

INITIATIVE 5 **Create a wetlands mitigation banking or in-lieu fee mechanism for public projects**

Mitigation banking can provide economies and ecologies of scale for wetland restoration. The consolidation of scientific expertise, financial resources, and regulatory oversight into large-scale mitigation activities can streamline the permitting process and ensure that mitigation is both professional and ecologically significant. Mitigation banking or in-lieu fee mitigation, if established in New York City, could channel resources to larger ecological restoration projects. Instituting a policy on these methods of mitigation could provide important new tools to improve the permitting process—and improve the environment.

The 2008 *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* issued by the Army Corps and EPA establishes mitigation performance standards and criteria for activities that require Federal permits. The two options favored in the Final Rule guidelines are in-lieu fee mitigation and mitigation banking.



In-lieu fee mitigation involves permit applicants designating an approved third-party organization to undertake wetland creation, restoration, and/or enhancement. The third-party organization—typically a governmental agency or non-profit—has an agreement with appropriate regulatory agencies to use fee payments from permit applicants to engage in compensatory mitigation. In-lieu fees have proved beneficial, as they allow organizations with technical expertise to tackle complex wetland projects. In the past, federal regulators have favored in-lieu fee arrangements, but the Army Corps now lists them second in its preference hierarchy.

Mitigation banking, the Army Corps's preferred mitigation strategy, allows permit applicants for projects of all sizes to purchase “credits” from a restored, established, enhanced, or preserved wetland, stream, or other aquatic resource. Based on a wetland assessment, a mitigation bank assigns habitat/ecological value to those resources in the form of credits that can be sold by the bank to permit applicants to offset losses of natural resources due to dredge and fill activities. Bank credits can be disseminated for projects within a delineated geographic region, or service area. Assigning credits and standardizing mitigation ratios (for example, one acre of wetland impact could require three acres of restoration) make the process more predictable.

The mitigation bank organization, which can be a private or public entity, is responsible for restoring, enhancing, or preserving natural resources. A bank's mitigation requires a detailed plan prior to approval. The bank owners and regulators have a formal agreement, or bank instrument, to establish liability, performance standards, management/monitoring requirements, and terms of credit approval. An inter-agency review team, usually chaired by an Army Corps representative, provides regulatory review, approval, and oversight of the bank and its mitigation efforts. This built-in enforcement ensures that a project meets its restoration goals.

Mitigation banks are often more successful than on-site mitigation projects. This is in part because many projects have modest wetland impacts. Mitigating individually for such impacts often results in a mitigation project that provides little, if any, environmental benefit. In contrast, a mitigation banking plan can be implemented on behalf of multiple projects. By assembling and applying extensive financial resources, planning, and scientific expertise not always available to permittee-responsible mitigation projects, mitigation banks reduce uncertainty over whether the compensatory mitigation will be successful. Mitigation banks also reduce permit processing times, and thereby improve the cost-effectiveness of compensatory mitigation. Finally, a mitigation bank can be created before a project is started, therefore ensuring the continuity of ecosystem services.

Both mitigation banking and in-lieu fee banking provide numerous benefits over the current system. They consolidate funding for larger projects that produce economies and ecologies of scale. By consolidating restoration projects and permitting approvals, these alternative mitigation strategies can save taxpayers and regulators time and money. The City will work with the State to develop wetland mitigation alternatives that will make the regulatory process more efficient and increase wetland restoration and creation opportunities.

The City will develop a mitigation banking mechanism for public projects. We will evaluate future City capital projects to determine the potential future need for wetlands mitigation. We will evaluate the costs of past on-site mitigation efforts and the potential costs of future on-site mitigation.

The City will work with State and Federal regulators and natural resource managers to develop a comprehensive list of wetland mitigation opportunities and evaluate the costs and feasibility of using these sites to generate mitigation banking “credits.” We will evaluate the remaining parcels that were recommended for transfer through the Wetlands Transfer Task Force but have not yet been transferred due to funding issues. We will also evaluate sites identified for restoration in the *Comprehensive Restoration Plan*. Such a coordinated effort will allow for greater efficiency and efficacy for those public projects obligated to mitigate wetland impacts.



Restoration

INITIATIVE 6

Complete City-funded restoration projects

Protecting existing wetlands is not sufficient to reduce the threats to our natural systems. We also need to restore degraded wetlands and create new habitats to replace losses that have occurred.

The City has a long track record of wetlands restoration efforts. The earliest protection and management actions emerged from natural area inventories that led to fencing and removing dumped cars from forests and wetlands. In the 1990s, wetlands restoration efforts were driven by spill response or outfall remediation at locations such as Arthur Kill and Willow Lake.

Since 2002, the City has worked with State and Federal partners to invest over \$56 million at 16 sites to restore 146 acres of wetlands. By the end of 2013, the City will work with State and Federal partners to complete investments of nearly \$48 million at 16 sites to restore and enhance nearly 122 acres of wetlands and adjacent habitat.

Restoration projects today focus on re-establishing appropriate hydrologic regimes, soils, and native wetland vegetation communities. These projects include fill removal, re-grading, clean soil placement, native plant installation, erosion control, and invasive plant management. To date, DPR has restored 80 acres of freshwater wetland and 90 acres of salt marsh.

DPR has also completed a *Riparian Invasive Plant Management Plan*, in partnership with the Bronx River Alliance and New York Botanical Garden, that will help sustain restoration efforts in our floodplain and riparian wetlands along the Bronx River.

There are currently numerous wetlands restoration efforts underway on NYC Parkland. In Marine Park in Brooklyn, DPR is restoring White Island through shoreline stabilization, invasive species removal, and planting of marsh grasses. 150,000 cubic yards of sand was placed from Army Corps' maintenance dredging of the Jamaica Bay Federal Navigation Project. This project is adjacent to a \$5 million project at Geritsen Creek that restored 22 acres of wetland and adjacent coastal grassland upon completion in July 2010. DPR is also undertaking restoration projects at Freshkills Park, Pralls Island, and Crescent Beach on Staten Island; Calvert Vaux Park in Brooklyn; Meadow Lake in Queens; Inwood Park in Manhattan; and Pugsley Creek, Tallapoosa, Turtle Cove, Soundview Park, and farther upstream along the Bronx River in the Bronx.

DPR has led several restoration projects, including the closure and remediation of the Pennsylvania Avenue and Fountain Avenue landfills on the perimeter of Jamaica Bay. These inactive hazardous waste sites are being transformed into safe, productive, and usable open space. DEP's ecological restoration plan for these properties will enhance the existing natural features of

Jamaica Bay. This project involves the planting of 30,000 trees and shrubs and more than 400 acres of coastal grasslands.

DEP recently completed a \$20 million environmental restoration of the northern portion of Alley Pond Park in Bayside, Queens. The project, which restored wetlands and reintroduced local plant life to a 16-acre section of the park, is part of an overall effort to reduce combined sewer overflows (CSOs) into Alley Creek and Little Neck Bay. The project included the construction of eight acres of tidal wetlands, and eight acres of adjacent coastal grassland and shrub land habitat. Prior to the restoration, the area was dominated by urban fill that had destroyed former wetlands and invasive plants that had prevented native plants and animals from growing and reproducing.

DEP is also undertaking a major ecological restoration of Paerdegat Basin as part of its effort to treat and capture CSOs and improve water quality within the basin. This \$15 million project will restore 12 acres of tidal wetlands and 26 acres of grassland adjacent to the Paerdegat Basin Combined Sewer Overflow (CSO) Facility located on the shores of Jamaica Bay in Brooklyn. Five acres of parkland will become an "Ecology Park," which will offer access to salt marshes and grasslands and include educational exhibits about coastal habitats. The project's 4.5-acre tidal wetland planting along the east and west shorelines is expected to be complete by summer 2012, and the Ecology Park is expected to be

Wetlands Restoration Projects in Collaboration with State and Federal Partners Completed Since 2002

RESTORATION PROJECT	BOROUGH	COMPLETION YEAR	CITY AGENCY	COST ¹	ACREAGE ²
Bronx River Concrete Plant Park	Bronx	2002	DPR	\$200,000	0.2
Four Sparrow Marsh	Brooklyn	2002	DPR	\$500,000	3.4
Seton Falls Park	Bronx	2002	DPR	\$500,000	1.1
Riverdale Park	Bronx	2004	DPR	\$600,000	2.0
Saw Mill West Marsh	Staten Island	2004	DPR	\$785,000	5.0
Bronx River Floodplain	Bronx	2005	DPR	\$1,200,000	7.0
Fresh Kills	Staten Island	2006	DSNY	\$2,100,000	3.1
Elders East	Queens	2007	DEP	\$13,000,000	40.0
Randall's Island	Manhattan	2008	DPR	\$3,000,000	6.5
Canarsie Park	Brooklyn	2008	DPR	\$500,000	3.0
Hendrix Creek	Brooklyn	2009	DEP	\$1,286,000	1.0
Thursby Avenue	Queens	2009	DEP	\$300,000	0.4
Indian Lake	Bronx	2009	DPR	\$4,400,000	3.3
Elders West	Queens	2010	DEP	\$17,200,000	40.0
Alley Creek ³	Queens	2010	DEP	\$6,000,000	8.0
Gerritsen Creek	Brooklyn	2010	DPR	\$5,000,000	22.0
TOTALS				\$56,571,000	146.0

1 Cost of the project associated with restoring wetlands or wetlands functions

2 Acres of wetlands restored, created, or enhanced.

3 The total project cost for the Alley Creek restoration was \$20 million for 8 acres of tidal wetlands and 8 acres of grassland and shrub land habitat

Source: NYC Dept. of Parks and Recreation; NYC Dept. of Environmental Protection; NYC Dept. of Sanitation

Wetlands Restoration Projects in Collaboration with State and Federal Partners with Completion Expected By 2013

