

Natural History of New York

New York State covers an area of 54,077 square miles (141,229 square km), 87% of which is land. Inland lakes and rivers cover 1,894 square miles (4,908 sq. km) and the State has jurisdiction over 981 sq. miles (2,541 sq. km) of the Atlantic Ocean as well as 3,988 square miles (10,329 sq. km) of the Great Lakes.

Climate

New York State lies in the humid temperate region of the northeastern United States. Average January temperatures range from 15.8 to 33.8 degrees Fahrenheit and 66.2 to 77 degrees Fahrenheit in July. Rainfall is evenly distributed throughout the year and most parts of the State receive about 40 inches annually. Variation in topography and proximity to bodies of water causes large climatic variations and these deviations have created distinct ecological zones, which are home to a complex web of biological diversity.

The Landscape

New York's land forms were shaped by the recent glacial stage which disappeared not more than 8,000 to 10,000 years ago. Thompson (1977) identified nine major land form regions within the state. The Adirondack upland in the northernmost portion of the State includes New York's highest point, Mt. Marcy, hundreds of glacial lakes, and rich mineral deposits. Other upland regions include the Appalachian upland, which occupies nearly half the state, and the Tug Hill Upland, which is the least settled part of the state due to its poor soils, bad drainage and excessive precipitation. There are many distinct physiographic features within the Appalachian upland region. The Finger Lakes, Helderberg Escarpment, and the Catskills have been shaped by the recent glaciation but the Allegheny Mountains in the southwestern end of the State were not glaciated and its angular terrain and exposed bedrock are characteristic features. The other parts of the state are mostly low-lying regions. The Erie-Ontario Lowland has a range of features including wetlands, lakes, beaches and the drumlin belt between Rochester and Syracuse. Two terminal moraines of the great ice sheet are found on Long Island and Staten Island in the Atlantic Coastal Lowland.

New York's landscape is dominated by several unique features. The 6 million-acre Adirondack Park, in northernmost New York, was established in 1892 and is a patchwork of public and private lands. Within the "Blue Line", the park boundary, there are campgrounds, hiking trails and opportunities for water sports. The Park has a diversity of wildlife which uses the streams, glacial ponds, acid bogs, marshes, and evergreen and hardwood forests. There are 2,800 lakes and 30,000 miles of rivers and streams that support the abundance of aquatic life in the Park. The area also provides habitat for mammals and hundreds of birds. For hundreds of years, wildlife and people have coexisted in this unique region.

Another of New York's mountainous regions is the Catskills. The Catskill Forest Preserve, established in 1885, has thousands of acres of forests, meadows, lakes and rivers, old farmsteads and abundant wildlife. The wetlands and intact forest of the Catskills protect the Delaware watershed, which serves as a source of drinking water for New York City. Native fish, amphibians and reptiles are

abundant in the forest preserve. The deciduous forests provide homes for the State-threatened timber rattlesnake and other species.

The Finger Lakes region is located in central western New York. There are eleven major lakes in the region but only seven are considered Finger Lakes. Believed to be pre-glacial stream valleys these lakes are some of the most picturesque in the State. They provide ample opportunity for water sports and water for cities around them. The Finger Lakes National Forest, located in western New York is the only national forest in the state and the smallest in the nation. Black bears, river otters, woodland salamanders and bald eagles are characteristic of the Finger Lakes and rare species like the northern coal skink can also be found there.

The Great Northern Forest, which covers 26 million acres in the northeastern U.S., is the largest contiguous block of forest land remaining in the United States. Though most of the land is privately owned (80%), many species thrive there. Moose, marten, beaver and hundreds of bird species use the habitats in and within aspen, oak, sugar maple, white pine and beech. There are 60,000 miles of lakes and rivers in the region which makes for excellent water sports and recreation in the winter.

It is difficult to think of New York and not think of the Hudson River. It is one of the most important commercial waterways in the country and a great environmental success story. The river, which runs the length of most of eastern New York, provides transportation, water, and vast open space. The river is home to endless aquatic life and provides connection to the Atlantic Ocean for diadromous fish. The Hudson was one of the most polluted waterways in the nation and collaborative efforts between government and citizens have resulted in a renewed river system teeming with wildlife and opportunity for recreation.

Ecoregions

These areas of ecological homogeneity which are defined by similarities in soil, physiography, climate, hydrology, geology and vegetation, are used to reference some species distribution information since distribution closely corresponds with ecoregional boundaries. The descriptions which follow are based on The Nature Conservancy ecoregional classifications for New York. A map of the ecoregions of New York can be found in Natural History Figure 1.

