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## PHOTO CREDITS

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# REPORT SUMMARY

In addition to providing some of New York's finest recreational opportunities, the state park system harbors some of the state's most imperiled and significant biological treasures. In 1996, the Office of Parks, Recreation and Historic Preservation (OPRHP) partnered with the NY Natural Heritage Program and the NYS Biodiversity Research Institute to develop a better understanding of what and where these biological treasures were and, in turn, to help OPRHP managers make more informed land-use decisions.

Rare species and significant natural communities are not just found in isolated areas rarely visited by people. Many live close to, or in the midst of, popular recreation areas, such as piping plovers on Orient Beach and gray petaltail dragonflies at Watkins Glen. Protecting these species can be accomplished in concert with providing outstanding recreational opportunities. Through conservation and outreach efforts, visitors can learn about the wonderful and varied forms of life within New York's borders.

The primary goal for this project was to document the rare species and significant natural communities that occur within New York's system of state parks and historic sites. This information is important because state park managers must balance a range of objectives when making land-use decisions. Information obtained from the state park system also contributes to biodiversity knowledge which can be used to address biodiversity issues across the state. Another goal of the project was to map all of the natural communities for many state parks in an effort to determine what types of communities were there, the conditions of these communities, and how they might be affected by management activities and other factors such as invasive species.

*Nearly 75% of the state parks surveyed support at least one rare species population or significant natural community occurrence.*

*All of these places are important for the protection of New York's biodiversity.*

In all aspects of this project, NY Natural Heritage used a prioritized approach to data collection, focusing first on those species and communities of global significance and later on those of regional and state importance. State parks were selected for survey under the direction of OPRHP. Each park received one of three levels of survey effort:

- ***In-Depth:*** Full natural community mapping and rare species population surveys were conducted in 105 state park facilities totaling 274,840 acres. Most of these state facilities had a significant proportion of natural area within their boundaries. Rare species and/or significant natural communities were documented in 91 of these properties.
- ***Targeted:*** We undertook focused surveys for rare species and significant natural communities in 47 state parks and sites with a combined total acreage of 18,555 acres. Rare species and/or significant natural communities were documented in 36 of these properties.
- ***Reconnaissance:*** Cursory surveys were conducted in 31 facilities totaling 4,160 acres. We found rare species and/or significant natural communities in eight of these locations.

For each site with rare species and/or significant natural community occurrences, we developed a report which included: (a) a map showing the location of the species or natural community, (b) a fact sheet about each of the rare species and natural communities found, and (c) management considerations to inform land managers as they balance different land-use objectives for the property.

The findings from this project were dramatic:

- ✎ NY Natural Heritage has records of 924 existing occurrences of rare plants, imperiled animals, and significant natural communities that are completely or partially within 132 state parks and sites. Of these, 487 were first documented during this project:
  - 213 significant natural community occurrences;
  - 131 imperiled animal populations; and
  - 143 rare plant populations.
- ✎ We updated the information on 403 rare species and natural community occurrences that had already been documented in the NY Natural Heritage database:
  - 65 significant natural community occurrences;
  - 110 imperiled animal populations; and
  - 228 rare plant populations.
- ✎ The 278 natural community occurrences found in state park facilities cover a total area of 121,761 acres within state park boundaries.
- ✎ The state park system has at least one outstanding example of 90 of the 167 different natural community types that are currently tracked by NY Natural Heritage. State parks, therefore, include at least one significant, representative example of more than 50% of New York’s natural community types.
- ✎ At least one existing occurrence of 91 different imperiled animals were documented within the state park system.
- ✎ At least one existing occurrence of 178 different rare plant species (including five mosses) were found in the state park system.
- ✎ The state park system is critical to the long-term protection of numerous rare species and community types in New York and, in many cases, throughout the Northeast. Moreover, New York state parks are important to preserving our nation’s biological diversity.
  - State parks are home to 504 separate populations of plants and animals that are listed as state endangered or threatened.
  - State parks support the only known occurrences on public lands of 104 rare species and natural community types.
  - State parks include 191 occurrences of globally rare species and natural community types.

In addition to detailing rare species and significant natural communities within the state park system, this project generated more than 550 management recommendations. OPRHP is actively using this broad suite of information to design and implement environmentally sensitive projects, prepare education programs, support research, and develop habitat protection plans. Having the information available early has also streamlined planning and environmental review processes.