RESTORATION PROJECT	BOROUGH	COMPLETION YEAR	CITY AGENCY	COST ¹	ACREAGE ²
Pugsley Creek	Bronx	2012	DPR	\$1,500,000	1.1
Tallapoosa	Bronx	2012	DPR	\$350,000	0.9
Turtle Cove	Bronx	2012	DPR	\$150,000	2.0
Soundview Park	Bronx	2012	DPR	\$7,000,000	3.5
Calvert Vaux Park	Brooklyn	2012	DPR	\$1,122,000	0.6
Pralls Island	Staten Island	2012	DPR	\$100,000	1.1
Crescent Beach	Staten Island	2013	DPR	\$300,000	3.0
Bronx River Riparian Wetlands	Bronx	2013	DPR	\$715,000	6.0
Bronx River Tributary Connection	Bronx	2013	DPR	\$1,500,000	10.7
Paerdegat Basin ³	Brooklyn	2013	DEP	\$7,200,000	12.0
Inwood Park	Manhattan	2013	DPR	\$500,000	0.3
Meadow Lake	Queens	2013	DPR	\$2,200,000	1.1
Yellow Bar	Queens	2013	DEP	\$19,642,857	42.0
Black Wall and Rulers Bar ⁴	Queens	2013	DEP	\$3,410,000	34.0
Freshkills Park, North Park	Staten Island	2013	DPR	\$700,000	0.4
Brookfield Landfill	Staten Island	2013	DEP	\$1,500,000	3.0
TOTALS				\$47,889,857	121.7

1 Cost of the project associated with restoring wetlands or wetlands functions

2 Acres of wetlands restored, created, or enhanced

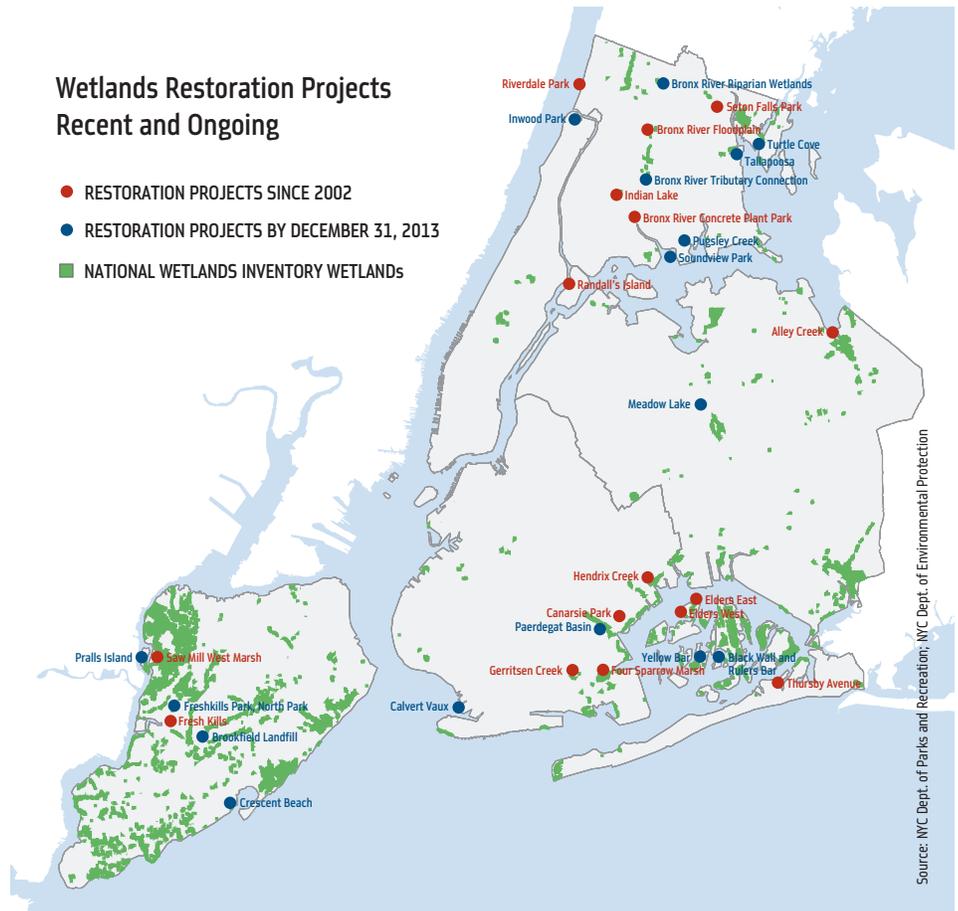
3 The total project cost for the Paerdegat Basin restoration is \$15 million for 12 acres of tidal wetlands and 26 acres of grassland. Expected completion for the restoration of Paerdegat Basin is 2013, but the two-year monitoring and maintenance period will last until 2015

4 While Black Wall and Rulers Bar are separate marsh islands, they are listed together since the restoration is taking place under the same contract. This restoration will include 22 acres at Black Wall and 12 acres at Rulers Bar

Source: NYC Dept. of Parks and Recreation; NYC Dept. of Environmental Protection

Wetlands Restoration Projects Recent and Ongoing

- RESTORATION PROJECTS SINCE 2002
- RESTORATION PROJECTS BY DECEMBER 31, 2013
- NATIONAL WETLANDS INVENTORY WETLANDS



Source: NYC Dept. of Parks and Recreation; NYC Dept. of Environmental Protection

complete by summer 2013. The upland planting is scheduled to begin in fall 2012 and is expected to extend into spring 2013. The project's funding was authorized under the American Recovery and Reinvestment Act through the Clean Water State Revolving Fund, a program administered the New York State Environmental Facilities Corporation.

The New York City Economic Development Corporation (EDC) is undertaking restoration projects as part of the remediation of a former brownfield and creation of a 22-acre waterfront park at Bush Terminal in Sunset Park, Brooklyn. The site of the future Bush Terminal Piers Park was once part of Sunset Park's active industrial complex and later became an illegal dumping ground for hazardous waste. Today, the site exemplifies the potential to have an ecologically vibrant and publicly accessible site within a reactivated industrial complex.

After 30 years of inactivity, dense vegetation, including several well-established trees, has successfully filled in upland areas. Naturally-eroding piers have resulted in subtidal and intertidal wetlands, tidal lagoons, and an emerging sandy beach, which are home to crustaceans and multiple bird species. EDC has completed the remediation of the site and is currently constructing the public open space amenities that will transform this site into a productive natural resource and much-needed waterfront park for Sunset Park residents.

Since 2006 a partnership of City, State, and Federal agencies has been restoring tidal wetlands by planting cord grass and using dredged sediment to raise the elevation of the land. Approximately 60 acres of salt marsh have been created since the partnership began.

As of 2005, Elders Point in Jamaica Bay was comprised of two marsh islands, Elders East and Elders West. The two islands totaled 21 vegetated acres. Army Corps activities at Elders Point East in 2006-2007 restored 40 acres of marsh to offset

environmental impacts of the New York and New Jersey Harbor Deepening Project. This approximately \$13 million project placed roughly 249,000 cubic yards of sand and planted more than 700,000 wetland plugs. DEP provided a cost-share of approximately \$2.5 million. In 2010, the Army Corps, in partnership with the Port Authority, NPS, the State, and the City, placed approximately 200,000 cubic yards of sand at Elders West. The \$17.2 million project restored 40 acres of wetland habitat and planted more than 200,000 wetland plugs. DEP provided a cost-share of approximately \$2.75 million.

In 2010, DEP announced an agreement to improve water quality and mitigate marshland loss in Jamaica Bay through a total of \$115 million in new investments. The agreement requires DEP to invest in heightened nitrogen treatment systems at four New York City wastewater treatment plants that discharge into the Bay, at an estimated cost of \$100 million. Also as part of this agreement, the City will establish a \$13 million environmental benefit fund to support

planned and future Army Corps salt marsh wetland restoration projects. In addition, \$2 million will be paid to DEC's Marine Resources Account to restore marsh island habitat. The City will seek to leverage this \$15 million investment in the Bay's wetlands by applying it as a local match to programs paid for with Federal funds, which typically pay for two-thirds of project costs. This step could net an additional \$30 million in funding for Jamaica Bay marshland projects. In 2012, the partnership initiated restoration of 42 acres of salt marsh at Yellow Bar and is planning several acres of salt marsh restoration along the north shore of Floyd Bennett Field.

The City is actively engaged with its partners and environmental groups in the restoration of the Jamaica Bay salt marsh island complexes. In addition to Elders East and West marsh islands, the restoration of the Yellow Bar salt marsh island began in January 2012 with the placement of approximately 350,000 cubic yards of sand. The planting contract for the installations of hundreds of thousands of wetland



Salt marsh island restoration at Yellow Bar in Jamaica Bay

Credit: U.S. Army Corps of Engineers



Brookfield Landfill in Staten Island

Credit: NYC Dept. of Environmental Protection

plants was awarded in January 2012 and will begin after the sand placement is complete and the appropriate planting window opens up in spring 2012. DEP is providing a cost-share of approximately \$5.4 million.

In addition, the City and State will be the 100% funding sponsor for the sand placement on two additional salt marsh islands, Black Wall and Rulers Bar. Sand will be placed to restore approximately 25 acres for the two islands. Funding agreements between the partners should be finalized in spring 2012. While these two islands will not be planted with plugs under a specific contract, additional grant funding has been secured to facilitate volunteer seeding and planting. DEP is providing a cost-share of approximately \$900,000.

Future salt marsh island restorations and other improvements will be coordinated with all agency partners and stakeholder groups. After the completion of the current work, all partners will convene to discuss the design and implementation of additional restorations.

INITIATIVE 7 Create a natural areas conservancy

The next phase of the City's restoration work will require additional funding and innovation. To maximize its efforts, the City will combine public resources with philanthropic funding by creating a natural areas conservancy. This entity will be the first conservancy in the nation dedicated to

preserving and enhancing urban natural areas for the purpose of enhancing ecological and public health.

Public/private partnerships are crucial to meeting long-term sustainability goals. A unified conservation agenda will also include a unified communications strategy and enhance the visibility of wetlands and other important ecological areas.

