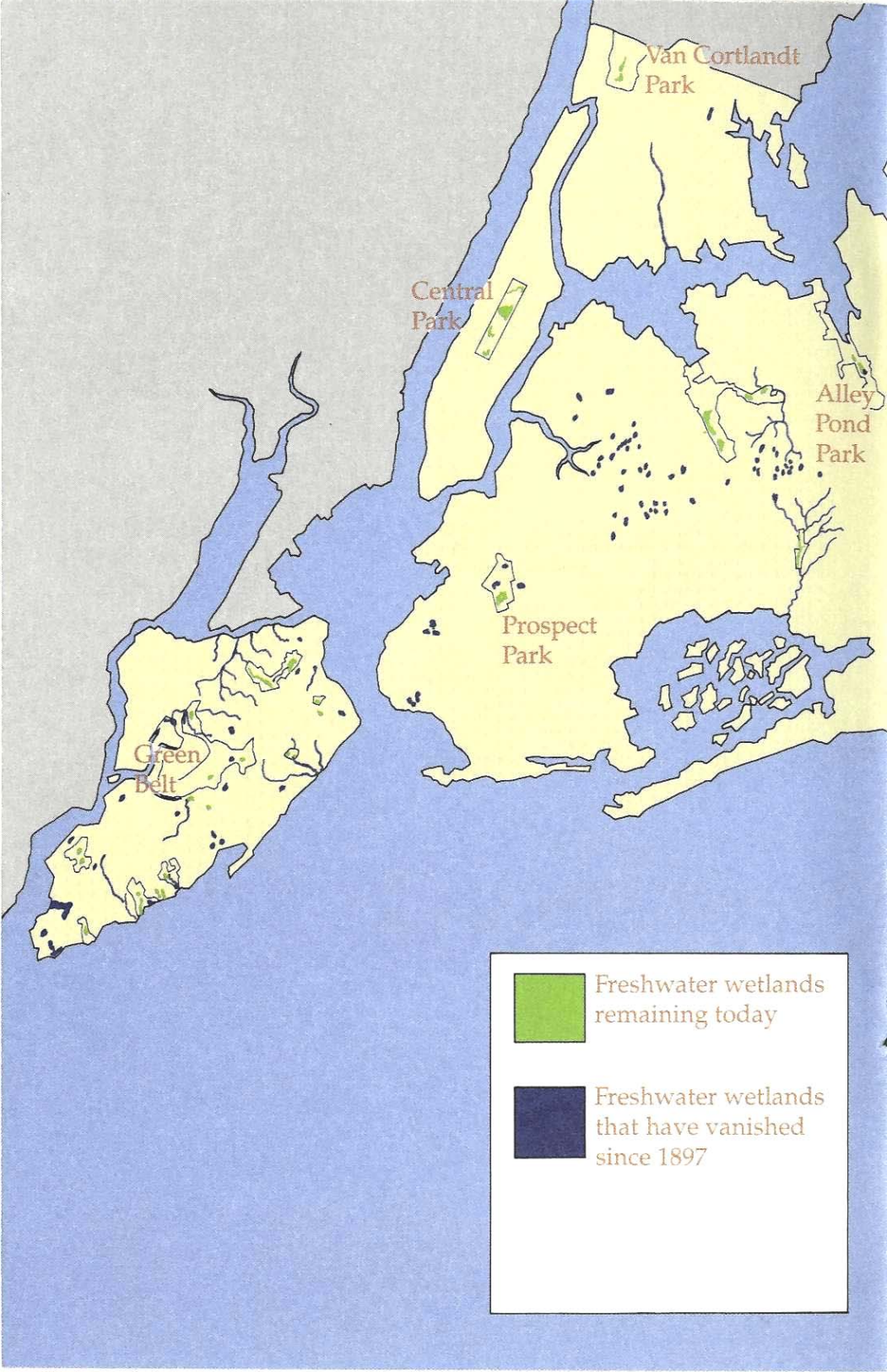

Freshwater
Wetlands of
New York City


Van Cortlandt Park
Central Park
Alley Pond Park
Prospect Park
Green Belt
Freshwater wetlands remaining today
Freshwater wetlands that have vanished since 1897

Freshwater Wetlands of New York City

Within New York City's paved streets lies a softer world, where willows and poplars rim marshy rings and water lilies float upon open water. Wetlands — where reeds and sedges, iris and arrow arum stand in the shallows. Great egrets land, folding their white wings. Red-winged blackbirds chorus from cattail roosts; dragonflies dart and hover.

Our ancestors wove these reeds, fished these waters, heard this music. The first records of humanity are found in fertile wetlands — that was where they found food. These early peoples were self-sufficient; they built no monuments, nor were they merchants. As civilization grew, we sought firm land for our structures, and deep water for transport. Wetlands, the interface between land and sea, provided a challenge, so we filled them as we needed land, or dredged them.

Of the estimated 224,000 acres of freshwater wetlands in New York City prior to the Revolution, some 2,000 acres remain today. Only recently have we begun to realize the value of wetlands. They are vital for storm water control and water purification, and they reduce erosion and slow global warming. While wetlands are attractive to wildlife, they are especially important in New York City, where they are some of the last open spaces where wild creatures roost and feed. Wetlands, once scorned, are now protected by law. In order to understand why, we must examine their natural history.

