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Preserving Nature in New York City: NYC Parks' Forever Wild Program

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Preserving Nature in New York City: NYC Parks' Forever Wild Program

Urban biodiversity has increasingly been recognized as providing multiple local, regional, and even global benefits. In New York City (NYC), conservation and planning professionals in the Department of Parks and Recreation (NYC Parks) pursued biodiversity protection through the creation of a "Forever Wild" program in 2001, which designated and aimed to protect 8,700 acres of the largest, most ecologically valuable natural areas across City parkland. In 2018-2020, NYC Parks' Natural Resources Group (NRG) expanded the program's extent, resulting in 2,500 acres added to the Forever Wild program, for a total of over 12,300 acres. These additions reflect new acquisitions to the Parks system as well as an acknowledgment of the ecological importance of smaller patches of habitat. By prioritizing the conservation of habitat at the scale of the Parks system, the Forever Wild program enabled tackling some of the scale mismatches that often challenge urban ecosystem management. Over the past two decades, this program has highlighted the value of habitat conservation within NYC Parks, enabled the reduction of natural resource impacts from construction projects in or near Forever Wild areas, and included hundreds of acres of ecological restoration. At the same time, the program has faced constraints and challenges due to competing priorities for limited public land in NYC. Because the program does not confer any regulatory or statutory power, its effectiveness has waxed and waned under different administrations, each with their own priorities. To meet this challenge, NRG has aimed to make information about Forever Wild areas, the program, and its intent widely available within the agency and to the public. NRG has worked to coordinate with other parts of the agency to anticipate and better manage conflicts while protecting biodiversity. Still, upholding the program's conservation goals in the face of continued threats remains an ongoing challenge. More recently, the need for outdoor recreation during the COVID pandemic has given new visibility to natural areas in NYC. NYC Parks will continue to rely on the Forever Wild program to care for these areas while also facilitating their appropriate use.

Keywords

natural resource management, biodiversity, urban conservation policy, ecological restoration

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INTRODUCTION

Urban natural areas are forests, wetlands, and grasslands that are primarily maintained for their habitat and other ecological values and are distinct from landscaped parks. These unique spaces are increasingly recognized as providing multiple local, regional, and even global benefits. At the local level, protection of natural areas within the urban context provides benefits in the form of cooling, stormwater management, and air quality improvement, not to mention critical human health, well-being, and quality of life benefits. From a global perspective, because cities are often located in biodiverse areas, biodiversity conservation within cities is merited (Secretariat of the Convention on Biological Diversity 2012). New York City's (NYC) biota, for example, is at the northern limit of many species from the mid-Atlantic region and at the southern limit of many New England species ranges; thus, the genetic diversity of NYC populations is important to conserve, especially in the face of climate change. When cities lie along global migration pathways, urban natural areas serve a critical role as rest and refueling areas for migratory birds and other wildlife. Recent research about invertebrate biodiversity has also shown that urban areas can function as important refugia for rare bees, thus contributing to global species conservation (Theodorou et al. 2020).

In NYC, various governmental agencies contribute to biodiversity conservation through multiple avenues and strategies. The National Park Service manages the over 9,000-acre Jamaica Bay Wildlife Refuge. New York State Department of Environmental Conservation (NYSDEC) regulates mapped tidal wetlands and freshwater wetlands¹. NYSDEC also regulates Bird Conservation Areas and Critical Environmental Areas and manages the listing process for plants and animals (NYSDEC 2022a-c). Other freshwater wetlands have been acquired and modified by the City to maximize their value in absorbing floodwater and managing stormwater through the NYC Department of Environmental Protection (NYCDEP) Bluebelt Program. Individual trees, under the NYC Department of Park & Recreation (NYC Parks) jurisdiction in parks and along streets, and the ecosystem services they provide, are partially protected through NYC's 2010 tree replacement law (§ 18-107 NYC Admin. Code). NYC Parks' Greenbelt Native Plant Center practices plant conservation through seed collection, propagation, seed banking, and plant distribution. Since 1996, NYC Parks has contributed to bird conservation by closed an area of Rockaway Beach, Queens annually during nesting season to protect listed shorebirds – including piping plovers, common and least terns, black skimmers, and American oystercatchers – as well as the federally listed plant, seabeach amaranth. Within the 30,000-acre NYC Parks system, a major strategy to conserve habitat and biodiversity was the creation of a “Forever Wild” program in 2001, which at that time designated and aimed to protect 8,700 acres of the largest, most ecologically valuable natural areas within NYC parks. Forever Wild fills a conservation “niche” in that it specifically protects urban natural areas as a category – without dependence on the listing status of the species that live within designated areas or the type of habitat therein.