The Central Park Conservancy (CPC) and the Prospect Park Alliance (PPA) have pioneered a successful model that has served as the template for dozens of public private partnerships in New York City. The Central Park Conservancy was founded in 1980. Between its incorporation and 2007, CPC spent more than \$450 million on restoring and maintaining Central Park. Today, CPC provides 85% of Central Park's \$37.4 million annual budget and hires 80% of its staff. The PPA was founded in 1987, inspired in part by the success of CPC. PPA has increased the number of park visitors by more than 300% and today supports a staff of more than 100 at a cost of approximately \$13 million per year.

Both of these organizations have increased the safety and improved the aesthetics of their parks. They have also improved the natural areas through ongoing investment in the North Woods of Central Park and the Ravine in Prospect Park. Without these institutions, these parks would not be what they are today: vibrant green spaces cherished by New Yorkers and visited by

millions of tourists every year. The Bronx River Alliance and the Greenbelt Conservancy have been similarly responsible for improving their parks through fundraising, stewardship, and community engagement.

Building on the success of the more than 40 public-private partnerships that exist in New York City, the natural areas conservancy will adopt this organizational model. The conservancy will be a 501(c)(3) non-profit entity with an independent board of directors. It will expand the capacity of DPR for natural areas management through a formal agreement that clearly defines the roles and financial obligations of both parties. The natural areas conservancy will have two crucial roles in particular: bringing together the interest groups that have a stake in the future of our natural areas, and communicating this work with the general public. The conservancy will also raise funds, advocate for natural areas, and promote sustained government investment.

The conservancy will expand the existing capacity of DPR's Natural Resources Group. The organization will raise private money to fund the staffing and management costs associated with its stated goals.

The City will continue its efforts to create a natural areas conservancy in 2012, including seeking to achieve incorporation, establishment of a board of directors and an advisory board, hiring of staff, fundraising, planning, and engaging community participation.



Elders East in Jamaica Bay during restoration

INITIATIVE 8

Work with State and Federal partners to complete and implement the Comprehensive Restoration Plan

There has been great momentum behind regional planning for the Hudson-Raritan Estuary. Since 1987, the HEP's partnership of Federal, State, and local governments, scientists and academics, and civic and environmental advocates has worked together to protect and restore waterways and productive habitats. They have also helped to manage sediments, foster community stewardship, educate the public, and improve safe access to our waterways.

In March 2009, a group of regional partners, led by the Army Corps and the Port Authority, released the draft *Hudson-Raritan Estuary Comprehensive Restoration Plan* (CRP). The CRP identifies four principles:

- The Estuary is human-dominated.
- It has been irreversibly changed.
- It will continue to change.

- However, it can be altered beneficially through the wise implementation of science and technology.

The CRP also identifies 11 measurable restoration objectives, or Target Ecosystem Characteristics (TECs):

- Coastal wetlands
- Islands for waterbirds
- Coastal and maritime forests
- Oyster reefs
- Eelgrass beds
- Shorelines and shallows
- Habitat for fish, crabs, and lobsters
- Tributary connections
- Enclosed and confined waters
- Sediment contamination
- Public access

The CRP identifies a total of 134 sites in New York City with coastal wetland restoration opportunities, 24 sites with tributary or stream connection restoration opportunities, and 16 sites with opportunities for restoration of enclosed or confined water bodies. These opportunities represent a wide range of sizes, conditions, costs,

types of wetlands, feasibility, and complexity. Only a small fraction of these opportunities have any funding associated with them, or have been the subject of a feasibility study of some kind.

The CRP is meant to be a guide for many partners to determine specific restoration projects within the estuary. Having a single plan reduces redundant efforts and ensures that the most critical parts of the ecosystem are targeted. However, to achieve the restoration goals, the New York-New Jersey Estuary needs substantial funding from numerous sources. Implementation of the CRP will also require cooperation among many agencies and organizations, regional partnerships beyond political boundaries and active support from officials and citizens.

The City will work with the Army Corps, Port Authority, and other regional partners to finalize the CRP by 2013. The next steps for the CRP are to revise the document based on public comments and identify new restoration and land acquisition opportunities.



Elders East in Jamaica Bay before restoration

Credit: U.S. Army Corps of Engineers



Elders East in Jamaica Bay during restoration

Credit: U.S. Army Corps of Engineers

The CRP partners will also further investigate each TEC, evaluate CRP sites/projects harbor-wide and within each planning region, validate each restoration opportunity, analyze ecological benefits and costs, and develop implementation strategies.

Assessment

INITIATIVE 9 Improve wetlands mapping in New York City

Wetlands shift over time and the available maps of regulated wetlands within New York City are based on outdated and inaccurate information. Updated, detailed maps of wetland areas would help to quantify threats and determine management and restoration strategies. Detailed maps are a necessary foundation for environmental planning and effective natural resources management.

Existing DEC regulatory wetlands maps are limited by the low quality and coarse resolution of available information that were compiled through overflights in the 1970s and 1980s. High resolution data mapping and GIS capability are critical for evaluating baseline environmental conditions and for observing and identifying natural resources trends over time, including changes in wetland coverage.

Local Law 31 of 2009, the law that called for the creation of this wetlands strategy, also required the City to submit by

September 1, 2010 a “preliminary survey of likely wetland areas based upon satellite or aerial imagery.” Pursuant to this requirement, the City produced preliminary wetlands maps as well as a technical paper explaining methodology used to develop these maps. This work was completed by the Lamont-Doherty Earth Observatory at Columbia University under the management of DEP. This material is available on the City’s PlaNYC website (www.nyc.gov/planyc), and the preliminary maps are included as Appendix B.

These preliminary wetlands maps adopt an alternative approach to traditional wetlands mapping. The preliminary survey combined current, high-resolution satellite imagery with archival imagery to identify potential wetland areas on the basis of multiple factors such as standing water, elevation above sea level, and vegetation dynamics. These alternative maps can be updated more readily than other remote sensing map products. Prior to this effort, most wetland maps have been based on visual interpretation of aerial photographs followed by field verification. That process of visual interpretation and manual digitizing of wetland boundaries is subjective, time consuming, expensive, and difficult to update.

The preliminary wetlands survey provides a unique perspective that is impossible to obtain from the ground. While remote sensing does not eliminate the need for field verification, the new imagery does provide a valuable reconnaissance tool to help scientists and decision-makers focus

field validation efforts. This effort is the first step to correctly identifying and better interpreting the data on the maps.

The preliminary wetlands maps show the potential minimum and maximum extent of wetlands areas. Many areas that are currently regulated as wetlands by DEC were not identified as potential wetlands through this preliminary survey. This may indicate that the City’s maps should be expanded, or that DEC is regulating areas that are no longer wetlands.

After further refinement of preliminary maps, these areas should be field verified to identify the presence or absence of wetlands. As such, these preliminary surveys are not yet definitive wetlands maps; instead, they illustrate potential wetland areas that require further analysis and field verification. With refinements to the methodology and field verification, this preliminary wetlands survey has the potential to evolve into final wetlands maps.

Another useful tool for wetlands mapping and assessment is Light Detection and Ranging (LiDAR) elevation data. Recently, the City acquired new LiDAR data to more accurately assess the physical characteristics of New York City’s natural and built environment. The data was developed from flights in April 2010. This data will be particularly useful in determining where there are opportunities for migration of wetlands, and where natural or built impediments will require other strategies to help protect and conserve tidal wetlands.



Gerritsen Creek in Brooklyn at the start of restoration

Credit: NYC Dept. of Parks and Recreation



Gerritsen Creek in Brooklyn during restoration

Credit: NYC Dept. of Parks and Recreation

The City will work with its partners at Lamont Doherty to incorporate new LiDAR elevation data into the preliminary wetlands maps. The recently-completed quality assurance and quality control of the LiDAR imagery has created a Digital Elevation Model (DEM) down to an elevation contour of three feet. To further improve the usefulness of this data, the City has entered into an agreement with the University of Vermont to develop a one-foot contour DEM. The creation of this DEM is expected to be complete by Summer 2012.

The preliminary wetlands maps are an important step toward better understanding the location and extent of wetlands in the city. A field verification effort of the city's potential wetlands areas would require funding that is currently not available. Field verification may also take several years as the work would likely need to be conducted over several seasons. The City will evaluate the feasibility, costs, and benefits of field verifying potential wetlands areas in order to develop a more accurate wetlands map.

The City is committed to working with DEC and other partners to turn the preliminary wetlands surveys into a final wetlands regulatory map for New York City that reflects changes in wetlands location and composition over the past 20 years and provides greater certainty to regulators and landowners alike.

INITIATIVE 10
Monitor tidal wetlands and analyze the potential impacts of sea level rise

To maintain healthy urban wetlands in the face of sea level rise, the City needs to know which wetlands are vulnerable and how to improve the resilience of these areas through restoration or protection efforts.

Various agencies from various jurisdictions with different objectives are already undertaking multiple inundation mapping and storm-modeling efforts. The City requires a clearer understanding of what different scenarios mean for short- and long-term wetland vulnerability and what they mean for the City as it manages and prioritizes its protection efforts.

Understanding what these scenarios mean will require monitoring a variety of wetlands with different influences and evaluating their ability to keep up with sea level rise. In addition, the City must study and consider corrective and restoration actions for climate change drivers such as accelerated rates of sea level rise, changing storm intensities, and altered temperatures.

To remain stable, salt marshes must accrete sediment and organic material at the same pace as sea level rise. To better understand site-specific conditions and long-term trends, DPR is installing Surface Elevation Tables (SETs) accompanied by marker horizons at selected salt marsh sites. These SETs are like high-precision

benchmarks, developed by the U.S. Geological Survey (USGS) to distinguish between surface sediment accretion and subsurface shallow subsidence in salt marshes. The elevation measurements document whether the shallow ground surface is subsiding or rising.