OPRHP is also using the information from this project to support facility management. For example, NY Natural Heritage zoologists conducted follow-up field surveys with state parks staff to help them design alternative trail routes that would reduce potential interactions between hikers and timber rattlesnakes and minimize unintentional trampling of rare plant populations in Hudson Highlands, Sterling Forest®, and Minnewaska State Parks.

*The state park system harbors more than 900 occurrences of 359 different rare species and natural community types.*



Watkins Glen State Park in the Finger Lakes Region supports the state-special concern gray petaltail dragonfly, the federally threatened Leedy's roseroot wildflower, and four significant natural community occurrences.





Some plants have clever mechanisms for surviving in low-nutrient conditions. Pitcher plants, for example, use their vase-shaped leaves to capture insects. These plants grow throughout the state park system, including Lake Superior and Sterling Forest® State Parks.



# INTRODUCTION

## STATE PARK SYSTEM & THE NEED FOR A COMPREHENSIVE SURVEY

In addition to providing some of New York's finest recreational opportunities, the state park system harbors some of the state's most imperiled and significant biological treasures. In 1998, the Office of Parks, Recreation and Historic Preservation (OPRHP) partnered with the NY Natural Heritage Program and the NYS Biodiversity Research Institute to develop a better understanding of what and where these biological treasures were and, in turn, to help OPRHP managers make more informed land-use decisions.

Rare species and significant ecosystems are not always found in isolated areas rarely visited by people. Many live close to, or in the midst of, popular recreation areas, such as piping plovers on Orient Beach and gray petaltail dragonflies at Watkins Glen. Protecting these species can be accomplished in concert with providing outstanding recreational opportunities. Through conservation and outreach efforts, visitors can learn about the wonderful and varied forms of life within New York's borders.

The primary goal of this project was to identify and map the locations of imperiled animals, rare plants, and significant natural communities across the 325,000-acre state park and historic site system. This information is important because state park managers must balance a range of objectives when making land-use decisions. This project was made possible by the Environmental Protection Fund through the NYS Biodiversity Research Institute. The NYS Biodiversity Research Institute has improved our understanding of New York's distinctive biodiversity by funding a vast array of projects.

This project was the first effort ever to gather comprehensive information of the state park system's biodiversity, particularly its rare and imperiled species and significant natural communities. It built, however, upon the local and regional work of countless biologists, land managers, and others who have been exploring New York's natural diversity for more than a century. NY Natural Heritage was able to update many of the records made by these naturalists through the years. We also made many discoveries, including populations of animals previously thought extirpated from the state, and new locations of rare wildflowers found in few other places on earth.

## NEW YORK NATURAL HERITAGE PROGRAM

NY Natural Heritage was established in 1985 and is a program within the NYS Department of Environmental Conservation's (DEC) Division of Fish, Wildlife, & Marine Resources. The program is staffed by more than 20 scientists and specialists with expertise in ecology, zoology, botany, information management, and geographic information systems.

NY Natural Heritage maintains New York's most comprehensive database on the status and location of rare species and natural communities. We presently monitor 167 natural community types, 745 rare plant species, and 433 imperiled animal species across New York, keeping track of more than 10,900 locations where these species and communities have been found. The database also includes detailed information on the relative rareness of each species and community, the quality of their occurrences, and descriptions of sites. The information is used by public agencies, the environmental conservation community, developers, and others to aid in land-use decisions. Our data are essential for prioritizing those species and communities in need of protection and for guiding land-use and land-management decisions where these species and communities exist.

## *Bald Eagle Nests Can Be 6' Across & 8' Deep*

Bald eagles are great recyclers, reusing the same nest over and over again. Each year they add a bit more until their nests are many feet deep and weigh hundreds of pounds.

Bald eagles prefer to nest atop large white pines growing on the shores of lakes and large rivers. Logging and development destroyed many of these trees beginning in the 1800s, which began the eagle's decline in New York. The few eagles that persisted into the mid-1900s could not reproduce successfully because of the egg-thinning effects of DDT and other chemicals, and by the 1960s only one pair was left in the state.