Scale mismatches often challenge urban ecosystem management due to urban systems' high level of heterogeneity and different spatial partitions imposed for different administrative

¹ Current regulations only protect wetlands mapped by DEC that are greater than 12.4 acres in extent, as well as specific wetlands of any size that have been designated of special local importance. Rule changes expected in 2025 will create a regulatory process for all urban wetlands regardless of size.

tasks (Borgström et al. 2006). Forever Wild is a management response at the municipal agency level to overcome this challenge. The overlapping protections provided by city, state, and federal law are not sufficient to protect urban ecosystems in and of themselves. The Forever Wild designation takes into account the full portfolio of the land under management by NYC Parks – at a large spatial scale, operationalizing the goal of biodiversity conservation for the agency as a whole. The designation also prioritizes ecosystem restoration, which responds to a consideration of temporal scale, and connectivity, which accounts for functional scales.

While NYC's conservation efforts were gaining momentum, other cities' efforts to conserve biodiversity were unfolding across the globe. In 1988 in London, for example, an Urban Conservation Strategy was developed based on an extensive ecological inventory (Houck 2015). In San Francisco, California, the East Bay Regional Park District was established in 1988 to preserve and protect open space in the urban area (Houck 2016). In Portland, Oregon, local activists started advocating for nature conservation even within designated urban growth boundaries in the late 1980s, which led to the adoption of the Metropolitan Green spaces Master Plan in 1992 (Houck 2016). In 2022, Houston City Council passed a Nature Preserve Ordinance to formalize protection of over 7,400 acres across 26 parks in Houston, Texas (Houston Parks and Recreation Department 2022, Ord. No. 2022-812, § 2, 10-12-2022).

While cities often set aside land for open space and other complementary environmental goals, the establishment of nature conservation targets at a municipal level is relatively rare. In a review of 135 plans from 40 cities, Nilon and colleagues (2017) found that almost 40% of municipal plans reviewed included habitat targets but less than 20% included biodiversity or species targets. The authors offered that this could be because the authority for biodiversity conservation often lies at a state/provincial or federal level. In addition, Nilon and colleagues considered that setting more specific nature goals could have lacked political support.

Here we present the NYC Parks' Forever Wild Program, and how it has evolved over the last twenty years. We report here in greatest detail on the 2018-2020 program update, in which we all took part. Our description of the creation of the program reflects consultation with archival documents and current and former NYC Parks staff rather than a formal research process. Earlier drafts were also reviewed by these staff members to strengthen the accuracy and comprehensiveness of this case study.

CONTEXT

Since its establishment, the Forever Wild Program has undergone several iterations and levels of promotion to the public. Here we summarize the history of the program's establishment in 2001 and the ways that different administrations left their mark on the program (See Table 1).

Within the context of the burgeoning American environmental movement in the late 1960s and early 1970s, which led to the U.S. Clean Water Act and other environmental protections, NYC began its first efforts to protect natural areas. The NYC Council established the 371-acre Thomas Pell Wildlife Sanctuary and the Hunter Island Marine Zoology and Geology Sanctuary in the Bronx in 1967 (§ 18-125 and § 18-126 NYC Admin Code). The William T. Davis Wildlife Refuge in Staten Island, originally established as a private preserve in 1928

(NYC Parks 2022b), was then incorporated into NYC Parks in 1982 (Local Law 1982), and the Shorakapok Preserve in northern Manhattan was established a decade later in 1992 (Local Law 1992).

Table 1. Summary of the evolution of the Forever Wild Program since its inception in 2001

Date	Action	Acreage	Number of Parks or Preserves	Cause of Change
2001	Creation of Forever Wild program, including designation of Nature Preserves	8,200	48 Nature Preserves	Greater knowledge of the ecological value of “undeveloped parkland”
2008	Published Forever Wild Guidelines, creation of a two-tiered system of Nature Preserves and Natural Areas	9,864	51 Nature Preserves and 26 Natural Areas	Funding to write management guidelines and promote through signage and public outreach
2018	Revision of boundaries, expansion of designated areas, revision of guidelines document	12,379	135 Parks	Updated ecological information, digitized maps, reintroduce program to new generation of NYC Parks staff

In the 1980s and 1990s, NYC Parks’ Natural Resources Group (NRG, now a part of the Division of Environment & Planning) mapped and inventoried thousands of acres of “undeveloped” parkland – i.e., NYC Parks property that did not include landscaping or active recreation amenities such as ballfields and playgrounds. NRG’s ecologists found significant plant and animal biodiversity, including rare and endangered species, in the forests, grasslands, and wetlands of the parks (Sisinni and Anderson 1993, Sisinni and Emmerich 1995). In the early 2000s, NYC Parks used this information to pursue multiple pathways to protect habitat, including acquisition of roughly 2,000 acres (NYC Parks 2022c) of natural areas on private property, for example at Neck Creek in Staten Island along the Arthur Kill and at Powell’s Cove in Queens on the Long Island Sound, as well as the transfer of city-owned natural areas to NYC Parks.