Front Cover:
Great egrets were driven nearly to extinction in the early 1900s. Legislation protecting wading birds was enacted in the 1930s. Uncommon in our area prior to the 1970s, these graceful imposing birds are once again common sights in local wetlands.

What is a Wetland?

A wetland is simply that: land that is wet. Wetlands form in basins that hold ground water, storm water, and rainfall. Shallows of a lake, pond, river, or stream are likely freshwater wetland sites. Drainage basins have differing water-holding capacities, depending upon their underlying structure of rock and soil; a sandy bottom will drain quickly to ground water level between soil and rock, while clayey soils form a seal and allow the basin to fill. Water supply is even more variable, changing in response to rainfall, season, and ground water levels.

With periodic flooding and drying, temperature extremes found in shallow waters, and the lack of oxygen in water-logged soils, wetlands are hardly an ideal environment. Wetland plant species have adapted to thrive in these conditions. Chief among these adaptations is aerenchymous (air-holding)

tissue, through which oxygen is transported to the plant's roots. The roots in turn push oxygen out into the earth around them. Thus living plants create a layer of fertile, aerobic soil for themselves.

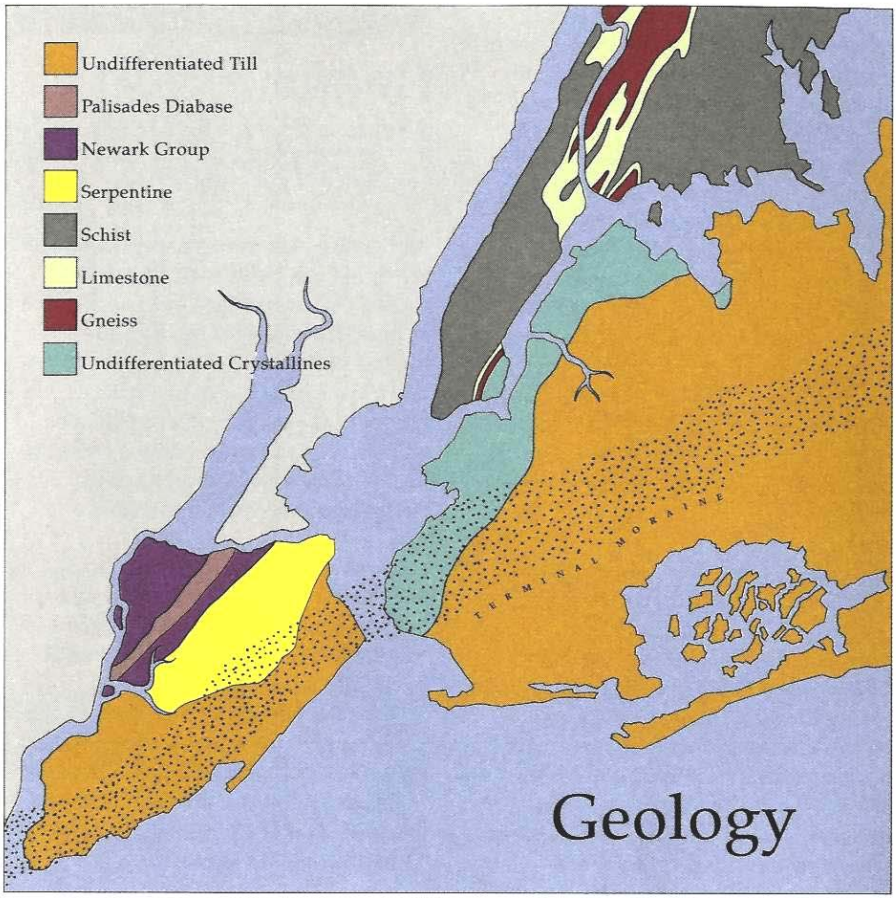
Few herbivores (plant-eaters) can reach wetland plant communities, so most of the dense growth dies back to the ground at the end of each growing season, becoming food for decomposers, such as worms, insect larvae, algae, and bacteria. These organisms break down the decaying organic matter, churning it into peat. The anaerobic bacteria that live in wetland mud are descendants of some of the earliest forms of life on our planet.

Peat, and the plants, animals, and microbes that call it home, is the sticky black muck characteristic of a wetland. This muck and its manufacture slows and filters surrounding waters, scaling basins. These transformed basins are huge sponges; an acre of wetland flooded one foot deep holds 330,000 gallons of stormwater. This water will slowly be released to groundwater and downstream areas. Where surrounding areas are paved, as in the city, wetlands are vital for flood control and water purification.

Freshwater wetlands are two to eight times as productive as the most intensively farmed land. Rapid rates of growth and decay enable an acre of marsh to produce 80 pounds of oxygen, and trap 110 pounds of the greenhouse gas carbon dioxide per day in the photosynthetic process. Wetlands are important contributors to slowing global warming.

But first, last, and foremost, the life of all organisms in a freshwater wetland is ruled by water. Lengths and levels of inundation are the critical factors in every wetland ecosystem.

Bullfrogs are voracious predators that eat insects, worms, other frogs, even mice.



Natural History — How Were They Formed?

New York City was undersea 700 million years ago. The sea bed was composed of mud and shells, compressed in its lower layer into shales and limestones. Three hundred million years later, pressures deep within the earth thrust up a chain of mountains as majestic as the Rockies. As the mountains rose, the shales and limestones at their base were metamorphosized by the pressures into the gneiss, schist, and marble that today lie beneath the city. Wind and water wore down these jagged mountains to the rounder slopes that we see today.