The Great Lakes ecoregion was formed during the last glacial advance 14,000 years ago and is characterized by gently rolling, low level landscapes and flat lake plains. The region's climate is influenced by the Great Lakes and has an astonishingly high level of biodiversity and unique habitats. The Montezuma Wetlands Complex is about 36,000 acres of wetlands and provides critical habitat for many bird species. It is one of the largest staging areas for waterfowl migration in the Northeast and is home to 368 species of fish and wildlife.

The High Allegheny Plateau ecoregion is defined by a broad series of high elevation hills that form a plateau rising to 1,700-2,100 feet, extending in the north from the Great Lakes Plains of Lake Ontario to the Ridge and Valley region of the Central Appalachians to the south, and from the Lake Erie Plain in the west to the Hudson River Valley. The O.D. von Engel Preserve at Malloryville contains a diversity of wetland habitats; bogs, fens, wooded swamps which nurture a

diverse group of species found in few other places in the State. Its spring-fed streams also offer pristine habitat to many clams, snails and amphipods.

Lower New England-Northern Piedmont ecoregion lies along the mid- to southeastern portion of New York. The limestone valley is defined by low mountains and lakes throughout. Thompson Pond is also part of the Lower New England/ Northern Piedmont eco-zone. It was designated a National Natural Landmark by the National Park Service in 1973 and is a prime example of a unique habitat in New York. The Pond is only 75 acres, but is home to 387 plant species, 27 mammals and 162 birds. It is one of the best places to observe king and black rails; endangered, ground-dwelling marsh birds.

The North Atlantic Coast ecoregion includes marine, estuarine and coastal components. The region which covers Long Island is characterized by grasslands, shrublands, vast pine barrens, coastal plain ponds and dunes and extensive salt marshes. It is particularly diverse since many species here are at the northern or southern edge of their range. This area is home to 1 of the 2 largest colonies of the endangered roseate tern in the western hemisphere and a very rare natural community of dwarfed pines and scrub oaks known as the Long Island Pine Barrens (The Nature Conservancy, 2004).

Northern Appalachian - boreal forest ecoregion which covers a large portion of northern New York covers most of the Adirondacks and Tug Hill Plateau. The region is defined by matrix forest communities and several large-scale wetland and remote pond complexes. The area contains the largest mature secondary forest in the northeastern United States. Central Tug Hill Forest is one of the few unfragmented large expanses of forest in the state. It is home to many large mammals including bobcats and black bear and forest dwelling birds like the Blackburnian warbler and goshawks.

The St. Lawrence-Champlain Valley ecoregion is characterized by mountain streams, deltas and marshes that line the shores of the St. Lawrence River and Lake Champlain. The ecoregion is largely defined by its aquatic features. Gadway Sandstone Pavement Barrens near the Canadian border is a unique natural community known from fewer than twenty sites world-wide. Few animals have established homes there but moths, butterflies and other invertebrates utilize the jack pine and its associated understory plants.

Western Allegheny Plateau ecoregion has a glaciated and unglaciated portion. Located in the southwestern-most end of the State the unglaciated portion is hilly and home to the Allegheny Mountains. The glaciated portion is characterized by low, rounded hills, and wetlands. The Nature Conservancy calls French Creek in the Western Allegheny Plateau the most biologically diverse aquatic system in the Northeast. It is located in the non-glaciated portion of the Erie Drift Plain and is home to 89 species of fish and 27 species of mussels. French Creek is the last refuge for many rare riverine species.

Status and Trends of Major Habitat Types

FOREST

The forests of New York cover over 60% of its land area and contribute significantly to the diversity of its wildlife. Large expanses of forests in most parts

of the state protect watersheds and preserve areas for recreation. The forests contribute to the economy of the state through timber production and tourism related activities. There are several distinct land type associations developed by the USDA Forest Service. The coniferous forests of the Catskills and Adirondacks are mostly second growth sugar maple, balsam fir, birch and red spruce. There are also areas of north talus slope and white ash woodlands. The forests in the upper elevations are being affected by acidic, atmospheric deposition which is changing the composition of these forests and their associated wildlife. On the coastal plain on Long Island pine dry forests, hemlock-white pine forests and maritime dune complexes dominate. These forested ecosystems are being affected by disease, development activities, pollution and urban runoff. The forests in other parts of the state are mixed forests of sugar maple, oaks, pines and other hardwoods. Since these are not climax communities the tree species will change and will affect the wildlife population.