SETs have been installed in City parks at Pelham Bay Park in the Bronx (along a Long Island Sound tributary and along the Hutchinson River) and at Udalls Cove Park Preserve and Spring Creek Park in Queens. The placement of SETs in tidal wetlands across New York City parks will allow monitoring of rates of accretion over the long term and help determine whether the marshes are keeping pace with accelerated sea level rise. In addition, it will allow comparison of accretion rates in City parks with other areas where SETs are located e.g., at Jamaica Bay (on NPS sites), Hackensack Meadowlands, Fire Island, North and South Shore of Long Island, and Narragansett Bay, as well as other SET locations nationally and internationally. Locally, an understanding of how the surfaces of tidal marshes are changing will help the City determine priority protection, acquisition, restoration, and management measures. These are long-term monitoring stations, and the City expects to have meaningful data on the relative sustainability of these marshes beginning in 2015.

In 2012, the City will establish SETs at two more parks, including one of the large marsh complexes in Staten Island. DPR is installing and monitoring these



Gerritsen Creek in Brooklyn after restoration

Credit: NYC Dept. of Parks and Recreation

instruments in partnership with The Nature Conservancy-Long Island, Fairleigh Dickinson University, NPS, DEC, and USGS.

In certain tidal wetland locations, the naturally steep higher terrain limits marsh migration. Artificially placed fill that is not developed, but has become vegetated over the past decades, also limits migration. Artificial fill that has remained open space, but would restrict wetland migration is at Spring Creek Park and Jamaica Bay, and is present to some degree at virtually all salt marsh wetlands in the city.

The City will identify opportunities for the inland migration of wetlands as sea level rises. This will require coordination among researchers, agreement on critical metrics, and improved understanding of wetland conditions. Coastal inundation, hazard assessment, and marsh migration analyses will require increased funding for elevation data. The City will determine the extent to which existing LiDAR elevation data covers coastal wetland areas and if and where there are gaps in data.

The City will also determine data needs and seek funding to conduct horizontal marsh migration analyses. These will identify New York City locations where adaptation strategies may be feasible. Options to protect marshes include the removal of barriers to upland migration, shoreline realignment, enhancement through sediment trapping, or the augmentation of subsiding marshes through the use of dredge material. Such adaptive measures could decrease the vulnerability of nearby

residential communities and transportation infrastructure to flooding.

INITIATIVE 11 **Assess the conditions and functions of New York City wetlands**

Understanding the conditions and functions of wetlands will enable the City to set appropriate priorities and improve management and protection. Understanding how conditions change over time, the relative condition of the different types of wetlands in urban landscapes, and the ecological and physical processes and stressors that control them is fundamental to making the best decisions for both individual sites and whole systems.

DPR is undertaking several wetlands assessment programs on wetlands that they own. An ongoing initiative involves the analysis of data from rapid assessments of the condition and characteristics of select freshwater and tidal wetlands mapped by DEC and the NWI, as well as select unmapped wetlands such as vernal pools or riparian systems.

DPR has begun to assess wetland vegetation characteristics and impacts, and is using these analyses to prioritize restoration and management needs. A rapid assessment protocol was piloted for freshwater wetlands in 2009 under a grant from the EPA. For tidal wetlands rapid assessments, DPR is piloting the Mid-Atlantic Rapid Assessment Method used in Delaware, Maryland, and Virginia.

DPR's pilot Freshwater Wetland Rapid Assessment Protocol was aimed at obtaining a relatively quick and standardized snapshot of impacts and wetland characteristics at City parks. This protocol provides an overview of wetland conditions, identifies management needs, and helps prioritize sites for further assessment, maintenance and monitoring.

Over two summers, DPR assessed 88 wetlands. These sites represent a wide range of wetland types, sizes, drainage basin areas, and proximity to development. About 10% of the sites had few highly visible signs of urban impacts while about 10% were highly impacted. The most common impacts, found at the majority of the wetlands, were the presence of trails or roads within the 100 foot wetland buffer, hydrological impacts, increased nutrients from runoff, invasive species, and trash and debris. These and other impacts were found across all wetlands regardless of size. There were no obviously greater impacts at one type of wetland than at another, with the exception of invasive species, which were least likely to occur in forested wetlands.

Preliminary results from the tidal wetlands rapid assessments show that all buffer areas include some development impacts and that inland migration potential is severely limited at most tidal wetlands sites. Roads, housing, parking lots, airports, and other human infrastructure built on fill border and restrict most marshes. At some of the larger wetland complexes, such as Pelham Bay Park in the Bronx, Idlewild Park in Queens, and William T. Davis Wildlife Refuge on Staten Island, there may be some sites where tidal restrictions can be reduced by redesigning and reconstructing infrastructure.

DPR will implement tidal rapid assessments on their properties with specific metrics to help better characterize conditions, impacts, and constraints in the city's ultra-urban environment. DPR plans to conduct the Mid-Atlantic Tidal Rapid Assessment

Method (MidTRAM) at six sites where long-term monitoring is being conducted. These sites are Udalls Cove, Spring Creek, and Idlewild Parks in Queens, Pelham Bay in the Bronx, and Saw Mill Creek on Staten Island. The MidTRAM protocol includes a GIS (desktop) component and a field-based component. DPR will adapt the protocol for New York City by accounting for steep slopes that would inhibit inland migration of marshes. DPR will conduct the MidTRAM protocol to characterize landscape and vegetation conditions at the six sites in late summer 2012 following peak growth at the end of the growing season.

The results from this assessment will determine whether the methodology is suitable for broader implementation across the city. Such assessments would allow the City to identify our most stable marshes and evaluate the degree of deterioration of tidal marshes in relation to ideal or reference conditions. The City is also working with local, State, and Federal partners through the HEP to include appropriate metrics about wetland conditions in the CRP database of restoration opportunities.

Defining these target, or reference, conditions requires identifying stressors, risks, and controls on wetland conditions and function. Several ongoing studies at DPR are helping the City to better describe ecological conditions in specific freshwater wetland systems.

In 2011, DPR began a multi-year study of vernal pools in Queens, Staten Island, and the Bronx and reference sites outside the City. Thus far, pools in the City have shown that they support species characteristic of those in less developed environments throughout the northeast. More data will be collected in 2012 so that comparisons can be made across sites within and outside the city.

DPR is further developing rapid field inspection protocols in 2012 that identify potential conservation and management needs and help track actions, such as invasive plant



removal. The efforts, to be completed in 2013, will help characterize conditions and point to potential management needs in wetland systems.

DPR has also been studying the sensitivity of select wetland-dependent species to freshwater emergent wetland conditions. Analysis of this data will continue in 2012 and be used to identify reference conditions for high ecological function.

INITIATIVE 12 **Develop a research agenda to address wetlands challenges**

Research and monitoring are critical components to the successful design and implementation of wetlands protection and restoration. It is important to undertake scientific research to understand the causes of habitat degradation and to facilitate a coordinated approach toward corrective actions, thereby enhancing restoration success and sustainability in New York City.

Testing alternative restoration techniques is required to select those that will have the greatest likelihood of success. The ongoing restoration of marsh islands, oysters, ribbed mussels, and eelgrass in Jamaica Bay has greatly benefitted from this approach. Many private sources and Federal, State, and local agencies have supported implementation of these plans.

Scientists from DPR's Natural Resource Group (NRG) conduct research on a wide range of topics including wetlands

conditions, fish and wildlife habitat, management and restoration practices, and the impacts of climate change. NRG's team focuses on applied science, where all data is used to inform management decisions. NRG also undertakes long-term research about the effectiveness of restoration work, including the study of the survival of plantings.

DEP has also undertaken research projects related to wetlands and restoration. Through the *Jamaica Bay Watershed Protection Plan*, DEP has implemented and monitored a series of pilot projects related to ecological restoration and the loss of salt marsh. This effort has also included organizing a series of symposia to highlight ongoing and emerging research.

The third symposium, *State of the Bay: Past, Present, and Future – Revisited*, took place October 20, 2011 and was co-sponsored by the NPS and Brooklyn College. The symposium addressed a range of issues affecting the ecology of Jamaica Bay. The findings have broader implications for wetlands areas in other parts of the region.

The City will continue to work with partners throughout the region to develop and implement a research agenda to address wetlands challenges. Specific research activities could include:

- Establishing a central information clearinghouse for research, monitoring, and stewardship activities



Installing a Surface Elevation Table at Udalls Cove Park Preserve

Credit: NYC Dept. of Parks and Recreation



Conducting surface measurements at Pelham Bay Park

Credit: NYC Dept. of Parks and Recreation

- Assessing the quantity of remaining wetlands
- Evaluating the condition and ecological functions of existing wetlands
- Gaining knowledge on key topics such as nutrient loading, sedimentation, and climate change
- Measuring fish and wildlife populations and health
- Identifying priority monitoring needs that would benefit from multi-agency support
- Sponsoring technical symposia and public education events

The City will collaborate with the National Park Service to evaluate the feasibility of establishing an enhanced urban ecology and wetlands research center in Jamaica Bay. NPS is in the process of expanding its research and science capabilities. The Gateway Research Learning Center, developed in 2002 under the name of the Jamaica Bay Institute, is part of the NPS's Natural Resource Challenge. Its mission is to promote and improve the ecological health and social relevance of Gateway National Recreation Area through research, education, and informed decision making.

The NPS's research currently receives financial support through the Research Learning Center program. The North Atlantic Coast Cooperative Ecosystem Studies Unit, a consortium of multiple Federal agencies (NPS, USGS, Army Corps, and others) and 15 non-Federal partners, including several from the New York-New Jersey region (CUNY, Columbia University, Cornell University, Stony Brook University, Rutgers University), currently provides a mechanism for facilitates Federal-academic cooperative studies.

Over the past year, the City and the NPS have explored opportunities to increase collaboration in New York City with a particular focus on Jamaica Bay. On October 27, 2011, Mayor Bloomberg and U.S. Department of the Interior Secretary Ken Salazar announced a new agreement to improve the Federal and City parklands around Jamaica Bay.