Four times during the past two million years great glaciers descended from the

Arctic, and four times they receded. A mere 75,000 years ago the Wisconsin ice sheet advanced southward, pushing before it a mass of rock, soil, and boulders called glacial till. The terminal moraine, a ridge cutting across Queens, Brooklyn, and Staten Island marks the sheet's southernmost advance. When the ice sheet began to melt along its southern edge some 17,000 years ago, glacial meltwaters flowed down to the sea, carrying till along with it. Large chunks of ice in the moraine melted also, creating deep depressions that filled and became kettlehole ponds. Innumerable streams and rivers carved their way through rock.

Where the waters flowed slowly or were shallow, windborne seeds and spores took root and flourished. Generations of plants grew and decomposed, building peaty sediments. As wind and water eroded the soil, steep slopes grew gentler, slowing the passage of water. Plant communities diversified in these favorable conditions, increasing the animal populations attracted to the plants. The sophisticated food web that developed brought advanced predators to the wetlands: snapping turtles, wolves, hawks, and humans.

Human History

The Native American groups who first inhabited the New York City area some 6,000 years ago found a land rich in marshes and swamps, and they hunted and gathered among them. The Wakwaskeek Indians, whom Henry Hudson encountered in 1609, were Mohicans, marsh men clad in the furs of wetland creatures such as mink, muskrat, otter, and beaver.

Europeans prized these furs. In 1621 a trapping and trading post was established at Fort Amsterdam at the foot of Manhattan island. The Dutch established their farms or "bouweries" around the trading post, mostly in the low marshy grounds which reminded them of home. Flatbush and Canarsie in Brooklyn, New Harlem in Manhattan, and New Dorp in Staten Island were all early settlements.

These settlers were familiar with wetlands. The English colonists who followed them were not. They drained, diked, dredged, and filled wetlands for farming and roads. After the revolution the new nation called for settlers. Settlers wanted land. As population increased, demand for farmland grew. Wetlands were filled with refuse, construction debris and ship ballast.

The elimination of wetlands became a moral imperative, reflected in our language. The Swamp Acts of the mid-1800s urged farmers to "reclaim" wetlands. Today, we speak of being bogged down, mired down, swamped with work.

Ecology of Wetlands

Wetlands can be classified in three broad groups: marshes, swamps, and bogs. Bogs form around sealed rain-fed basins, usually kettlehole ponds left by glaciers. They support a unique group of plants and animals that are too fragile to have survived development; the bogs of western Staten Island have been nearly wiped out. Relict patches exist, but none is as big as the floor space of a midtown studio. Marshes are characterized by soft-stemmed plants, while swamps are woody. Water depth divides a wetland into well-defined habitat zones.

Turn to the illustration on pages 6 and 7 and let us take a brief walk from the open water in the middle of a marsh to the upland forest of an idealized wetland.

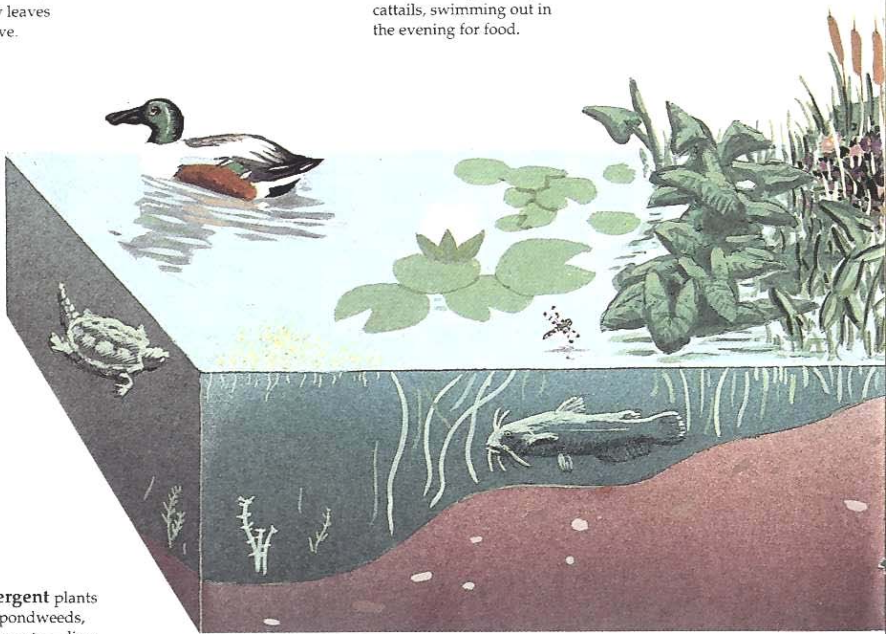
Yellow warblers nest in shrubs near water. Spider webs are an imporant nest-building material.

A Wetland Walk

We begin in the open water with microscopic green algae, the base of most wetland food chains. Insects, fishes, tadpoles, and crustaceans all depend on "pond scum." Slightly larger are the smallest **aquatic** plants: duckweed and watermeal float on the surface. Big as a nailhead, these floaters are early colonizers of the open water. White water lilies and yellow pond lilies are rooted in the bottom of the wetland basin, with their spongy leaves floating above.