In the deciduous forests of the state, two major species of trees have virtually disappeared during the 20th century due to disease. The American chestnut and American elm both succumbed to fungal diseases and are exceedingly rare in New York forests. Other non-indigenous species like black locust and Norway maple have been introduced and rapidly colonized deciduous forests. Tree-of-heaven has become well established in disturbed areas and urban settings around the state.

About 72% of New York's forests are privately owned. It is critical that organizations interested in conserving forest habitats and forest-dependant wildlife species focus on working collaboratively with the approximately 500,000 private forest land owners in the state to engage them in forest management decision making in a landscape context. This will require examination of their individual ownership objectives and education about the forest habitat needs of wildlife in their area of the state.

In light of the majority private ownership of forest lands in the state, it is fortunate that numerous sustainable forestry certification programs have developed over the past several years. Most of these initiatives build on the principles of forest sustainability originally outlined in the "Montreal Process", and have developed into credible systems that generally involve third-party auditing and verification, and chain-of-custody procedures. The Montreal Process, and similar initiatives in other regions of the world, came in response to 1992 Earth Summit or United Nations Conference on Environment and Development (UNCED), where participants called upon all nations to ensure sustainable development, including the management of all types of forests.

The sustainability guidelines, principles and criteria used in these systems all address conservation of biological diversity, maintenance of forest ecosystem health and vitality, conservation and maintenance of soil and water resources. The major programs operating in New York (by enrolled acreage) include the American Tree Farm System, Sustainable Forestry Initiative® (SFI®) and Forest Stewardship Council® (FSC®). Other, comparable, internationally-accepted certification programs include the Canadian Forest Standards program and Pan European Forest Certification System.

Hundreds of thousands of acres of New York's forested land are enrolled in one or more forest certification system(s), and can be deemed to be managed with

wildlife habitat and biodiversity consideration in mind (although not necessarily as a primary management objective). Latest enrollment statistics indicate the following for New York:

American Tree Farm System: 911,694 acres
Sustainable Forestry Initiative®: 863,000
acres Forest Stewardship Council®: 204, 095
acres.

In addition, over 1.4 million acres of New York forest land are enrolled in either the Fisher Forest Tax Law Program (Real Property Tax Law (RPTL) § 480), or its successor, the Forest Tax Law, RPTL §480-a. While management explicitly for wildlife species or habitat is not an authorized objective under either Forest Tax Law³, both programs facilitate the retention and management of large, unfragmented blocks of forest land. This protection of large forest blocks can promote the diversity of active, environmentally-sound, silvicultural practices that have been elsewhere identified in the CWCS as being important to maintaining desirable wildlife habitats. Efforts have been made in recent years to broaden the scope of the current Forest Tax Law program to accommodate more generic “open space” conservation objectives. Changes to this law could also be considered that would more specifically benefit landowners who intentionally manage their forests for wildlife.

Finally, under DEC’s Forest Stewardship Program (formerly known as the Cooperative Forest Management Program), we have completed sustainable forest management plans covering 1.5 million acres of land since 1990. In many cases, these management plans are the primary vehicle for communicating wildlife habitat needs and strategies to private forest landowners. (Note: the acreages listed are not cumulative, as some lands are enrolled in more than one program.)

WETLANDS

New York has diverse wetland resources including freshwater and estuarine wetlands of several types. There are major fringing marsh types in the coastal areas of the state along both Great Lakes and the Atlantic and estuarine shorelines. New York has typical temperate emergent and submerged vegetation in its freshwater and estuarine wetlands. There are forested and shrub freshwater wetlands as well.

Historically, New York is thought to have lost 60% of its total wetlands since 1780 (Dahl, 1990). About 300,000 acres of that loss is thought to be due to agricultural drainage of freshwater wetlands, especially in the Great Lakes Plain in western New York. Local areas of the state suffered much more severe losses of wetlands. In Bronx County, for example, a US Fish and Wildlife Service (USFWS, 1965) report indicates a 90% loss of large wetland complexes in just a 10 year span from 1954 to 1964. Wetland losses nationwide appear to have hit a peak between 1954 and 1974.