The agreement commits to a joint planning process that will devise a new, unified governing model and common objectives for over 10,000 acres of publicly-owned land in south Brooklyn and Queens. Through this partnership, the City and NPS, along with other public agencies and key stakeholders, will evaluate the potential to develop a new center that supports environmental research and stewardship.

A great model for this effort already exists in New York City. In 2010 the City and the U.S. Forest Service jointly opened the New York City Urban Field Station (UFS) at Ft. Totten in Queens. The UFS is modeled after the Forest Service's century-old experimental forest research stations across the nation. UFS scientists conduct long-term research and share knowledge to support key initiatives such as parks improvements and urban ecosystem management.

A key component of this partnership was to create a joint field lab and residential space for visiting scientists. This site allows scientists to reside and work in New York City on a temporary basis, greatly expanding the scientific and technical staff available to work throughout the city. The new facility is designed as a shared office and lab where city and Federal scientists work together to address critical land management questions.

Implementation



Freshkills Park in Staten Island

This wetlands strategy establishes a framework for improving wetlands and natural areas in New York City. By implementing this strategy, the City will improve wetlands protection, restore the functions of important wetlands, and improve the mitigation process.

Implementing this strategy will require strong coordination and collaboration within City government as well as with State and Federal agencies and key non-profit organizations and other important stakeholders.

Education and outreach are also important components of wetlands protection. The City's efforts would be enhanced if more community members, landowners, and property managers recognized the values of wetlands and the biodiversity that depend on them. The City currently promotes the value of wetlands and natural areas through outreach and education at its several nature centers in Inwood Park, Marine Park, the Greenbelt, and several other sites around the city. In addition, DPR works actively with multiple non-profit organizations across the city to provide environmental education and stewardship emphasizing wetlands and streams, including groups such as the Bronx River Alliance, Rocking the Boat, the Alley Creek Environmental Center, the American Littoral Society, the Rockaway Waterfront Alliance, the Eastern Queens Alliance, and the Salt Marsh Alliance, to name only a few.

For the last seven years, DPR's GreenApple Corps (now part of DPR's new Environmental Service and Training Programs) hosted over 100 volunteers annually to learn about and clean up coastal habitats citywide. Coastal cleanup sites were chosen based upon the most significant needs. Locations have included: Pugsley Creek in the Bronx, Kaiser Park and Mill Basin in Brooklyn, Sherman Creek and the Hudson River in northern Manhattan, Dubos Wildlife Sanctuary and Rockaway Community Park in Queens, and Lemon Creek and Conference House Park in Staten Island. In the future, we will improve our outreach efforts by providing more service and training opportunities related to wetlands through DPR's Environmental Service and Training Programs.

The mission of Environmental Service and Training Programs is to support the restoration and protection of New York City's natural areas through volunteerism. The Program works to recruit, train, and support volunteers for a variety of projects across the city. These projects span coastal, wetland, grassland, and forested ecosystems and include park and street trees.

DPR's Urban Park Rangers have been promoting environmental stewardship for wetlands and natural areas through innovative, outdoor environmental education programs for over 30 years. Working out of 11 nature centers, including the Salt Marsh and Inwood Hill Nature Centers, the Rangers reach thousands of New Yorkers every year and strive to heighten awareness of the open spaces and natural resources hidden within our urban landscape. Rangers lead environmental education programs for school children, mentoring programs for high school students, and active recreation programs for the general public. They patrol natural areas and rescue, rehabilitate, and reintroduce native wildlife. They also operate nature centers in parks across the City. The mission of the Urban Park Rangers is to link New Yorkers to the natural world, teach them to care for the environment and their parks, defend the parks and their wild residents, and restore New York's natural heritage.

In 2011, Urban Park Rangers led 3,509 programs for 83,622 participants, including 45,482 students served through The Natural Classroom, the Urban Park Rangers' award-winning environmental education program for students in grades K-8. They also led 27,793 people through 1,289 active outdoor recreation programs such as canoeing, fishing, hiking, birding, and nature exploration. The Urban Park Rangers are currently working together with researchers and educators at the Center for Climate Systems Research at Columbia University to produce a new curriculum for The Natural Classroom focusing on the impacts of climate change on New York City's wetlands and natural areas.

The City will track the implementation of this wetlands strategy in several ways. The annual PlaNYC Progress Report, released every April, will provide an update on the City's wetlands efforts. The Jamaica Bay Watershed Protection Plan, to be released next in October 2012, will report on many of the initiatives in this draft strategy. As required by Local Law 31 of 2009, the City will submit a report on the wetlands strategy to the Mayor and Speaker of the City Council no later than April 22, 2015 and no later than every fourth year thereafter.

In addition to reporting on the initiatives of the City's wetlands strategy, the City will develop a reporting mechanism for wetlands indicators. By 2015, the City will provide metrics on wetland acres created, restored, and enhanced, as well as the number of sites where assessments and monitoring have occurred.

Milestones

MILESTONES TO BE COMPLETE BY DECEMBER 31, 2013	LEAD CITY AGENCY	OTHER PARTNERS
PROTECTION		
1 Strengthen protection of vulnerable wetland parcels		
Complete the transfer of 10 City-owned wetland parcels to DPR	DPR	DCAS, SBS
Complete the transfer of nine City-owned wetlands parcels to DEP for inclusion in the Staten Island Bluebelt system	DEP	DCAS
Evaluate funding needs for the necessary improvements that are required for future transfers to DPR	DPR	OLTPS
2 Increase wetlands acquisition efforts		
Seek to acquire additional acres of private lands for inclusion in the Staten Island Bluebelt system	DEP	
Work with local, State, and Federal partners to evaluate opportunities for additional wetlands acquisitions	DPR, DEP	OLTPS
3 Update the Waterfront Revitalization Program to enhance wetlands protection		
Complete the Waterfront Revitalization Program update	DCP	DOS
MITIGATION		
4 Work with State and Federal partners to revise wetlands mitigation guidance		
Work with partners to provide clear, transparent, and scientifically-sound guidelines	OLTPS	DEC, USACE, DPR, DEP, EDC
5 Create a wetlands mitigation banking or in-lieu fee mechanism for public projects		
Develop a mitigation banking or in-lieu fee mechanism for public projects	OLTPS	DEC, USACE, DPR, DEP, EDC
RESTORATION		
6 Complete City-funded restoration projects		
Complete Pugsley Creek restoration	DPR	NYS DOS
Complete Tallapoosa restoration	DPR	DEC
Complete Turtle Cove restoration	DPR	DEC
Complete Soundview Park restoration	DPR	USACE
Complete Calvert Vaux Park restoration	DPR	DEC
Complete Pralls Island restoration	DPR	NYS DOS
Complete Crescent Beach restoration	DPR	
Complete Bronx River Riparian Wetlands restoration	DPR	NYS DOS, NOAA, WCS, NYS AGO, NFWF
Complete Bronx River Tributary Connection restoration	DPR	NYS DOS, NOAA, WCS, NFWF, Bronx BP
Complete Paerdegat Basin restoration	DEP	

MILESTONES TO BE COMPLETE BY DECEMBER 31, 2013	LEAD CITY AGENCY	OTHER PARTNERS
Complete Inwood Park restoration	DPR	Columbia University
Complete Meadow Lake restoration	DPR	DEP, DEC
Complete Yellow Bar restoration	DEP	USACE, DEC, NPS, PANYNJ
Complete Black Wall and Rulers Bar restoration	DEP	USACE, DEC, NPS, PANYNJ
Complete Freshkills Park, North Park restoration	DPR	
Complete Brookfield Landfill restoration	DEP	
7 Create a natural areas conservancy		
Incorporate the natural areas conservancy and raise funding for staffing and management	DPR	Doris Duke Charitable Foundation, Tiffany&Co. Foundation
8 Work with State and Federal partners to complete and implement the Comprehensive Restoration Plan		
Work with regional partners to finalize the CRP and seek opportunities for implementation	DEP, DPR	ACOE, PANYNJ, DEC, EPA, NPS
ASSESSMENT		
9 Improve wetlands mapping in New York City		
Create a one-foot contour Digital Elevation Model utilizing LiDAR data	DEP	University of Vermont
Create a new preliminary wetlands survey incorporating one-foot contour Digital Elevation Model	DEP	Lamont-Doherty Earth Observatory
Work with DEC and other partners to turn the preliminary wetlands surveys into a final wetlands regulatory map	DEP	DEC, DPR
10 Monitor tidal wetlands and analyze the potential impacts of sea level rise		
Establish Surface Elevation Tables at two more parks, including one of the large marsh complexes in Staten Island	DPR	TNC, DEC, USGS, Fairleigh Dickinson
Determine data needs and seek funding to conduct horizontal marsh migration analyses	DPR	
11 Assess the conditions and functions of New York City wetlands		
Conduct tidal rapid assessments at six New York City Parks sites where long-term monitoring is being conducted	DPR	
Collect data on vernal pools and make comparisons across sites within and outside the city	DPR	
12 Develop a research agenda to address wetlands challenges		
Work with regional partners to develop and implement a research agenda to address wetlands challenges	OLTPS, DEP, DPR	NPS, ACOE, DEC, EPA, PANYNJ, NOAA
Work with regional partners to evaluate the feasibility of establishing an enhanced urban ecology research center in Jamaica Bay	OLTPS, DEP, DPR	NPS, ACOE, DEC, EPA, PANYNJ, NOAA

Appendices

NEW YORK CITY WETLANDS STRATEGY MAY 2012

- A **Wetlands Maps from the New York State Department of Environmental Conservation and the National Wetlands Inventory**
- B **Wetlands Maps from the Preliminary Survey of Wetland Areas**
- C **Local Law 31 of 2009**



A GREENER, GREATER NEW YORK

APPENDIX A:

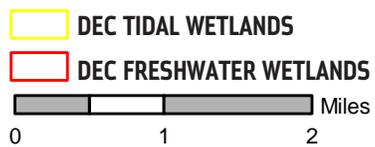
Wetlands Maps from the New York State Department of Environmental Conservation and the National Wetlands Inventory