Toward the water's edge, plant life in the **deep marsh** is richer. Cattails, sedges, bulrushes, decodon, and arrow arum stand in one to three feet of water. These emergents often form dense stands, ideal habitat for nesting birds. Red-winged blackbirds cry *Oook-a-leee*, while marsh wrens gurgle. Muskrats lodge among the cattails, swimming out in the evening for food.

In the soft bottoms of the **shallow marsh,** showier species swell the community's ranks, including blue flag, pickerelweed, arrowhead, skunk cabbage, and water plantain. These plants provide tasty meals for muskrats. Marsh flowers are thickest here, with bees and butterflies pollinating marsh buttercup, swamp rose, and rose mallow.



The **submergent** plants — milfoils, pondweeds, and bladderworts — live almost entirely below the water's surface. The last are carnivorous, sucking minute creatures into their bladders. Dragonflies and birds glide above the open water while turtles, minnows, and bullfrogs swim below.

As water levels decrease, shallow marsh grades into **wet meadow.** Here we find sedges, grasses, rushes, and wetland wildflowers such as meadow rue, and water horehound. Rough-winged swallows, yellow-shafted flickers, and other birds of the open spaces flit above; any sound may send a cottontail or a toad bounding across the puddled meadow.

As water levels drop further, **shrub swamps** form. Alder, buttonbush, pussy willow, elderberry, and other plants form dense thickets where common yellow-throats, yellow warblers, and swamp sparrows nest.

Scattered throughout shrub swamps are red maple saplings, along with sweet gum, tupelo, pin oak, and willow. The trees of the **lowland swamp forest** can stand in shallow water through spring floods, their branches adorned with blue-winged warblers, cardinals, and Northern orioles. Viburnums, swamp azalea, and highbush blueberry are typical of the shrub layer; at your feet are jewelweed, Jack-in-the-pulpit, and drifts of ferns. Marsh, sensitive, and cinnamon fern thrive in these shady areas; neon-red efts scuttle through leaf litter.

As you proceed to the **upland swamp forest**, beech, silver maple, American elm, white, green, and black ashes, yellow birch, and red oak form a community which prefers damper ground than do the trees of the upland forest. Its creatures are forest creatures, secretive and sweet-songed. From this vantage the wood thrush sings.

Wetlands in New York City's Parks

Alley Pond Park

Everything You Want Under One Roof

The retreating Wisconsin glacier left kettleholes in the terminal moraine. These filled with meltwater which overflowed to the sea. The meltwater's course can be traced from the kettlehole ponds at the southern end of the park through Alley Creek and down to Little Neck Bay. South of the Bay are saltwater wetlands, cattail marshes, and wet meadows. In the southern section shrub swamp and swamp forest ring the kettlehole ponds. To the west lies the deeper water of Oakland Lake. Within the 654 acres of Alley Pond Park, many kinds of freshwater wetland can be found.

The 13 acres of Oakland Lake are banked by glacial boulders. White water lilies and water milfoil grow in the deeper waters. In the sandy soil beneath the clear waters of the shallows are the ribbed veins of arrowhead and the blue spires of pickerelweed. A mixed urban collection of birds can be found on these shores, including Canada geese, Peking ducks, mallards, pigeons and long-legged common moorhens. Toward the southwestern end, near the ravine which carries the stream that feeds the lake, the waters are muddier. Arrow arum and common reeds hold sway beneath the willows. Red maples, pin oaks, dogwood, sweetgum, and wild cherry trees surround the lake elsewhere, with witch hazel, viburnums, and sweet pepperbush grow beneath them.

At Cattail Pond, near the Alley Pond Environmental Center, the robust cattails have almost closed the open water, but clear water trails left by muskrats swimming through duckweed to feed on their roots reveal killifish swarming below. The pond is the lowest-lying point in a good-sized cattail marsh which stretches for acres, punctuated by water plantain and arrow arum. Bullfrogs chant from hummocks of swamp rose mallow.

The pond is fed by water that drains from a sedge/rush meadow. A boardwalk here protects the fragile plants from trampling. Marsh St. John's wort and swamp milkweed bloom in this meadow, which is criss-crossed by toad and turtle tracks.

Lily Pad and Decodon Ponds, the deep and steep-sided kettleholes of the southern section, have grown shallow and rich in plant life. Erosion of their slopes have made them nutrient-rich, and a floating mat of decodon occupies almost all the open water. As decodon grows, it loops up and back down, its air-filled stems forming a mat on which new seedlings can develop.

