



THE SIGNIFICANCE OF THE HABITATS OF THE NEW JERSEY MEADOWLANDS

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Terms like “low quality,” “marginal,” or otherwise “insignificant” are often used when describing the fragmented habitats and natural resources present in urban ecosystems. Many of these areas, such as those in the New Jersey Meadowlands (also called the Hackensack Meadowlands), exist as highly altered but ecologically functional landscapes that serve as invaluable wildlife habitat and provide unprecedented ecosystem services to humans and wildlife in areas where there are little to no other habitat available, and where these services reach more people directly. Similarly, urban habitats are often described as “low quality” due to the surrounding development based on definitions developed for more rural habitats, even though these habitats are in fact highly functioning, and relatively rare. Often, it is the nearby development and not the habitat itself that causes these ecosystems to be considered as “low quality.”

Yet, because of the common narrative, these habitats lack the required protections that are ascribed to lands deemed as “critical habitat” or “high quality.” It is therefore essential to shift this narrative to an acknowledgement that the remaining habitats in urban systems such as the New Jersey Meadowlands provide meaningful and essential ecological and societal value, and are in fact important critical habitat.

In fact, the United States Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the National Oceanic and Atmospheric Administration have designated the Meadowlands as an area of aquatic national importance. In addition, the 2025 New Jersey State Wildlife Action Plan states: “The Hackensack Meadowlands shine with vast tidal marshes and rivers important to wading birds, fish, and migratory birds and bats. Protecting vital corridors connecting habitats north to south is vital for the future of both people and species across the region.”

Though disturbed and in some places degraded by past development and industrial activities, the Meadowlands remain significantly important in supporting resident, breeding, and migratory bird species, and in providing life cycle requirements to fish and invertebrates. These wetlands and other associated habitats are also important in reducing flood risks, thus increasing the resilience of local communities and ecosystems while protecting infrastructure, residences, businesses, and ecological resources from flood events.

WHY URBAN AREAS ARE DIFFERENT

Wildlife species are in a state of perilous decline. Changes caused by human activity, including urbanization, climate change, and the conversion of habitat to developed areas mean there are fewer habitats to support plants and animals. Preserving and restoring native habitats in urban areas like the Meadowlands is essential to combatting biodiversity loss and enhancing people's quality of life.

Urban habitats support migratory pathways and stopovers that link populations. Landscape connectivity is critically important as species struggle to adapt to climate change and migrate to more suitable habitats.

Traditional definitions of habitat quality often revolve around the idea of pristine open areas or minimally disturbed conditions. Under this framework, it is nearly impossible for urban ecosystems to fit the bill of “high quality” habitat. Despite this, the same ecological processes that occur in areas denoted as “high quality” still occur in urban ecosystems, albeit in a less traditional sense. “Low quality” often reflects human perception rather than ecological reality, as these areas contribute to biodiversity, connectivity and resilience.

In addition, wetlands in urban systems such as the Meadowlands serve as critical natural flood buffers, absorbing storm surges, tidal flooding, and extreme precipitation events. The loss of even small wetland areas reduces overall system capacity, making adjacent communities vulnerable to catastrophic damages as incremental habitat loss compounds flood risk over time. This makes habitat loss in urban systems as much an ecological threat as it is a public safety threat.

HABITATS OF THE MEADOWLANDS

Despite the legacy of historic fill, altered hydrology, contamination, and development, the Meadowlands continue to support sensitive and highly specialized wildlife species. For example, saltmarsh sparrows persist across fragmented high marshes in the region, and tricolored bats are detected across various woodland and upland areas, despite the lack of traditionally pristine habitat. Similarly, monarch butterflies utilize small, fragmented patches of milkweed and other native plants for migration and breeding. The consistent and measurable presence of these species, among many others, demonstrates functional habitat value beyond that perceived by humans. This indicates notable adaptability of species perceived as specialists, and also a strong dependence on the remaining habitat patches.

Below is a summary of some of the habitat types found in the Meadowlands, as well as descriptions of their importance to wildlife and human populations.

Low and High Tidal Marshes

Despite its distance from the Atlantic Ocean, many of the habitats immediately adjacent to the main stem of the Hackensack River are tidal marshes. These intertidal wetlands are influenced by regular tidal cycles, including both daily flooded low marshes and less frequently flooded

high marshes. Many of them were historically fragmented, ditched, filled, or otherwise hydrologically altered due to development and mosquito control practices, leading to edge effects and altered salinity regimes. For this reason, they lack the expansive, continuous structure typically associated with “pristine” coastal systems that are present along the south Atlantic Coast of the state. Additionally, the marshes in the Meadowlands often contain at least some amount of *Phragmites australis*, a non-native species typically found in altered environments, further contributing to the perception of degradation and low quality, as they are evaluated against reference conditions that are largely unattainable in an urban estuary context.