NEW YORK CITY WETLANDS STRATEGY MAY 2012



Staten Island

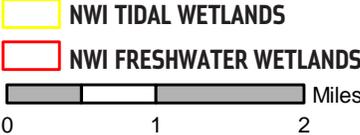
DEC Freshwater and Tidal Wetlands

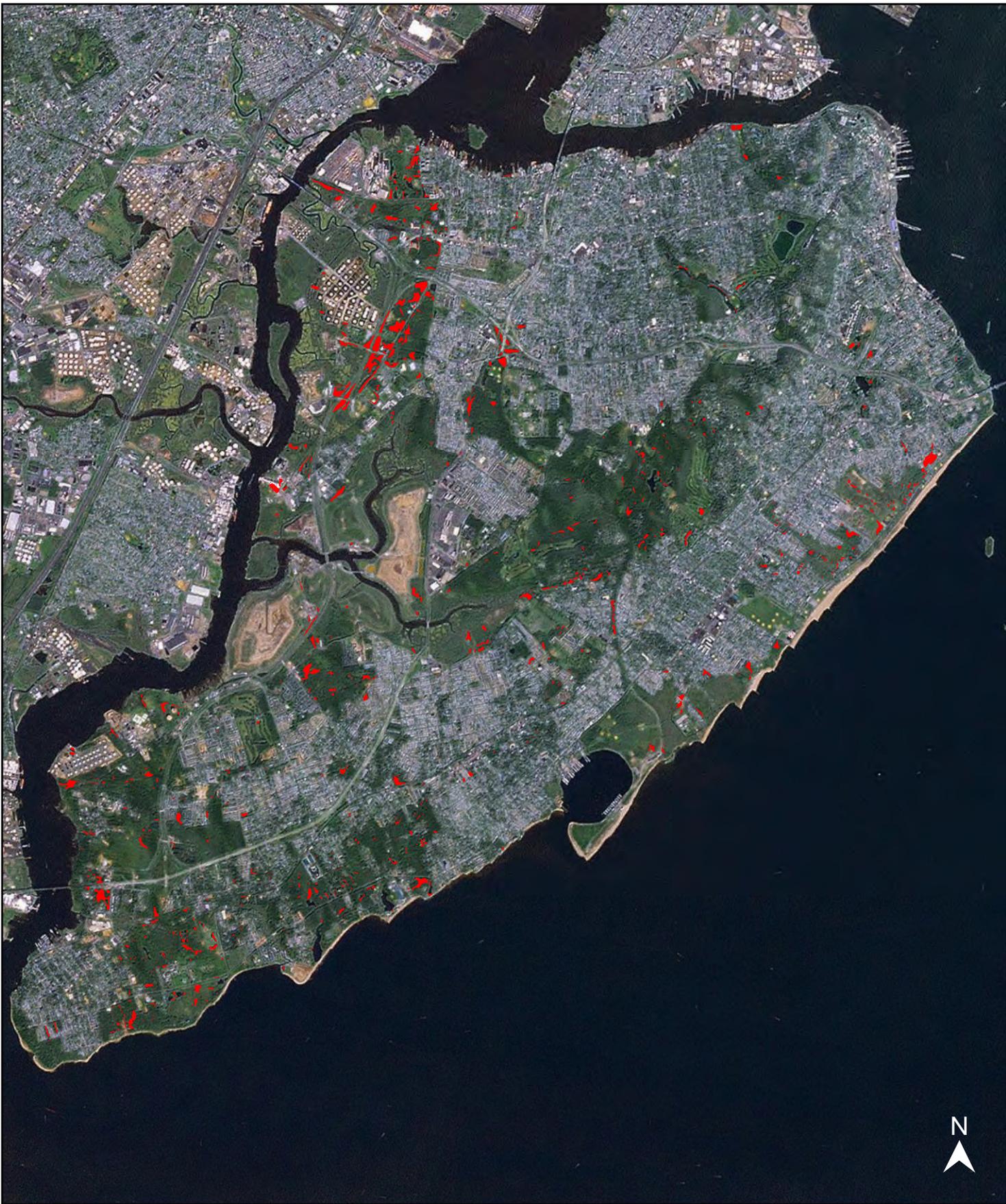




Staten Island

NWI Freshwater and Tidal Wetlands



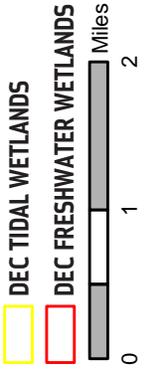


Staten Island

NWI Freshwater Wetlands Not Mapped by DEC

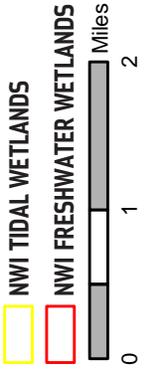
 Uniquely NWI Freshwater Wetlands





Jamaica Bay

DEC Freshwater and Tidal Wetlands



Jamaica Bay
NWI Freshwater and Tidal Wetlands

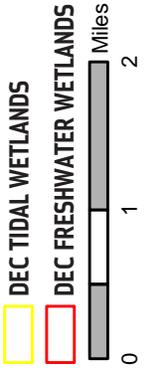


Uniquely NWI Freshwater Wetlands

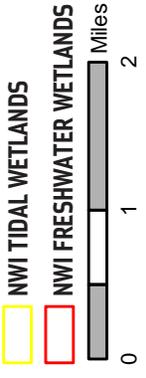
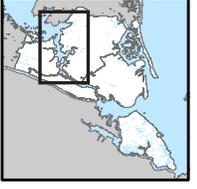
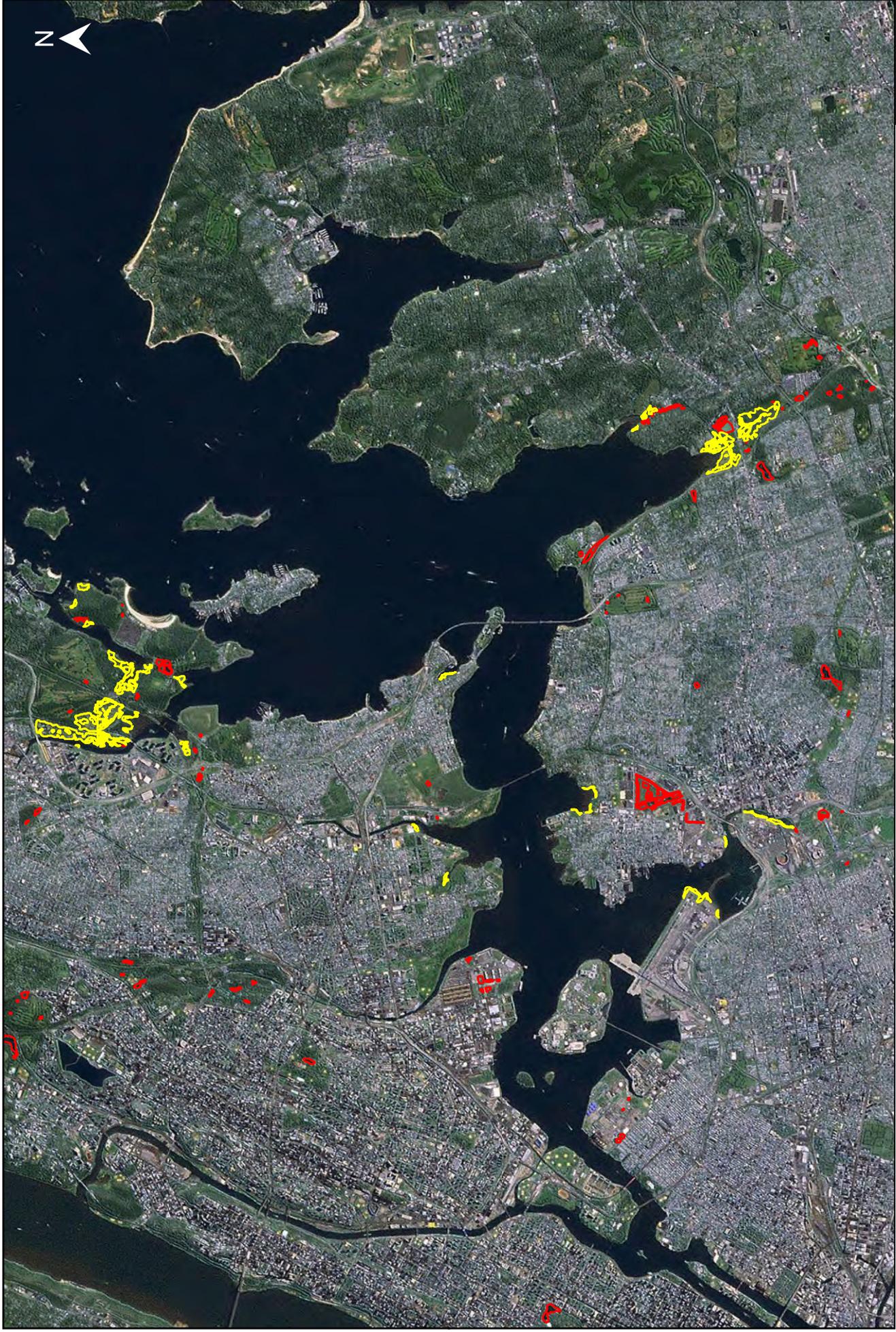
0 1 2 Miles