GOALS

To protect against further development within natural areas, NYC Parks approved the creation of the Forever Wild program in 2001, initially proposing 48 sites, which included the previously established preserves. The name was inspired by the “Forever Wild” clause of the New York State constitution (Article 14, section 1), which provides protection for state-owned forest lands in the Catskill and Adirondack regions: “The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands.” An initial goal of this effort was to legislate protection for all Forever Wild sites, but to date Forever Wild has remained an internal NYC Parks program (Berger 2004). As a result, it is at the Agency’s or the City administration’s discretion to uphold Forever Wild guidelines – because no

legal standard has been created, and actions in keeping or in conflict with the Forever Wild program are not subject to external review or sanctions.



Figure 1. Forever Wild Map, 2004.

Concurrent regional efforts at conservation prioritization – for example, under the New York New Jersey Harbor Estuary Program – also informed and bolstered the effort to establish the Forever Wild program. The original Forever Wild sites were chosen according to 1) physical and geographical factors (i.e., large size and shape, connectedness and proximity to other natural areas, and the presence of native soils rather than anthropogenic soils, and 2) biological factors (i.e., the presence of unique ecological communities and rare biota) (see Figure 1, Forever Wild

map and brochure). Ecological uniqueness was informed by over a decade of mapping, reconnaissance, plant inventories, and wildlife observations conducted by NYC Parks and other regional ecologists from city and state environmental and planning agencies, private organizations, and academic institutions.

APPROACH

2008 Update: Guidelines & Tiered System

From 2003 to 2008, NYC Parks received state and city funding to develop Forever Wild guidelines and promotional materials, to install signage and protective measures, and to revise the list of Forever Wild sites. This resulted in further formalization of the program through an official page on the NYC Parks website, informational and rules signs in Forever Wild areas (see Figure 2), and management guidelines intended for internal use by NYC Parks staff. These guidelines included recommendations for how regular operations across the agency should be modified in Forever Wild sites – for example, NYC Parks maintenance vehicles should only be driven on paved paths, salt piles for winter weather response should not be stored within Forever Wild sites, among many others in the 30-page document.



Figure 2. Forever Wild sign first installed in 2004.

During this update, the list of Forever Wild sites expanded through the addition of 26 “natural areas” and 3 additional nature preserves to the 48 previously designated Forever Wild nature preserves, creating a tiered system of protected areas. The justification for including these additional sites provides insight into how habitat conservation principles, which place a high value on habitat patch size and historic land use, were being applied in urban areas at the time:

Many sites exist within the City that possess substantial ecological value but have not been named Forever Wild Nature Preserves. They may be too small,

too fragmented, or are constrained by past land use history. Nonetheless, many of these sites directly benefit Forever Wild Nature Preserves and the City’s ecological vitality: serving as buffers and connecting corridors as well as providing stepping stones that facilitate the movement of pollinators, seeds, and wildlife across an otherwise fragmented landscape (NYC Parks 2008, p. 4)

The 2008 Management guidelines handbook was printed, disseminated to numerous divisions in the agency, and posted on NYC Parks’ internal network. The 2008 authors decided to leave tracked changes visible in the printed and online document to emphasize that these guidelines have and could be revised over time – whether specifically to facilitate protection of Forever Wild sites or to accommodate changing park management priorities (see Figure 3 for an example of what the tracked changes looked like in practice).

The 2008 update made NYC’s natural areas more visible to a larger audience. The Forever Wild program and guidelines were referenced in NYC’s High Performance Landscape Guidance (2010), an interagency blueprint for how parks should best be managed sustainably into the future. Forever Wild was mentioned in the New York City Wetlands Strategy (2012), put forward as part of the citywide resiliency planning effort PlaNYC. The Forever Wild program was also given as one justification for the need to create the non-profit organization the Natural Areas Conservancy (NAC), which was established in 2012 to partner with NYC Parks.