Sportsmen and hunters were among the first wetland preservationists, recognizing the value of wetlands for waterfowl and fisheries habitat. The first federal duck stamp was issued in 1934 to generate revenue for wetland preservation. Wetlands were first protected by state and federal law in the mid-1970s. The passage of the federal Clean Water Act in 1972, the state Tidal

³ This program is managed with a timber production focus.

Wetlands Act in 1973, and the state Freshwater Wetlands Act in 1974 virtually halted these large-scale losses, although agricultural activities are exempt from these laws.

New York wetland cover has increased in the last decade but there has been a change in the wetland types. There are about 2.4 million acres of wetland in the state. The most common wetland type is forested (66%) followed by scrub/shrub (19%), emergent marsh (10%), and wetland-associated open water (5%). Forested wetlands and open water have increased as cover types while there has been a decrease in the scrub/shrub and emergent marsh types. The main causes of wetland loss have been agriculture, urbanization and mining. The statewide wetlands status and trends study determined that there was a gain of just over 39,000 acres and a loss of just less than 22,000 acres resulting in a net gain of about 18,000 acres. About 68% of the gains in wetlands acreage have been from reverting agricultural land and the remaining gains resulted from increased runoff and altered hydrology.

While large losses of estuarine wetlands due to construction and development in New York have been halted with regulation and enforcement, continuing trends of loss of estuarine (tidal) wetlands in the state have recently been documented by DEC staff. Clear causes for these losses have not yet been established, but several factors, including rising sea level are thought to be responsible. In Jamaica Bay in Queens County, wetland losses have been documented at a rate of 44 acres per year.

WATER

The State's aquatic resources have helped define its landscape and economy. The 52,000 miles of rivers and streams which include the Hudson, Mohawk and Genesee rivers provide critical habitat for wildlife. There are about 7,900 lakes and ponds which cover 790,000 acres. The 600 miles of Great Lakes coastline provide recreational opportunities as well as lacustrine and beach habitat for many species. In the southernmost portion of the state, 1,530 square miles of estuaries and 120 linear miles of Atlantic Ocean provide a diverse group of habitat types for many species. The rivers and streams are in relatively good condition. About 50% of lakes and reservoirs and 40% of estuary waters have been characterized as impaired or threatened (NYSDEC, 2004). Most of the Great Lakes shoreline (70%) has been characterized as impaired. Human activity is the major stressor of aquatic systems. Erosion, agriculture, toxic pollution and urban runoff all impair waters and reduce the integrity of habitat for aquatic species.

GRASSLANDS AND SHRUBLANDS

Most of the grassland habitat of New York lies in the Great Lakes Plain consisting of active and abandoned agricultural lands. Large tracts of important natural grasslands are found in Jefferson County and Long Island. The alvar grasslands and shrublands found in Jefferson County are unique to the state and represent some of the finest examples of alvar grasslands worldwide. The remnant Hempstead Plains on Long Island, sandplain grassland formed from a terminal moraine, are considered a globally rare community by the Nature Conservancy. Additional extensive grasslands are found on the south fork of Long Island. The pine barrens of Long Island, Albany and Saratoga are globally rare ecosystems with unique wildlife. The pine barrens in the Albany area provide critical habitat for the federally endangered Karner blue butterfly. Suppression of fire in these

ecosystems has caused a change in plant species composition and their associated wildlife.

CULTURAL LANDSCAPES

Land utilized for agricultural cultivation has decreased to twenty five per cent of the State's land cover, down from forty five per cent in 1960. Agriculture is concentrated in the central and western portions of the State. The number of major urban centers has changed little during the past century. Albany, Binghamton, Buffalo, Rochester, Syracuse, and New York City are the principal cities.

New York Natural History Table 3 displays an estimated acreage of each land cover type in the state taken from the EPA MRLC data.

Land Cover Changes across the Landscape

In three hundred years since the start of agricultural intensification, the face of the State's landscape has changed tremendously. Prior to European settlement the state was predominantly forested but by the 1890s, 85% of the land was being utilized for agricultural pursuits. According to the U.S. Environmental Protection Agency Multi-Resolution Land Classification, 62 % of the state is forested, most of which is second growth forest. This rapid change in land use and land cover has had a tremendous effect on the native wildlife; and has created a haven for opportunistic non-native species. Many of the extirpated species were at the edge of their range and/ or associated with specialized habitats that are now rare, as are those associated with natural fire regimes. The decline in loggerhead shrike population is directly linked to reduction and changes in agriculture.