Jamaica Bay

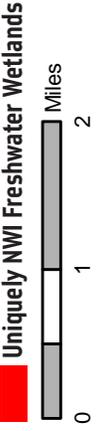
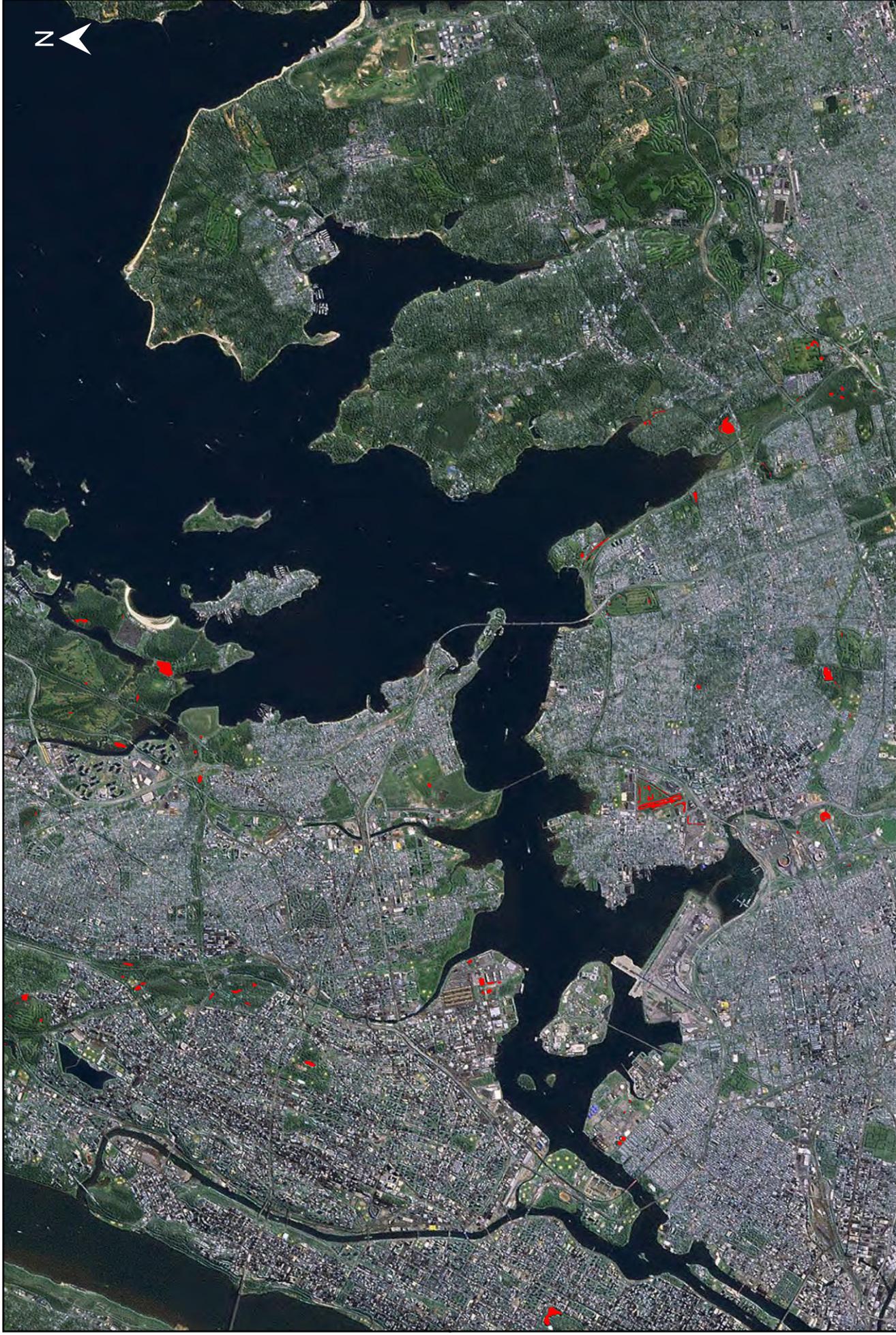
NWI Freshwater Wetlands Not Mapped By DEC



Upper East River / West Long Island Sound
DEC Freshwater and Tidal Wetlands



Upper East River / West Long Island Sound
NWI Freshwater and Tidal Wetlands



Upper East River / West Long Island Sound
NWI Freshwater Wetlands Not Mapped By DEC

APPENDIX B:

Wetlands Maps from the Preliminary Survey of Wetlands Areas

NEW YORK CITY WETLANDS STRATEGY MAY 2012

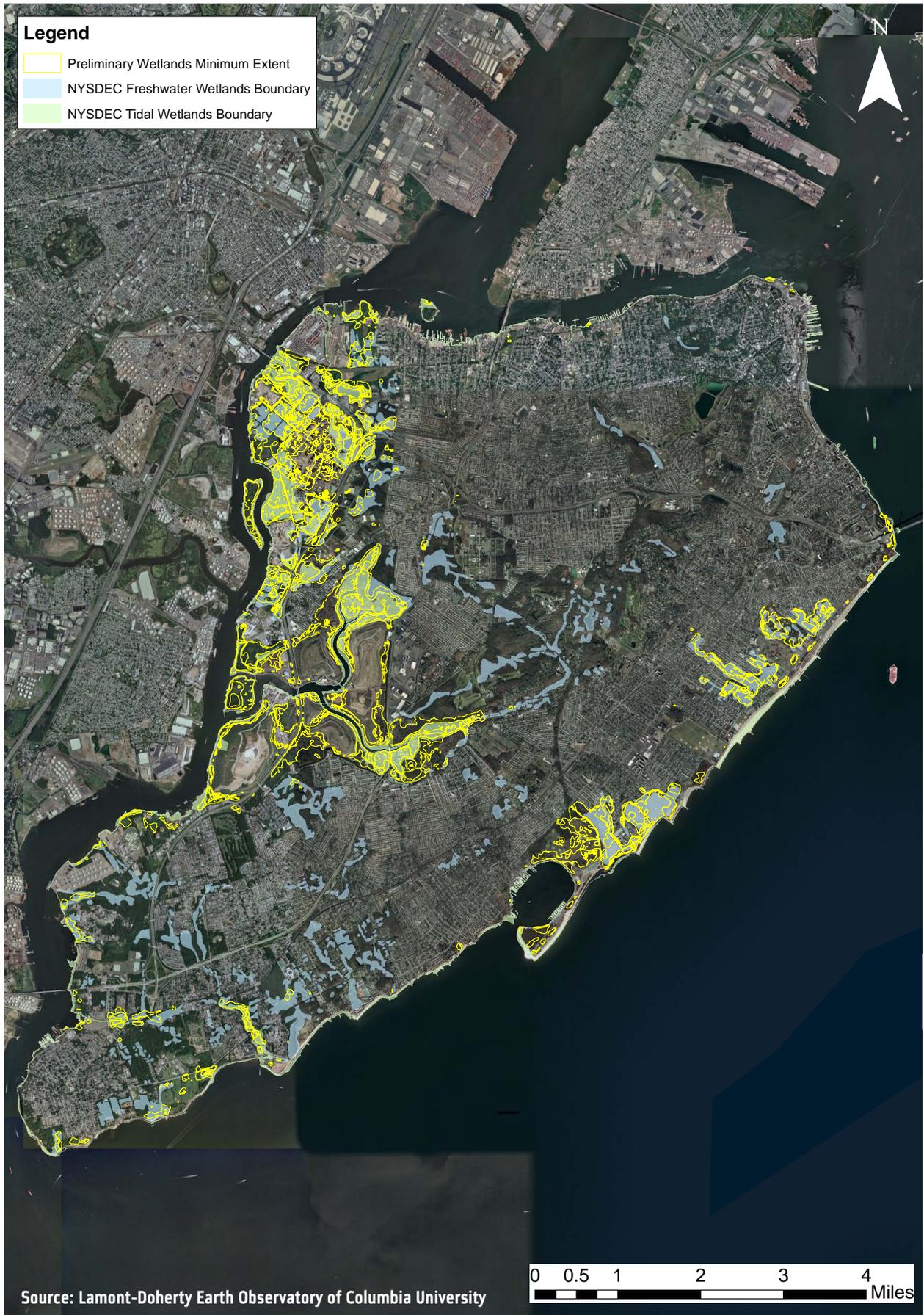


Bronx, Brooklyn, Manhattan, and Queens

Preliminary Survey of Wetland Areas - Minimum Extent of Wetlands

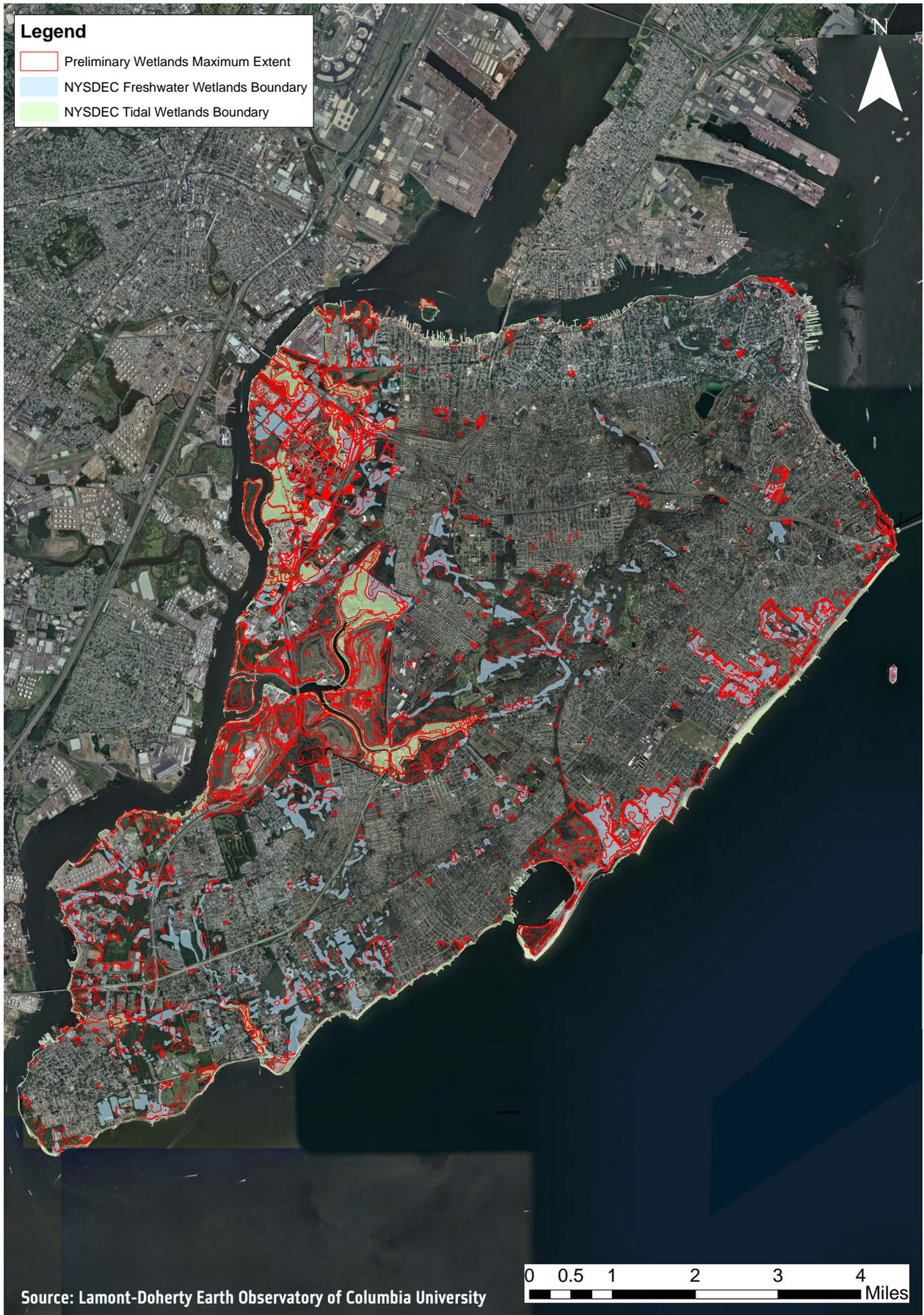


Bronx, Brooklyn, Manhattan, and Queens
Preliminary Survey of Wetland Areas - Maximum Extent of Wetlands



Staten Island

Preliminary Survey of Wetland Areas - Minimum Extent of Wetlands



Staten Island

Preliminary Survey of Wetland Areas - Maximum Extent of Wetlands



Jamaica Bay
 Preliminary Survey of Wetland Areas - Maximum Extent of Wetlands



Legend

- Preliminary Wetlands Maximum Extent
- NYSDEC Freshwater Wetlands Boundary
- NYSDEC Tidal Wetlands Boundary



Source: Lamont-Doherty Earth Observatory of Columbia University

Jamaica Bay

Preliminary Survey of Wetland Areas - Maximum Extent of Wetlands

APPENDIX C:

Local Law 31 of 2009

NEW YORK CITY WETLANDS STRATEGY MAY 2012

**LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 2009**

No. 31

Introduced by Council Members Gennaro, Brewer, Fidler, Gentile, Gonzalez, James, Koppell, Liu, Nelson, Sanders Jr., Weprin, Gerson, White Jr., Martinez, DeBlasio, Vann, Felder, Mitchell, Eugene, Recchia Jr., Vallone Jr., Crowley, Garodnick, Lappin and Katz.

A LOCAL LAW

To amend the administrative code of the city of New York, in relation to the creation of a comprehensive wetlands protection strategy for New York City.

Be it enacted by the Council as follows:

Section 1. Legislative findings and intent. The Council finds that wetlands serve a variety of critical functions important to the residents of New York City. These functions include filtration of pollutants, surface water storage, flood control, shoreline stabilization and prevention of erosion, stream flow maintenance including maintaining the aquatic habitat and opportunities for aesthetic appreciation of streams, groundwater recharge, sediment removal and nutrient recycling, promoting aquatic species productivity, biodiversity and provision of plant and wildlife habitat and enhancing recreational opportunities. Draining and filling wetlands impairs their functions and destroys native habitats. New York City has lost the majority of its wetlands to development, over time. The Council finds that to the maximum extent possible in consideration of competing land uses, preserving the remaining wetlands, creating new wetlands and undertaking actions designed to improve the functions of wetlands to the maximum extent

possible is in the best interests of the City, and offers a way to respond to the challenges that will be presented by climate change and rising sea levels.

. The Council further finds that the existing law leaves gaps in wetlands protection and that it is necessary for the City to develop and implement a comprehensive wetlands protection strategy.

The Council further finds that existing maps of wetlands in the City are outdated and incomplete. For all of these reasons, the City must take steps to conduct a preliminary satellite or aerial imagery survey that will provide an overview of the remaining wetlands in the City, and provide a basis to develop and implement a wetlands strategy that will address challenges or obstacles to wetlands protection.

§2. Chapter 5 of title 24 of the administrative code of the city of New York is amended by adding a new section 24-528 to read as follows:

§24-528 New York city comprehensive wetlands study and protection strategy. a.

Definitions.

1. *“City” shall mean the geographic area constituting the city of New York, including wetlands, shorelines and underwater lands.*

2. *“Office” shall mean the mayor’s office of long-term planning and sustainability.*

3. *“Wetlands” shall mean those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.*

b. Preliminary satellite or aerial imagery survey. No later than September 1, 2010, the office shall submit to the mayor and the speaker of the council a preliminary survey of likely

wetland areas based upon satellite or aerial imagery. The preliminary satellite or aerial imagery survey shall be for the purpose of indicating the overall size and location of remaining wetlands within the city and therefore to inform the development of an overall strategy for wetlands in the city.

c. *Development of a comprehensive wetlands strategy.* The office shall complete a preliminary wetlands protection strategy the overall goals of which shall be to (1) conserve, protect, enhance, stabilize, restore and expand wetlands and associated buffer areas in the city; (2) avoid and minimize wetlands losses and achieve no net loss of wetlands in the city; (3) standardize and improve the management of wetlands and associated buffer areas and (4) balance the needs for wetlands protection with other, competing land uses that are in the public interest, such as the construction of schools or affordable housing. Such strategy shall consider (1) the ecological, hydrological, economic, aesthetic and habitat functions of wetlands including, but not limited to future protection from storm surges and other effects of rising sea levels; (2) the current condition and protections afforded wetlands in the city, including wetlands smaller than 12.4 acres in size; and (3) the wetlands policies, laws, rules and regulations that have been adopted by other municipalities in New York state.

d. (1) No later than December 31, 2011, the office shall submit a preliminary comprehensive wetlands protection strategy that meets the requirements of this subdivision to the mayor, the speaker of the council and the public for review and comment. Access to the public shall include posting such preliminary strategy on the city's website and such other measures as the office deems appropriate to increase notice.

(2) No later than March 1, 2012, the office shall submit a final comprehensive wetlands protection strategy that meets the requirements of this subdivision to the mayor, the speaker of

the council and the public. Submission to the public may include posting such final strategy on the city's website and such other measures as the office deems appropriate to increase notice.

(3) The comprehensive wetlands protection strategy shall include, but not be limited to, the following:

(i) appropriate legal requirements, management mechanisms, funding mechanisms, enforcement mechanisms and incentives to conserve, protect, enhance, restore, stabilize and expand wetlands and associated buffer areas in the city, whether publicly or privately owned;

(ii) appropriate legal requirements, management mechanisms, funding mechanisms, enforcement mechanisms and incentives regarding management of wetlands in the city by public and private owners to ensure their consistency and best practices;

(iii) land acquisition and land use planning practices and opportunities to provide for wetlands retreat;

(iv) strategies for adaptation to sea level rise that involve wetlands to the extent not provided for in any other planning or management initiatives undertaken by or on behalf of the city;

(v) opportunities to improve the implementation of wetlands mitigation and creation activities;

(vi) a protocol for coordination with appropriate federal, state and city governmental entities that have jurisdiction over or other property interest in wetlands or associated buffer areas including, but not limited to, coordination in the development of a comprehensive list of wetland mitigation opportunities and notification procedures regarding proposed development projects that may adversely impact wetlands or associated buffer areas;

(vii) reporting mechanisms for wetlands indicators; and

(viii) a public education program to increase awareness about the ecological, economic, aesthetic and other values of wetlands and their associated buffer areas, which shall include information presented on the city's website and such other means as the office deems appropriate.

(4) The comprehensive wetlands protection strategy shall include a schedule and milestones for implementing the strategy and achieving its goals. .

(5) To the extent that any element of the comprehensive wetlands protection strategy is provided for in any other planning or management initiative undertaken by or on behalf of the city, such element may be incorporated by reference.

e. The comprehensive wetlands protection strategy developed pursuant to this section shall be reviewed and revised as necessary to achieve its goals, the first such review to be undertaken within three years and thereafter no less often than every four years. No later than April 22, 2015 and no later than every fourth year thereafter, the commissioner shall submit a report to the mayor and the speaker of the council that provides an update on the comprehensive wetlands protection strategy developed pursuant to this section which shall include, but not be limited to:

(1) the implementation status of the measures included in such strategy, as it may have been revised pursuant to this subdivision; and

(2) specific progress towards each of the strategy's goals.

§3. This local law shall take effect immediately.

THE CITY OF NEW YORK, OFFICE OF THE CITY CLERK, s.s:

I hereby certify that the foregoing is a true copy of a local law of The City of New York,
passed by the Council onMay 6, 2009..... and approved by the Mayor
on ...May 26, 2009.....

MICHAEL M. McSWEENEY, City Clerk, Clerk of the Council.

CERTIFICATION PURSUANT TO MUNICIPAL HOME RULE §27

Pursuant to the provisions of Municipal Home Rule Law §27, I hereby certify that the enclosed Local law
(Local Law 31 of 2009, Council Int. No. 506-A) contains the correct text and:

Received the following vote at the meeting of the New York City Council on May 6, 2009: 51 for, 0
against, 0 not voting.

Was signed by the Mayor on May 26, 2009

Was returned to the City Clerk on May 26, 2009

JEFFREY D. FRIEDLANDER, Acting Corporation Counsel

The New York City Wetlands Strategy is published pursuant to Local Law 31 of 2009.

For more information, please visit:
www.nyc.gov/planyc

Mayor's Office of Long-Term
Planning & Sustainability
City Hall
New York, NY 10007
www.nyc.gov/PlaNYC