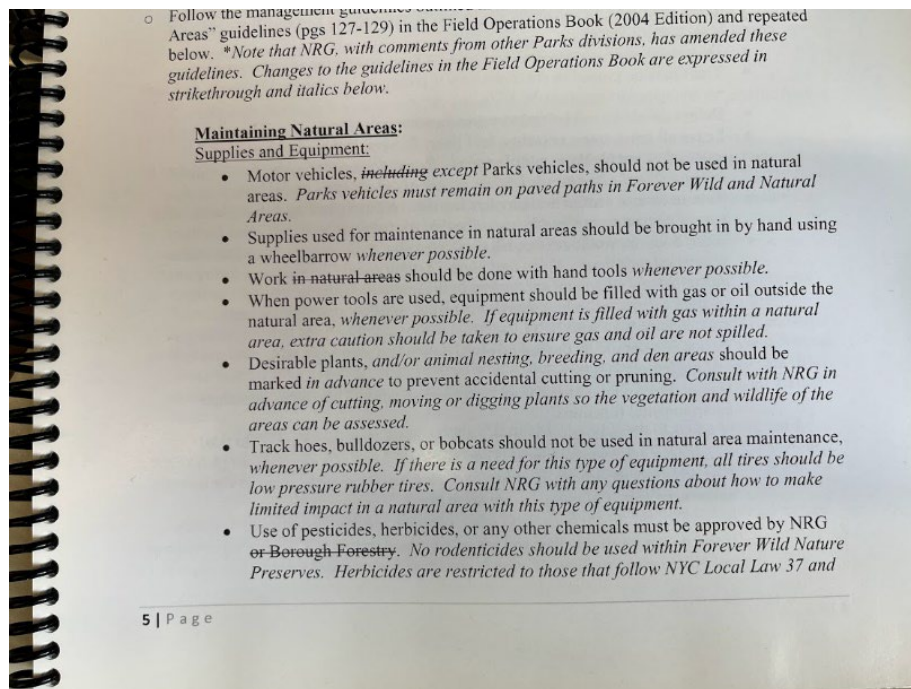


Figure 3. A page from the 2008 Management Guidelines Handbook.

2018 Guidelines and Map Update

The ten-year anniversary of the publication of the 2008 Forever Wild Guidelines Handbook served as a driver for NRG to review and update the guidelines document as well as the Forever

Wild boundaries and site list. In the years since 2008, park boundaries had been refined and digitized in geographic information systems (GIS) (Antonios Michelakis, pers. comm.), the use of GIS was more standardized and widespread across agency operations, new acquisitions had been added to the parks system, and major construction had occurred in a few Forever Wild areas. Climate change, with sea level rise and storm surge, lent urgency to efforts to conserve habitat, due to climate change's threat to human communities, critical infrastructure, and ecosystem integrity, such as subsiding salt marshes.

Furthermore, NYC Parks' NRG staff (including the authors of this paper) wanted to re-introduce the program to a new generation of Parks staff in other parts of the agency. Given past construction in Forever Wild areas, and the ongoing lack of legislated protection for these sites, we wanted to raise awareness of the policy to prevent further loss. Our natural resources management work since 2008 revealed inconsistencies in the sites we perceived as ecologically important and those designated as Forever Wild. This effort was internal and did not engage with the public.

The field of urban ecology has matured significantly since the inception of Forever Wild in that much more is known about the importance of different kinds of habitat in an urban context. For example, small patches play an important role in supporting native pollinators and allowing connectivity between larger patches, while restored landscapes can bolster sensitive native wildlife such as salamanders (Pehek 2017). Even anthropogenic habitats on reclaimed lands can be valuable for biodiversity. For example, the New York State threatened sedge wren (*Cistothorus platensis*) was observed breeding on the east mound of Freshkills Park, a former landfill, for the first time in NYC since 1960 (Ramírez-Garofalo et al. 2022). The east mound is also being used by other rare or declining grassland birds, including the largest population of grasshopper sparrows (*Ammodramus savannarum*) in the state (a New York State species of special concern).

For the comprehensive update of the Forever Wild boundaries, we drew on three valuable datasets : 1) NYC Parks' digital geospatial dataset of legal park property boundaries; 2) the 2013-2014 Ecological Assessment of NYC Parks natural areas undertaken by the NAC, which revealed great detail about the health of and threats to NYC Parks forests and wetlands (NYC Parks 2017, Pregitzer et al. 2019), and 3) 2014 NAC landcover map of NYC based on Light Detection and Ranging (LiDAR) data and analysis of orthoimagery and thematic data layers, which identified 37 unique natural vegetation cover classes (O'Neil-Dunne et al. 2014).

In addition to new data and a greater understanding of the importance of natural areas in urban ecosystems, we wanted an update to the Forever Wild boundaries and guidelines to clarify and advance the goal of the program for a new era. While the initial designation of Forever Wild sites emphasized the inclusion of "the best of the best," the 2018 update highlighted the value of every patch of habitat over a certain size (2 acres), reflecting our increased understanding of small habitat patches' contribution to ecological function and their ability to produce social and human health benefits for New Yorkers.

We revised the sites included in the Forever Wild Program using this new information and approach. First, we reconciled the 2008 Forever Wild boundaries with the official park

property boundaries, which had been digitized around the same time that the original 2008 Forever Wild GIS layer was developed. Next, we removed areas that had been developed or converted. For example, a cricket pitch had been established in a park in Canarsie, Brooklyn, in the Forever Wild area. Finally, we simplified the two-tiered “nature preserve” and “natural area” system – all sites were designated as Forever Wild. This decision was made partly to reflect our new understanding of the value of even the smallest sites and partly to simplify communication about Forever Wild sites with others.