In the 1970s and 1980s, state and federal government biologists began restoring bald eagles to New York, mostly from Alaskan stock. Today, more than 80 breeding pairs and numerous wintering eagles soar in New York, many associated with state parks.



Bald eagles have 6-7' wingspans.

NY Natural Heritage is an active participant in NatureServe – the international network of biodiversity data centers. There are currently Natural Heritage Programs in all 50 states and several interstate regions. There are also 21 Conservation Data Centers, the international equivalent of Natural Heritage Programs, in Canada, Latin America, and the Caribbean. These programs work with NatureServe to develop biodiversity data, maintain compatible standards for data management, and provide information about rare species and natural communities that is consistent across many geographic scales – from ¼-acre wetland sites to the North American continent.

NY Natural Heritage's collaboration with NatureServe and other states helps us put our information into a broader context. With NatureServe, we track the rarity of species and natural communities at global and state scales. This allows us to distinguish the conservation priority for an orchid with just four populations in the world from another orchid with four populations in New York but many populations elsewhere. We can also pool our data to look across state and international lines. For example, New York data on rare species and natural communities along Lake Ontario have been combined with similar data from Canada to facilitate analyses of potential consequences of lake-level changes.

### **ECOLOGICAL COMMUNITY CLASSIFICATION SYSTEM**

In 1990, NY Natural Heritage published *Ecological Communities of New York State*, an all inclusive classification of natural and human-influenced communities (Reschke 1990). From 40,000-acre beech-maple mesic forests to 40-acre maritime beech forests, salt marshes to alpine meadows, our classification quickly became the primary source for natural community classification in New York and a fundamental reference for natural community classifications in the northeastern United States and southeastern Canada. This classification, which has been continually updated as we gather new field data (Edinger *et al.* 2002), has also been incorporated into, and in turn has helped define, the International Vegetation Classification that is being developed and refined by NatureServe, The Nature Conservancy, and Natural Heritage Programs throughout the Western Hemisphere (including New York) (NatureServe 2003, Grossman *et al.* 1998, Sneddon *et al.* 1998).

The Federal Geographic Data Committee has established the International Vegetation Classification as the standard vegetation classification system for use by Federal government agencies and their cooperators (Federal Geographic Data Committee 1997). Further, the International Vegetation Classification has been accepted as the primary systematic taxonomy of vegetation assemblages in North America by the Ecological Society of America and the National Biological Information Infrastructure (Ecological Society of America *et al.* 1999).

NY Natural Heritage tracks the known locations of rare natural community types, such as the dwarf pine ridges in Minnewaska State Park, and the state’s best examples of common types, such as hemlock-northern hardwood forest, an outstanding example of which is found in Allegany State Park.

**RANKING: PUTTING BIODIVERSITY INTO CONTEXT**


NY Natural Heritage’s statewide inventory efforts revolve around lists of rare species and all types of natural communities known to occur, or to have historically occurred, in the state. These lists are based on a variety of sources including museum collections, scientific literature, information from state and local government agencies, regional and local experts, and data from neighboring states.

Each natural community and rare species is assigned a rank based on its rarity and vulnerability (Table 1). Like all state Natural Heritage Programs, NY Natural Heritage’s ranking system assesses rarity at two geographic scales: global and state. The global rank reflects the rarity of a species or community throughout its range, whereas the state rank indicates its rarity within New York. These ranks are usually based on the range of the species or community, the number of occurrences, the viability of the occurrences, and the vulnerability of the species or community around the globe or across the state. As new data become available, the ranks may be revised to reflect the most current information. Subspecific taxa are also assigned a taxon rank which indicates the subspecies’ rank throughout its range.

Individual occurrences of rare plants, imperiled animals, and natural communities are ranked according to their quality, or perceived viability, based on factors including size, condition, and landscape context. All occurrences are assigned a quality rank of A-F, H, or X.

Species occurrence ranks are based on historical evidence of presence and/or on current population data. They are determined by evaluating the population’s size, condition, and reproductive health, plus ecological processes needed to maintain the population and total landscape condition. Each of these factors is compared against specifications gathered from other populations throughout the species’ global range. A final occurrence rank is calculated from this comparative review. Generally, an A-ranked occurrence is considered to represent one of the largest, most viable populations within a natural landscape.