Despite their history of alteration and the present perception of low quality, the marshes of the Meadowlands, especially those largely dominated by native grass species, support a suite of regionally imperiled species, one of the most important being saltmarsh sparrows. These habitats provide essential nesting and foraging habitat for this high conservation priority species, and recent data show a small but stable population across high marsh fragments in the region. Another high priority species found in these marshes is diamondback terrapin, which requires a gradient of mudflats, low and high marshes, and uplands for its life cycle. Annual mark-recapture efforts conducted in the Meadowlands demonstrate a robust and stable population present throughout the estuary.

These tidal marshes also serve as nursery habitat for a suite of fish and invertebrate species that are critical to coastal food webs, including some that are rare and poorly understood such as spotfin killifish.

The thriving populations of these indicator species demonstrate the high functional value of Meadowlands tidal marshes despite their proximity to urban areas, but the benefits extend to human infrastructure as well. These wetlands attenuate storm surge and tidal flooding, reducing flood risk to local communities. They also sequester carbon and improve water quality through nutrient cycling. The cultural heritage and recreation opportunities associated with these habitats are equally important. Sport fishing occurs throughout the river, canoers and kayakers explore the interiors of the marshes, and education opportunities for underserved communities are abundant. Protecting the tidal marshes of the Meadowlands is therefore as critical to wildlife as it is to humans.

Freshwater Wetlands and Open Water / Impoundments

Remnant non-tidal freshwater wetlands exist throughout the landscape as a result of tide gates and other urban infrastructure, serving as artifacts of a once largely freshwater system that existed long before colonization of the region. These habitats are dominated by emergent vegetation, mostly influenced by storm water inputs. They are frequently immediately bordered by infrastructure, with constrained hydrologic connectivity and legacy contamination. They are perceived as low quality due to the relative lack of hydrologic stability and watershed integrity typically present in less urbanized freshwater systems.

These freshwater systems are often viewed as artificial or heavily modified due to storm water influence and proximity to development as well as fluctuating water levels and the dominance of non-native vegetation. Yet, a suite of often overlooked regionally imperiled wildlife species rely

on these marshes. For example, Atlantic Coast leopard frogs are the last remaining chorusing amphibian in the Meadowlands. They rely on the persistence of vegetated freshwater marshes, and have adapted well to the surrounding urbanization despite the associated challenges, making this species a beacon of resilience and a relic of the distant past.

These habitats also serve as critical migratory refuge for many species of conservation concern including American woodcock and American bittern. Additionally, recent data suggest that these biodiversity reservoirs are improving over time. The recent rediscovery of eastern red-backed salamanders in several Meadowlands freshwater habitats highlights both the improving water quality and the fundamental lack of a full understanding of the true breadth of biodiversity that exists in the Meadowlands.

The ecosystem services provided to the immediately adjacent human infrastructure and communities cannot be understated. These marshes store and slowly release storm water, which greatly reduces downstream flooding. They also filter pollutants and improve water quality throughout the watershed. Finally, an often overlooked service provided by these marshes is to provide cooling effects and local climate regulation. Because these marshes are often so close to major urban and industrial complexes, they have been subject to a lack of research and monitoring, and we may therefore not fully understand the true breadth of their value to both humans and local wildlife.

Forested Wetlands

Historically, forested wetlands dominated much of the Meadowlands' interior wetland systems, forming extensive mosaics of Atlantic white cedar swamps and seasonally flooded hardwood forests. Although these habitats are no longer widespread throughout the region, the remaining forested wetlands continue to function as critical avian migration corridors, breeding habitat for raptors and insectivores, and important winter foraging areas for irruptive finch species. Many of these systems are fragmented and hydrologically altered, yet they still provide essential structural complexity and ecological connectivity within the urban landscape.

Despite their reduced extent, Meadowlands forested wetlands support a diverse assemblage of wildlife species associated with mature wetland forests and floodplain systems. Breeding species may include red-shouldered hawk, great crested flycatcher, and yellow-crowned night-heron, while migratory and wintering periods can bring concentrations of common redpolls, purple finches, and other irruptive species. These habitats also provide shelter and foraging opportunities for amphibians, bats, and invertebrates that rely on humid, structurally complex forested wetland environments. As one of the few remaining freshwater wooded wetland systems in the Lower Hackensack watershed, these habitats are disproportionately important for regional biodiversity conservation.