We also edited the Guidelines document for clarity and to bring it up to date. We chose not to include tracked changes in the updated guidelines document to make it clearer and more authoritative. We wanted to counter the impression of impermanence or incompleteness that the tracked changes in the 2008 guidelines document could convey. We formulated general guidelines for protection, additional context about background and purpose, and recommendations for managing conflict between Forever Wild guidelines and other programs or agency priorities. Finally, we edited each individual division’s guidelines for preservation in collaboration with key staff from each division within NYC Parks to ensure that there was consensus and alignment with each division’s operations. Examples of modifications include adding reference to risk rating for tree removals in accordance with new tree risk management guidelines, restructured guidelines for capital construction projects in or near Forever Wild areas to align with specific stages of the NYC Parks capital design and construction process, and added references to the 2013 Native Species Planting Law (§ 18-141 NYC Admin. Code).

To be considered as new additions to the Forever Wild program, properties and parcels had to meet the following three criteria: 1) ownership by NYC Parks, 2) dominance of natural vegetation (e.g. natural forest, scrub, grassland, wetland) as identified by the 2014 land cover map, and 3) size greater than two acres (Milder 2007). All original natural areas in the Forever Wild program also met these three criteria. Natural vegetative cover of any sort, even small parcels, provide resources for wildlife (e.g. food, shelter) as well as critical ecosystem services, such as carbon sequestration, noise attenuation, human physical and mental health benefits, and stormwater capture.

Beyond the three minimum criteria, parcels were prioritized for inclusion depending on site characteristics. For example, priority would be given to a site if it improved protection of habitat already designated as Forever Wild (e.g., a parcel adjacent to an existing Forever Wild natural area acts as buffer to increase the amount of habitat suitable for sensitive wildlife that require larger patches of habitat). Additions were prioritized when they enhanced hydrological or habitat connectivity with existing Forever Wild natural areas (e.g., a parcel between two existing Forever Wild natural areas, or a parcel that contains headwaters of a wetland in an existing Forever Wild natural area). When reviewing potential additions to Forever Wild, we also wanted to protect our previous restoration investments in forest, grassland, or wetland restorations. To reflect the fact that our management does not stop at the water’s edge, we added land under water within parks property that was contiguous with wetland and upland natural areas. Finally, we prioritized areas with documented presence of rare, threatened, or endangered species. Final decisions about inclusion were made following consultation across the agency. Overall, the update added some 2,500 acres to the Forever Wild Program, for a total of over 12,300 acres.

KEY RESULTS

In the 20 years since the Forever Wild Program was created, the program enabled several important changes to NYC's approach to habitat and biodiversity conservation, restoration, and management despite constraints due to competing interests and uses and the lack of regulatory authority in protecting Forever Wild Areas over multiple mayoral and agency administrations.

Habitat Conservation and Other Public Values

Prior to NRG's establishment and its mapping-inventory work, NYC Parks natural areas were classified within the agency as "undeveloped parkland" – implying that their final value would be realized upon their development. With the Forever Wild designation, NYC Parks officially recognized the value of these sites as habitat and created a policy to protect and enhance that habitat. Today, natural areas represent more than a third of the NYC Parks' system (over 12,300 out of 30,000 acres).

Like many American cities, NYC has emphasized ecosystem services and resiliency goals when considering city planning (Ibes 2011, McPhearson, Hamstead, and Kremer 2014, Nilon et al. 2017). NYC's natural areas serve critical functions towards meeting these goals. They offer exceptional recreational and educational opportunities, filter the air we breathe, provide shade and temperature regulation, help protect homes by absorbing and storing flood waters, and offer respite from the noise and pace of NYC for all our residents and visitors. In a study of park users across the City, over half of the respondents indicated that parks in the City are the primary places they use for outdoor recreation (Auyeung et al. 2016), demonstrating that natural areas can play a crucial role in providing a genuine nature experience for those who recreate within the five boroughs. More recently, the COVID-19 pandemic has made natural area benefits more evident. With most opportunities for entertainment and socializing shuttered during COVID-19 lockdowns, urban natural areas saw increased visitation (Pregitzer et al 2020) and became even more important for their physical and mental health benefits.

Because of the commitment to conserving habitat that the Forever Wild program implies, and because it has led to the protection of over 12,300 acres of habitat across the five boroughs, NYC Parks is the primary conservation landholder within the City (followed by National Park Service, NYSDEC, and NYCDEP). Half of NYC's freshwater wetlands (850 of 1,630 acres), almost 40% of its salt marshes (1,540 out of 4,020 acres), and almost three quarters (7,300) of the City's 10,000 acres of forests are managed by NYC Parks within the Forever Wild program.