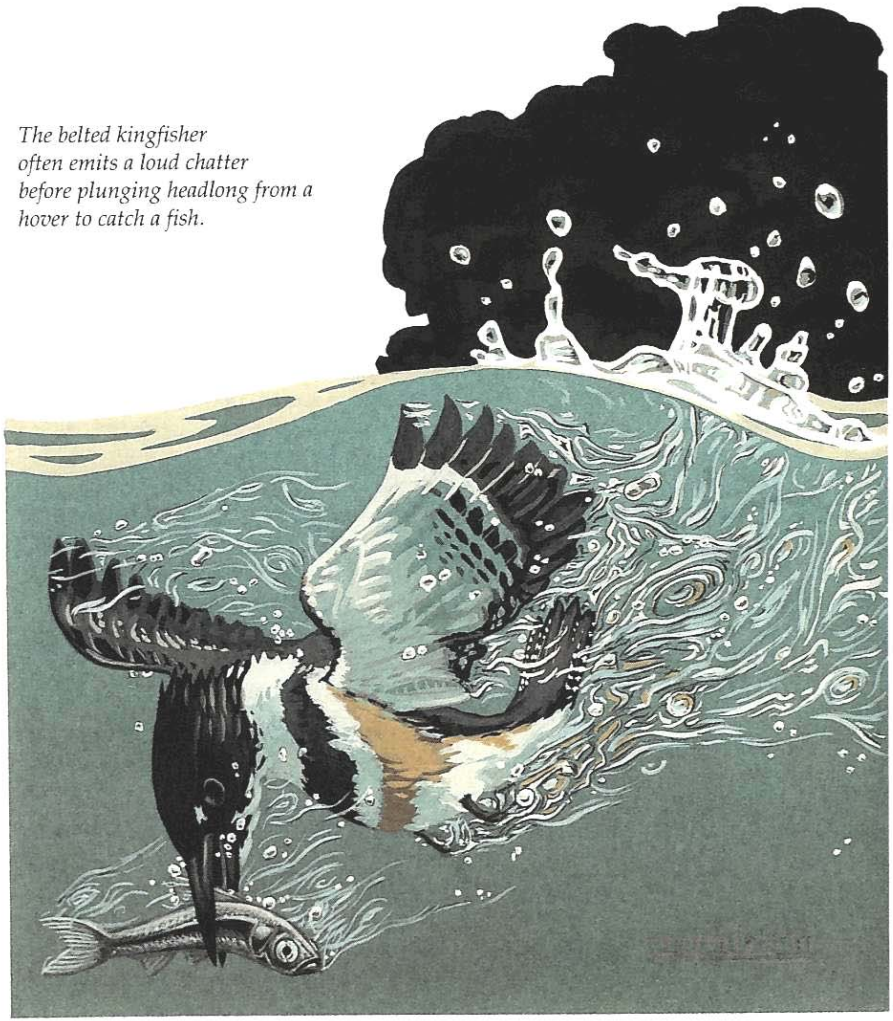
The larger Turtle Pond retains comparatively large areas of open water around its decodon mat, though the water is still shallow and warm enough to let yellow bladderwort and duckweed flourish. A few carp and minnows live in the pond, which is prime for frogs; every step along its

shores is likely to set off a chorus line of splashes. Mallards nest in decodon, and wood ducks find shelter in the dead trees of the upland swamp forest. The forest rises abruptly from the shore, following the contours of the land, and is thick with rufous-sided towhees roosting in the buttonbush, spicebush, and viburnums that grow, in order, up the slopes. Above them a great blue heron may roost in the sweetgum, red maple, or red oak which block all view of the sky.

Van Cortlandt Park

The Swamp

Tibbett's Brook cuts through soft Inwood limestone on its way from Westchester to Spuyten Duyvil. Before diving into a concrete culvert, it feeds the Van Cortlandt Swamp.



The belted kingfisher often emits a loud chatter before plunging headlong from a hover to catch a fish.

Though only a small area, this wetland has many layers. Different water depths yield different plant communities, which in turn provide habitat for various animal species. Water lilies, decodon, and arrowhead each grow in different water depths, almost closing the open water by midsummer. Dense stands of cattail are interspersed with buttonbush, arrow arum, blue flag, and willows.

The variety of wildlife behaviors — feeding, nesting, roosting, courtship, and territorial displays — exhibited in this environment is stunning. As in any diverse neighborhood, there is plenty of "street life": eastern kingbirds sing from the tree tops, parents lean down from their perches to call their young home. Mallards glide out from decodon stands and preen themselves in the crimson reflections of swamp rose mallows. Shy wood ducks, gaily colored, hug the shadows. Green-backed herons and great and snowy egrets stalk through the muddy waters, looking for fish and frogs. Red-winged blackbirds cry from cattail stands. Painted turtles loaf atop sunny muskrat lodges, ignoring the belted kingfishers feeding above them and raccoons swimming by.

Most of these creatures are carnivores, feeding on insects, crustaceans and small fish. Mammals, with the exception of muskrats, hunt in the wetlands but live on its uplands or edges. Edge-living creatures form a wetland's most stable community. A drought may eliminate the world of deep-water creatures, and shallow water may be flooded, but the edges will always be there.

The once extensive swamp forests that ringed the lowland were razed to build the nation's first municipal golf course in 1895. Enlarged from 9 holes to 18 in 1914, Van Cortlandt Golf Course is known for its many unplanned water traps, relics of its swampy origin. A narrow belt of lowland swamp forest still survives along the Kieran Trail around the open water, where willow, pin oak, and red maple grow above an understory of jewelweed, Solomon's seal, Virginia creeper, marsh, and sensitive fern. Predators like barred owls and red-shouldered hawks sometimes hunt in Van Cortlandt's swamps.

Nearby Bronx Park has a special and particular type of wetland — a floodplain hardwood forest. Where the Bronx River cuts through Webster Valley on its way to the East River, it runs through a forest of thick and straight-trunked trees: silver maple, black willow, green ash, sycamore, box elder, and slippery elm. Spring floods soak the river terrace with nutrient-rich river silt and retreat in summer, providing a nearly perfect environment for plant growth. Floodplains are extremely fertile; the oldest traces of humanity yet discovered lie in African floodplains that were once even richer than the Nile valley. The large trees of the Bronx River floodplain stand witness to a time before use had compacted its shores and humans paved its watershed.