In addition to their wildlife value, forested wetlands provide extensive ecosystem services that benefit both ecological processes and surrounding communities. They store and slowly release floodwaters, filter pollutants and sediments from runoff, stabilize soils, and improve local water quality. These habitats also contribute to urban cooling, carbon sequestration, and climate resilience while buffering nearby developed areas from extreme weather events. Protecting and

expanding forested wetlands within the Meadowlands will therefore be essential for maintaining habitat connectivity, supporting woodland wildlife communities, and improving long-term ecological resilience across the region.

Scrub-Shrub and Grassland Uplands

Many of the remaining open upland habitats are present on closed landfills which leads to an immediate perception of low quality. Yet, despite their highly artificial origins, many of these areas are characterized by either scrub-shrub habitats or coastal grasslands. Indicator species of these habitats, such as field sparrows in scrub-shrub and grasshopper sparrows in grasslands, are present in generally declining numbers. These declines are primarily attributed to development pressure and invasive species encroachment, making these habitats a major regional conservation priority.

The upland habitats on closed landfills are often dismissed as unnatural or temporary landscapes due to their anthropogenic origin, and are therefore not traditionally recognized as legitimate wildlife habitat in conservation frameworks. Aside from those mentioned, other indicator species including indigo bunting, blue grosbeak, and savannah sparrow use these habitats for breeding. Monarch butterflies, upland sandpipers, and eastern meadowlarks use these areas as critical stopover habitat in the spring and fall. The creation of these habitats by capping landfills is one of the greatest examples of unintended positive consequences in modern conservation, and they now represent some of the only remaining open upland habitats available across the entirety of northeastern New Jersey.

Opportunities for habitat creation and restoration are abundant, such as through the introduction of natural disturbance regimes typical of these early successional ecosystems. From an anthropogenic standpoint, they reduce urban heat island effects through vegetative cover and contribute to carbon sequestration and storm water infiltration. These are some of the rarest and most imperiled habitats across the entire northeastern United States, and their preservation, despite their non-traditional creation, is of the utmost importance.

Forested Uplands

Forested uplands within the Meadowlands consist primarily of isolated upland woodlots, reforested fill sites, and elevated patches of mixed hardwood habitat embedded throughout an otherwise heavily urbanized landscape. Examples include remnant upland forests adjacent to transportation corridors, restored landfill sites, and naturally regenerating woodland edges. While these habitats are often small and fragmented, they provide some of the only dry forest conditions available within the Lower Hackensack watershed. Their position within a dense urban matrix makes them especially important as stopover habitat for migratory birds and refuge habitat for resident woodland wildlife.

Despite their limited size and altered structure, Meadowlands forested uplands continue to support a surprisingly diverse community of forest-associated wildlife species. Breeding wood thrushes, resident barred owls, and migratory rusty blackbirds all utilize these habitats during important stages of their life histories. During migration, these upland forests also provide

critical stopover resources for warblers, vireos, tanagers, and other neotropical migrants navigating the urban Atlantic Flyway corridor. The federally listed tricolored bat is additionally documented using these forest patches, particularly during post-breeding dispersal movements. In a landscape where little comparable upland forest habitat remains, these areas function as critical refugia for regional woodland biodiversity.

Beyond their ecological importance, forested uplands provide substantial environmental and social benefits throughout the Meadowlands. They improve air quality, reduce urban heat island effects, stabilize soils, and intercept stormwater runoff before it reaches surrounding waterways. These habitats additionally provide carbon storage, thermal refuge, and important recreational and aesthetic value for nearby communities. By increasing habitat heterogeneity and ecological resilience across the urban matrix, Meadowlands forested uplands play an essential role in supporting both wildlife persistence and human well-being within one of the most densely developed regions in the country.

SUMMARY

The Meadowlands exist as a mosaic of small, disconnected habitat patches. Each patch contributes to broader ecological networks and critical life-history stages of sensitive species including movement, foraging, and breeding. The loss of one patch can disrupt connectivity and reduce overall system function. When these factors are considered, it becomes clear that small patches may serve as stepping stones or refugia, and that urban wildlife often depends on a network of patches rather than large, pristine habitats.

Land management decisions based on the binary mindset of high versus low quality habitat are no longer valid in our urban society. The gradient-based value of habitats in urban systems must be recognized, function must be acknowledged over perceived condition, and the critical nature of the rare remaining habitats must be accredited. Conservation strategies should prioritize protection of all remaining habitat, regardless of subjective assessments of quality. Additionally, restoration and enhancement could improve function without requiring pristine conditions. This forward-thinking paradigm shift could lead to dramatic improvements of urban ecosystem function.

In short, no habitat in the Meadowlands is truly “low quality” when viewed through functional and societal lenses, and all remaining habitat is thus critical. There is a clear dual importance of both ecological support and human community protection. In urban environments, habitat scarcity elevates the value of every remaining acre. Protecting all habitat is essential for both biodiversity and community resilience.