The Forever Wild program has served as a fruitful avenue for partnerships to advance conservation within NYC and beyond. These partnerships take different forms – some more formal than others – with non-profit environmental groups that also focus on natural habitat protection and restoration in the City and beyond. These include groups that work in natural habitats across different scales and types: citywide (e.g., Natural Areas Conservancy, Trust for Public Land), within watersheds (e.g., Bronx River Alliance, New York & New Jersey Harbor Estuary Program), along coastal shorelines (e.g., American Littoral Society), within neighborhoods (e.g., Coney Island Beautification Project, Harlem River Working Group), within individual parks (e.g., Freshkills Park Alliance, Van Cortlandt Park Alliance, Prospect Park

Alliance, Greenbelt Conservancy), and on specific taxa (e.g., New York Botanical Garden, NYC Audubon).

Ecological Restoration, Advisement, and Mitigation

A central tenet of the Forever Wild program is that land does not need to be pristine; degraded land should still be protected and can contribute to habitat conservation and biodiversity goals. Over time, the conservation work at NYC Parks has evolved from a focus on inventorying and surveying to also include monitoring, adaptive management, ecological restoration, and natural resources protection work. This approach reflects how NYC, like many urban areas, has evolved from viewing “wild spaces” as remnant habitats mostly made up of native species to restored habitats that may include novel ecosystems – and the importance preserving and providing access to a greater diversity of wild spaces for urban dwellers (Threlfall and Kendal 2018).

Significant restoration in NYC Parks began prior to the creation of the Forever Wild program, in 1991, with the establishment of the Urban Forest and Education Program and the Salt Marsh Restoration Team. The Urban Forest and Education Program resulted in the management of 600 acres of forest and 150,000 trees planted between 1991 and 1996 (NYC Parks 2014). From 1990-2001, NRG’s Salt Marsh Restoration Team restored dozens of acres of wetlands. This restoration was enabled by the 1990 Water Resources Development Act that created a federal requirement for wetland mitigation – a prime driver of funding for wetland restoration across the country. In NYC in particular, wetland restoration was largely funded by the 1991 Arthur Kill Exxon Oil Spill (Bergen et al. 2000) and the 1997 passage of the Clean Water/Clean Air Bond Act (New York State 1997). Important protection of natural areas also included perimeter fencing at what would become Forever Wild sites. The Forever Wild program enabled NYC Parks to continue protecting and building upon these past investments in restoring and improving natural areas.

In 2007, the MillionTreesNYC program made a significant impact on Forever Wild areas, with the planting of 480,000 trees in restored forests. In 2013 and 2014, the Natural Areas Conservancy used Forever Wild as the boundary for where to collect ecological data (Forgione et al. 2016) and the U.S. Forest Service selected parks with Forever Wild areas to collect social data on park visitors’ perceptions, use, and value of natural habitats (Campbell et al. 2016). These data have since been used to develop a Forest Management Framework (2018) and Wetland Management Framework (2021) that provide the basis for restoration and management priorities and decisions today. These Frameworks also serve as a way to communicate with elected officials about the sustained funding needed to accomplish city-wide ecological restoration goals.

The Forever Wild guidelines created a mechanism for disseminating best practices for natural resource management in NYC Parks and established a standard that NYC Parks biologists should be consulted on issues related to habitat and natural resources on or adjacent to NYC Parks property. The Forever Wild guidelines have also impacted urban forest practices in the City’s right-of-way. For example, only native street trees are approved to be planted within 100 ft of any Forever Wild area and no problematic nonnative tree species may be planted within 500 ft.

The designation of Forever Wild gives NYC Parks leverage to advocate for preserving ecological function in the face of other priorities. For instance, Idlewild Park, in southeastern Queens, is impacted by major infrastructure. Due to their proximity to JFK airport, trees in the park within the flight envelope of aircraft landing at JFK must not exceed a certain height. Thus, hundreds of trees were replaced by shorter stature trees and shrubs. The Forever Wild status of the park enabled advocacy for restoration investment beyond what the tree replacement and wetlands regulations would require.

Constraints due to Competing Interests

NYC Parks has a broad mission to serve New Yorkers and visitors through management and programming of its open space amenities. NYC's density means that open space is at a premium and must meet the needs of multiple and diverse stakeholders. Trade-offs between public goods are inevitable in urban biodiversity conservation (Dearborn and Kark 2010). Habitat conservation in and of itself is valued but must be balanced with the need for active recreation (e.g., ball fields and playgrounds). In addition, NYC's natural areas have a relatively low profile in the city although this is changing thanks in part to their increased use during the COVID pandemic (Pregitzer et al 2020).