Staten Island

The Greenbelt

Staten Island has its own watershed: its waters are less muddied and fouled by upstream sources than the waters of Brooklyn, Queens, and the Bronx.

However, the clarity of its waters is deceptive; the island has been the City's dump for decades. Fresh Kills Landfill receives some 17,000 tons of refuse daily, and releases up to two million gallons of liquid refuse per day into the sea, nearby creeks, and ground water, following the courses of the wetlands it has smothered.

Along Staten Island's terminal moraine in the Greenbelt, spring-fed kettlehole ponds contain some of the most pristine waters within the five boroughs. A half-hour's walk east along the Blue Trail from the main entrance to High Rock Conservation Center brings you to Hourglass Pond, the highest in a series of water bodies that spill down the upland ridge. Between the open water and the close-ranked trees lies a meadow of sedges and bulrushes. Water lilies and bladderwort cover its surface. The pond is well on its way to filling in and becoming a marsh, due to slope erosion and the build-up of plant matter at pond bottom.

Pump House Pond, below Hourglass Pond, is deeper. Bull frogs abound along the shore, where painted turtles sun themselves on boulders. Large sweetgum and red maple trees at midsummer, stand in water two feet deep — a condition that would normally kill them. The nutrients in the mud helps them survive.

Further down is Ohrbach Lake, a quiet place, as the relatively infertile deep waters provide few creature comforts. There is little duckweed, insects, or other food, and no tall grasses or shrubs for refuge from predators. Where slopes have eroded, small marshes have formed near the shore.

Still further downhill, is the recipient of even more nutrient-rich eroded soil, Decodon Swamp is lush with plant life; buttonbush and red maple saplings have established themselves on the decodon mat. Here mallards glide, American redstarts sing, eastern kingbirds flit in and out of plant cover, and big-eyed dragonflies buzz through the still air. In the shade of red, black, and pin oaks, climax forest trees whose size and numbers reveal the upland forest's mature age, highbush blueberries encompass the pond. Where the banks are steep enough for trees to overshadow the pond, sun-loving decodon is inhibited and shade-tolerant arrow arum and blue flag cluster in thick stands.

Egbertville Ravine lies northwest of these ponds. The ravine was formed by glacial meltwaters, which cut a wide swath through the sandy soils, and is now the site of a number of streams and vernal as well as permanent ponds. Stands of sweet gum, beech, and oaks grow near these streams. The trees form a closed canopy that blocks out sunlight by late spring, so only early-blooming flowers are found here. Jack-in-the-pulpit, violets, and bloodroot join the sarsaparilla, Solomon's seal, and Canada mayflower that cover the ground beneath the trees.

Where more light penetrates the canopy, wet-loving shrubs such as swamp azalea and sheep laurel take hold. The many layers of plants yield a diverse wildlife community. Rose-breasted grosbeaks sing from the highest branches, rufous sided towhees from the shrubs and ovenbirds scurry through the undergrowth, feeding on the worms and insects that burrow into the dark leaf litter. The impenetrable tangle of vines that forms by early

summer affords cover to many creatures. Greenbrier, wild grapes, poison ivy, blackberries, and porcelain berry are both a refuge and a restaurant for brown thrashers, catbirds, and cardinals.

The ponds are often surrounded by low rings of black squishy peat that supports few species. In the absence of light and the overabundance of water, the ancient shapes of ferns are seldom joined by more modern flowering plants.

Staten Island

The Bluebelt

Along the unglaciated southern edge of the island, sandy soils lie beneath clayey ones washed down from the moraine by meltwaters. The clays seal and water collects that cannot penetrate into the sands below. Wolfe's Pond Park, Conference House Park, and Blue Heron Park are all characterized by these perched ponds, which often sit above the water table.

Rose mallow grows densely around the banks of Wolfe's Pond, interspersed with arrow arum,water plantain, elderberry, spicebush, and sweet pepperbush. Toward the mouth of the stream that feeds it, white water lilies, decodon, and buttonbush grow in zones defined by water depth. Double-crested cormorants dive for deepwater fish, while black-crowned night herons pay daily breakfast visits.

Many varieties of fern inhabit the upland area: New York, royal, hay-scented, cinnamon, marsh, and sensitive ferns. Black, crack, and weeping willows fill the islands in Acme Pond, which is ruled by huge snapping turtles. Green-backed herons, belted kingfishers, eastern kingbirds, tree swallows, and northern orioles surround the open waters.

Wetlands develop wherever land is saturated or covered by water. There are many freshwater wetlands throughout the city — too many to fully describe here. Alderbrook Wetland in Riverdale Park is almost a pure stand of alder, a shrub swamp type common in wild mountains. In Queens, Cunningham Park has kettlehole ponds in various states, from shallow water to wet meadow. In nearby Flushing Meadows-Corona Park, abandoned ball fields have changed from lawn to wet meadow in just three years. Staten Island is home to much of the city's wetlands: the William T. Davis Wildlife Refuge is full of bubbling springs and rare wildflowers; Buttonbush Swamp in the Egbertville Ravine is a vision of white spheres against waxy green foliage in late July. Since wetlands were vilified for so many years, those not destroyed have remained relatively untouched.