The increase in forest cover can be somewhat misleading as it pertains to the health of wildlife populations, as the forests of today are very different from those pre-European settlements. In the Catskill forests sugar maple is replacing American beech and the nitrogen dynamics in those forests have been severely altered. American beech promotes nitrogen retention in soils, increasing fertility, whereas sugar maple promotes its loss from soils. This seemingly small alteration of the ecosystem can have a cascading effect on the entire system with potential negative effects for certain wildlife species. Lack of credible quantitative historical data makes it difficult to discuss longer trends but qualitative information provides us with ample evidence that we are losing biodiversity at an alarming rate. The Nature Conservancy estimates one third of all species in the United States to be at risk of extinction (Sierra Club, 2004).

New York Demography

New York State has a total population of over 19 million residents. Over 12 million of those residents live in the New York City metropolitan region. Most of the remaining residents are clustered in the other large cities of upstate New York; Albany, Binghamton, Buffalo, Rochester, Syracuse, and Watertown. Many of these upstate cities have experienced flat population growth, or reduction in population over the past decade (U.S. Census Bureau, 2005).

An assessment of New York GAP Analysis landscape associations of species and population trends show that population growth is fastest in regions of highest diversity (Smith et al., 2001). The Lower and Upper Hudson are home to most of

the state's amphibians and reptiles and much of the recent population growth is centered in those two watershed basins. Though human population is not directly correlated to any ecological processes, consequences of human dominance in landscapes have well been documented. Loss of biodiversity is primarily traceable to land transformation, particularly fragmentation of natural habitat. The land use changes associated with development sprawl are another hindrance to conservation efforts. Despite a population growth rate in upstate New York of only 2.6% between 1982 and 1997, there was a corresponding 30% increase in urbanization. The consequences of this conversion of farming towns into suburban settlements have been documented. Continuous tracts of land are being fragmented, water quality has deteriorated and wildlife populations are suffering as a consequence.

Biological Diversity

New York State has a rich biological diversity (biodiversity). There are more dragonfly and damselfly species than any state but Texas and more mammal species than any state in the northeast (Johnson, 2001). However, only 55% of the State's plants and vertebrates are considered secure and the status of most invertebrates remains unknown according to the New York Natural Heritage Program (NYNHP) database. The biological diversity of the state is threatened by the demands of a sprawling human population. Species are threatened by habitat degradation and loss, non-native invasive species, pollution and climate change. Natural History Table 2 summarizes what is known about the State's biodiversity.

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Natural History Table 1. Species listed on New York State and Federal Endangered Species lists (New York species)

Taxonomic Group	NY Endangered	NY Threatened	NY Special Concern	NY Total	NY SGCN	Federal Endangered	Federal Threatened	Federal Total
Mammal	10	1	3	14	21	5	1	6
Mollusk	6	3	3	12	59	1	1	2
Insect	10	5	15	30	198	1	-	1
Fish	8	11	5	24	91	1	-	1
Amphibian	2	-	7	9	14	-	-	-
Reptile	7	5	6	18	30	3	3	6
Bird	10	10	19	39	118	2	2	4*
Total	53	35	58	146	538	13	7	20

* Great Lakes piping plover population is listed as endangered, and the population outside the Great Lakes is listed as threatened.

Table Natural History 2. New York State biodiversity of known species and the percentage of those species considered to be at risk for extirpation. The number in parentheses indicates the nationwide risk ranking for these species.

Category	# of species	Species at risk (%)
Total species diversity	3333 (22)	4.9 (27)
Endemism	9 (27)	N/A
Extinctions	10 (20)	N/A
Vascular plants	2215 (24)	3.7 (25)
Mammals	91 (18)	6.6 (25)
Birds	327 (16)	1.2 (44)
Reptiles	35 (32)	14.3 (8)
Amphibians	32 (22)	3.1 (29)
Freshwater fish	159 (16)	7.5 (33)

New York Natural History Table 3. The estimated acreage of land cover types across the state taken from the EPA MRLC data.

Land Classification	Acreage	% cover
Forest	20,316,472	43.9
Wetland*	1,022,747	2.2
Residential	1,860,889	4.0
Commercial/ Industrial	385,810	0.8
Agriculture	8,014,022	17.3
Barren	65,369	0.1
Water	4,823,680	10.4
Parks, golf, lawns	270,906	0.6
uncoded	9,539,402	20.6

* Wetland estimates performed by the DEC staff indicate that actual wetland acreage is much higher