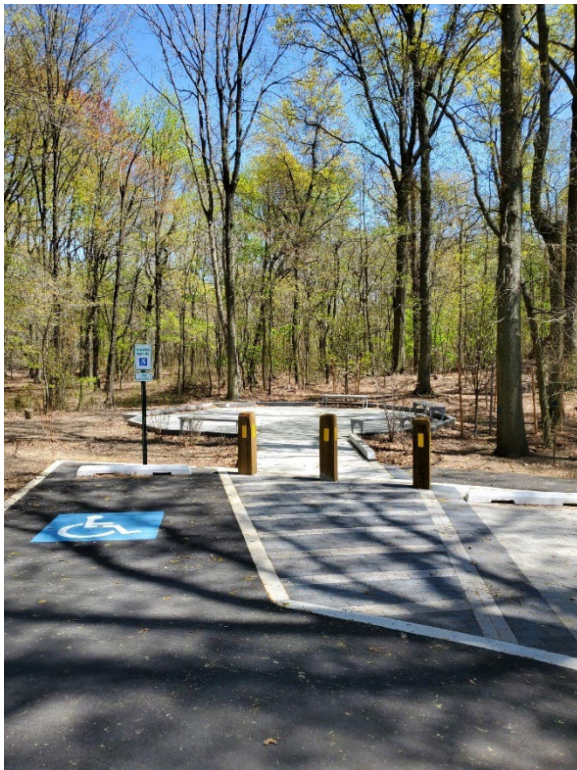


Figure 4. Arden Heights Woods accessible viewing platform.



Figure 5. The Putnam Greenway in Van Cortlandt Park, Bronx, NY.

Given this context, NYC Parks has worked to find opportunities for natural areas to serve multiple stakeholders and meet multiple public needs without compromising natural resource

value or integrity. For instance, it is an agency-wide priority to improve access for differently abled park visitors. In Arden Heights Woods on Staten Island, almost the entire park is designated Forever Wild. In order to create access to this beautiful space, a small parking lot with a fully-accessible viewing platform was constructed on one edge of the park, in lieu of creating an accessible trail network throughout the entire park where addition of impervious surface could contribute to degradation (see Figure 4). Another example is the siting of alternative transportation options within parks – the Putnam Greenway, which cuts through Van Cortlandt Park’s Forever Wild area, is a bikeway that connects to the Empire State Trail (see Figure 5). In both instances, the siting of these features was not ideal from a habitat conservation perspective (they both included increased impervious surface and a small amount of habitat loss). These projects also both included forest restoration actions such as invasive plant management, increased diverse native species planting, and care to plan and plant to replace temporarily reduced tree canopy. Additionally, the value of making it easier for more New Yorkers to access nature may not have a direct ecological benefit but cannot be ignored in public space management and may contribute to wider public support for conservation going forward. These are negotiations and compromises that are sometimes necessary in NYC and no doubt in other cities, too (e.g., Gobster 2001).

We also contended with conflicting priorities within the agency during the 2018 boundary update. The final maps reflect broad consultation across the agency. The circumstances, management concerns, and future plans surrounding individual sites meant that some sites that otherwise met the stated criteria for inclusion were not added to the Forever Wild program in 2018. One example included an approximately 16-acre area of woodland and freshwater wetland at the north end of Willowbrook Park in Staten Island, which was not included due to interest in updating the amenities for the baseball fields and exploring the creation of a more active and expansive northern entrance to the park (see Figure 6).



Figure 4. Willowbrook Park, Staten Island.

Constraints due to Limits to Protection

Because the Forever Wild program is a NYC Parks policy and the Forever Wild sites are not protected under legislation, development can still happen in these areas. Construction of city infrastructure (e.g., stormwater sewers), as well as NYC Parks recreational and operational development have all impinged on Forever Wild habitats over the years – especially in cases where no other regulatory protection (e.g., wetland protections) existed. For example, in 2003, over 10 acres of Forever Wild woods were cleared for ballfields and a playground in Bloomingdale Park, Staten Island. These woods lay outside the boundary of what New York State Department of Conservation had mapped as regulated wetland so at that time the only protection for this habitat was the Forever Wild program.

The lack of regulatory power also makes the goals of the program vulnerable to changes in staff and priorities with different mayoral administrations. Currently, NYC Parks policy is enacted mostly through shared norms across the agency, which can undermine the public's confidence in the commitment to conservation (e.g. Newton 2022). With staff turnover, there is a chance that the processes in place to refer to Forever Wild boundaries and guidelines when siting new initiatives may be lost. Both within the agency, and when interacting with other city agencies, protection of Forever Wild areas can be traded off for other priorities. For instance, often the siting of major stormwater infrastructure like storm sewers and Bluebelt stormwater wetlands does not take into account existing habitat or past restoration efforts. Mayoral priorities, like the DeBlasio Administration's expansion of the citywide ferry service, took priority over Forever Wild protection when a ferry terminal was initially sited in Coney Island Creek, with potential impacts on the shorebirds and breeding horseshoe crabs that use the calm waters and shores of the site for mating, feeding, and resting.