Altered Wetlands

So far we have looked at the more undisturbed freshwater wetlands remaining in New York City. Leftover earth from excavations and dredging, and human refuse have filled many a wetland, and once diverse wetlands have been replaced by stands of

common reed, *Phragmites*, purple loosestrife, and other invasive species.

During heavy rains, sewer system overflow brings mass quantities of nutrients including phosphorus and nitrogen to the soils they flood. Wetland plants, adapted to hoarding scarce nutrients, are overcome by the excess, while *Phragmites* thrives upon it. Like most grasses, it grows from rhizomes — underground networks of tough roots and stems. Unlike most grasses, it attains heights of up to ten feet. Its dead stems persist throughout the winter, shading out possible competitors in the spring. Purple loosestrife is an aggressive invader from Europe; this plant will eagerly crowd out native wetland species, even making incursions into a stand of *Phragmites*. The diversity of wetlands is lost, often irretrievably, once they have been altered and these cosmopolitan pests have taken over.

Unbroken stands of *Phragmites* can be seen throughout the city, waving their plumes above tall stems. Where plant communities lack diversity, animal populations usually follow suit, because the range of food and habitat is narrow. A few forms of life have adapted to *Phragmites*; marsh wrens and red-winged blackbirds find them suitable nesting sites. Stands of *Phragmites*, however, can have a surprisingly diverse understory. Climbing vines ascend the stems at stand edges, and muskrats feed and lodge deep among the reeds. Often one can part the heavy reeds to find an entire wetland plant community, small but hardy, awaiting the day when overfertilization will cease and they can come back into their own.

The alteration of wetlands by humans can have many results, but in the hands of Frederick Law Olmsted and Calvert Vaux — the architects of Central Park in Manhattan and Prospect Park in Brooklyn — the planned result was a more pastoral landscape. Where their vision has been retained, scenes of natural beauty delight the senses.

Purple loosestrife is generally reviled by wetlands lovers because of its ability to crowd out native wetland plants. Some insects, like the silver-spotted skipper, are unconcerned by such details — loosestrife's blossoms are loaded with nectar.

Prospect Park

The Watercourse

In 1866, having completed work on Central Park, Olmsted and Vaux began to plan Prospect Park, their masterpiece of urban park design. They designed several of the park's features, collectivly named the Watercourse, around the area's glacial terrain: the kettleholes of the terminal moraine became the present Swanboat Lakes; the course of glacial meltwater was enlarged to form the Ravine; and the outwash plain dredged to form the Lake.

Near the turn of the century, Swanboat Lakes held a water-carousel of swan-shaped boats, a favored recreation of Victorian ladies and gentlemen. Today the lakes are a sporting ground for frogs and birds who hide among the cattails and sedges that line its eroded banks. The waterfall which supplies the Watercourse enters Swanboat Lakes from the southwest rim.

Olmsted and Vaux planned the Ravine to mimic an Adirondack stroll, creating a deep and narrow stream clattering over rock between steep, pine-clad cliffs. Erosion of these cliffs has silted in the stream and caused its flow to be reduced; pines have been largely replaced by deciduous trees such as locust and wild cherry.

Pagoda Pond near the Nethermead is planted to swamp azalea, sweet pepperbush, and other species that perfume the air and provide habitat for nesting birds. Though *Phragmites* crowds out cattail in the silted shallows, the area still resembles wet meadow and shrub swamp. The terrace of the Boathouse offers a view of the Lullwater, where mallards paddle through cabomba to the open water. Black-crowned night herons roost in the willows above quarrelling geese, and minnows school in their shade. This fairly well-preserved vista is close to Olmsted and Vaux's original plan, making the tranquil beauty of still waters available to all. As one continues along the waters toward the southern section of the park, the wide sweep of the Lake is revealed, dotted by many small islands near shore. This open water is home to many familiar and exotic species of birds, from mallards and American widgeons to coots and pied-billed grebes. A wide range of birds finds the combination of small, thickly vegetated islands and shallow waters to be close to ideal.

Central Park

The Pool, The Loch, The Meer

Before designing the Watercourse in Prospect Park, Olmsted and Vaux created a similar series of waterways in Central Park. There the water follows the course of Montayne's Rivulet, which rose from two sources in the

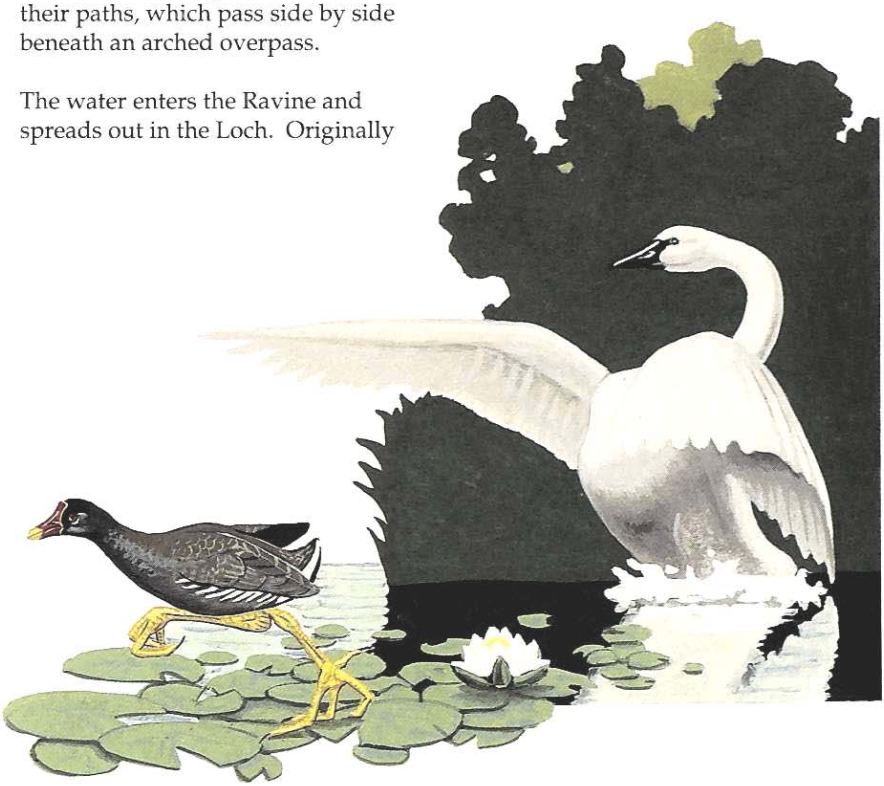
Mute swans — native to Europe — are aggressively terratorial. Since they were introduced to our region in 1910, they have increasingly discouraged native waterfowl nesting. Here, a swan is shown chasing a common moorhen, a not-so-common city breeder.

upper 90s near Columbus Avenue. It entered what is now the park near 101st Street, curved northeast near McGown's Pass in the northeastern corner of the park, and widened as it joined another feeder branch of Harlem Creek at 106th Street. Harlem Creek then drained some 50 acres of the Harlem Marsh, which extended from 110th Street to about 90th Street, and as far west as Third Avenue.

The Pool lies at the original level of the land — 30 feet below Central Park West. The willows, which drape gracefully over its banks, partially conceal trampled, compacted, and eroded banks. Tree roots as thick as your wrist are exposed everywhere. One follows the water westward, down a small cascade and along a typical Olmstedian arrangement of traffic: water and pedestrian each have their paths, which pass side by side beneath an arched overpass.

The water enters the Ravine and spreads out in the Loch. Originally designed as a series of cascading lakes, the Loch is now a muddy floodplain where large black willows lie on their sides, their vigor confined to upright shoots. After drizzling over another cascade and disappearing from sight beneath the Huddlestone bridge, the water runs under Lasker Rink and into the Meer. The Rink is plagued by structural problems, as the water attempts to retrace its ancestral course to the sea.

The Pool, Loch, and Meer receive runoff from nearly 200 acres, or one quarter, of Central Park. Much of this watershed includes the park's steepest terrain where soil erosion is a chronic problem. More than a century of soil erosion in this vast area and subsequent sedimentation in the relatively constricted Loch has radically altered its appearance.



The Central Park Conservancy's "Landscape Management and Restoration Program for the Woodlands of Central Park", will correct many factors which contribute to erosion within this watershed. The treatment of the root cause of problems in the Loch will facilitate future attempts at restoring this historic wetland landscape.

Conserving Freshwater Wetlands

Freshwater wetlands perform many invaluable services. They slow erosion and store storm waters. Their peaty soils strain pollutants from our water and their decomposers break them down into less toxic forms. Wetlands absorb and filter the water borne excesses of human production. Yet we are paving them over every day to construct flood-prone roads and wet-cellared houses.

The economic value of preserving freshwater wetlands is clear, when compared to the enormous cost of building structures that re-create their functions. Maintenance-free wetlands provide greater benefit at lower cost than man-made storm sewage systems, for instance. It makes good sense to let water cleanse itself by flowing through wetlands and under sunshine, rather than to culvert and contain it in the festering dark.

But what price do we assign to a white great egret that at dawn glides silently into the heart of our city as we turn in sleep? What is the dollar value of the water lilies beneath its wings? And how shall we assess the worth of the marsh wren rousing from cattail roosts, singing soprano to the bullfrogs' bass?

Life in the city rushes and pours through narrow channels that do not yield. The citizens of a wild and diverse city, pavement-walking, stone-dwelling, share it with the oldest of landscapes. Soft-bottomed, thicket-ringed, the freshwater wetlands of New York City have all the wildness and diversity that its citizens deserve.

Complete brochures with detailed maps for many of the parks mentioned in this brochure are available at the Urban Park Ranger stations in each park or by mail from the Natural Resources Group, 1234 5th Avenue, Room 234, New York, NY 10029.

Note: When visiting freshwater wetlands, wear comfortable boots or shoes which can withstand some mud. Protect yourself against mosquitoes with a good repellent. Light-colored clothes will make you less threatening to wildlife; wear pants tucked into socks for protection against ticks. For safety's sake, walk with a companion.

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Written by Anna Mockler
Illustrated by Frank Ippolito
Produced by Josephine A. Scalia and Michael J. Feller, NRG
Designed by Mentyka/Schlott Design

City of New York
Parks & Recreation
Natural Resources Group

David N. Dinkins, Mayor
Betsy Gotbaum, Commissioner,
Parks & Recreation
William F. Dalton, Deputy Commissioner
Marc A. Matsil, Director, Natural
Resources Group

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