CONCLUSION AND FUTURE PLANS

Habitat conservation programs like the Forever Wild program can strengthen protection for urban natural areas. Even within existing constraints, simply by having more people aware of unique urban natural spaces and the value they provide within a broader parks system can be one of the first steps toward advocacy, and ultimately, protection. While NYC's Forever Wild program has benefited from being linked to citywide, long-term planning, coordination at multiple scales with other parts of NYC Parks as well as with other city agencies and community organizations continues to be a challenge. Coordination and information sharing has been flagged as critical for resilience planning at the city scale (Campbell et al. 2016), and we aim to address this in several ways.

Within NYC Parks, NRG staff have provided in-depth trainings on the Forever Wild program to horticultural staff, landscape architects, Urban Park Rangers, and others across the agency. We have made digital maps available in multiple formats and online locations for NYC Parks staff. In addition, we have posted the updated management guidelines on the agency's internal network. In a step toward transparency beyond NYC Parks, we have also made prior and current Forever Wild maps available on the NYC Open Data portal for anyone to access (NYC Parks 2022a). These files include metadata about how Forever Wild areas are selected and what the program means within NYC Parks. Ongoing efforts to increase awareness within NYC Parks and the public remain a priority. We are planning a conference about Forever Wild to bring together multiple disciplines, voices, and perspectives and to examine the importance of enduring natural areas protection for the City and region. We plan to continue to build on our external partnerships to strengthen protection for Forever Wild areas. For example, the Natural Areas Conservancy plans to undertake a remeasurement of the Ecological Assessment of NYC natural areas in 2024. This assessment will include the new Forever Wild sites. New multi-disciplinary and cross-sector environmental coalitions that NYC Parks has joined, ranging from

the local (e.g., Forests For All NYC²) to international scale (e.g., CitiesWithNature³), hold the potential to further raise awareness about the Forever Wild program and to share resources and celebrate accomplishments in improving urban habitat and biodiversity conservation across a wider community.

Further work could be taken on by other actors with different expertise and scope of work. For instance, legislating the protection of Forever Wild sites could also be a way to improve the longevity and efficacy of the program, but advocating for and working towards that legislation is not within our scope as NYC Parks Staff. We would welcome others to comment on the feasibility, strategy, and advisability of making this possible. Finally, we acknowledge that we cannot fully capture the multiple perspectives of this program's history in this format and the process we took to portray it. We must also underscore that our current positions probably impact the narrative portrayed here in ways that we do not anticipate. Nonetheless, we hope that this case study provides a helpful example of how our agency addressed biodiversity conservation and urban natural resources protection in the absence of formal legislative and regulatory protections and provides insight into a governance structure that can be further analyzed and evaluated by future researchers.

As the benefits of urban natural areas continue to receive greater recognition, it is important to examine policies and programs that aim to protect and maintain these areas, the extent to which these policies and programs have been successful, and why or why not. NYC Parks' Forever Wild program is a management policy that has evolved over the last 20 years as the science that it is based on has advanced and progressed, there is greater adoption of new technologies such as geographic information systems by natural resources management professionals, and there are new norms and infrastructure available for data transparency and open data sharing. While the core objective of protecting ecologically valuable areas has remained the same, given that it is an internal policy driven by grassroots efforts of NYC Parks staff rather than a top-down or legislated policy with regulatory power, the finer details of the Forever Wild program (i.e., the acreage and location of properties included in the program) and how it is implemented (i.e., which activities are and are not allowed) have also evolved due to staff turnover, differing views on priorities and constraints, and different political and economic conditions. The protections for habitat and biodiversity achieved through the Forever Wild program remain vulnerable. Nonetheless, the acreage of Forever Wild has increased in the past 20 years and natural areas restoration efforts have brought back species that have not been seen in decades, which is a hopeful sign of how much urban natural areas are valued and have improved in NYC. As one of the densest cities in the world, NYC will undoubtedly face continued development pressures and other threats to our urban natural areas, for example from climate change. Nevertheless, our hope is that as we continue to expand our public outreach, engagement, and education efforts around our Forever Wild program, we will build a stronger and more robust constituency that will continue to protect, care, and advocate for these natural areas in the years to come.

² Forests for All NYC is a coalition of over 70 organizations that support NYC's urban forest: <https://forestforall.nyc/>

³ CitiesWithNature is a coalition of over 200 cities that aim to enhance the value of nature in and around cities worldwide: <https://citieswithnature.org>

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