<p><b>Table 1. Global, State, and Occurrence Quality Ranks.</b> Global and State Ranks reflect the relative rarity of a species or community across its entire range (Global Rank) and within New York (State Rank). Occurrence Quality Ranks provide a standard for comparing occurrences of a given species or community to each other in New York. These ranks are determined by NY Natural Heritage and NatureServe in consultation with other Natural Heritage Programs and experts throughout North America.</p>			
<p><b>GLOBAL &amp; STATE RANKS</b></p>			
<b>G1 S1</b>	Critically imperiled because of rarity (5 or fewer occurrences, or few remaining acres or miles of stream) or factors making it especially vulnerable to extinction rangewide (global) or in New York (state)		
<b>G2 S2</b>	Imperiled because of rarity (6-20 occurrences, or few remaining acres or miles of stream) or factors demonstrably making it very vulnerable to extinction (global) or extirpation from New York (state)		
<b>G3 S3</b>	Either rare or local, typically with 21 to 100 occurrences, limited acreage, or miles of stream rangewide (global) or in New York (state)		
<b>G4 S4</b>	Apparently secure rangewide (global) or in New York (state)		
<b>G5 S5</b>	Demonstrably secure, though it may be quite rare in parts of its range		
<b>SH</b>	Historically known from New York, but not reported in the last 20 years		
<p><b>OCCURRENCE QUALITY RANKS</b></p>			
<b>A</b>	Excellent	<b>E</b>	Existing – No detailed information
<b>B</b>	Good	<b>F</b>	Failed to Find – Not found during recent surveys
<b>C</b>	Marginal	<b>H</b>	Historical – No recent field information
<b>D</b>	Poor	<b>X</b>	Extirpated – Believed to no longer exist



Sky-blue aster is common in the midwestern U.S. (G5) but has only one known population in New York (S1)

## Comet Darners Are Nearly the Size of a Hummingbird

With bright red and green bodies more than 3" long and wings even wider, the comet darter is one of New York's most spectacular dragonflies. Though documented in Brookhaven State Park, the species' status as a New York resident is a topic of debate (at least among odonatologists). Some believe that adults fly north into New York in the spring and lay eggs; these eggs hatch, grow to adulthood, then fly south before the winter cold. Others claim that the predatory aquatic nymphs spend the winter buried in mud to emerge, metamorphose, and fly the next spring. Perhaps both are right – only more research will tell for sure.



Male comet darners have bright red abdomens and green thoraxes. Females also have green thoraxes, but their abdomens are a muted brown.

Significant natural communities are also assigned ranks based on quality and are evaluated within the context of the known or hypothesized distribution of that particular community. Several ecological and spatial factors must be considered when determining the occurrence rank of a community. These include the occurrence size, maturity, evidence and degree of unnatural disturbance, continued existence of important ecological processes, overall landscape context, and existing and potential threats. A-ranked community occurrences are among the largest and highest quality of their type. These community occurrences are large enough to provide reasonable assurance of long-term viability of component ecological processes. They are essentially undisturbed by humans or have nearly recovered from past human disturbance, and typically exhibit little or no unnatural fragmentation. Exotic or particularly invasive native species are usually absent from high-quality community occurrences, or if present, are observed at very low levels.

### ENDANGERED, THREATENED, & OTHER LEGAL LISTINGS

NY Natural Heritage tracks a selected subset of the state's plants and animals. We also track all of New York's different natural community types, but only examples that are significant from a statewide perspective. The animal and plant species we track are chosen based on their degree of rarity or imperilment within New York, and as new information comes in, new species are sometimes added while others are discontinued. Information on the species and communities tracked by NY Natural Heritage are used for conservation, research, and regulatory purposes.

In this report, we refer frequently to "rare plants" and "imperiled animals." "Rare plants" typically have few occurrences in the state and are state listed as endangered, threatened, or rare. Most "imperiled animals" also have few occurrences within New York and are state listed as endangered, threatened, or special concern. Some animals, however, are more abundant (typically with more than 50 occurrences), but are nonetheless vulnerable to rapid decline. For example, northern harriers are known to nest at more than 65 places in New York, but rapid habitat loss jeopardizes their long-term persistence. Therefore, the northern harrier is an "imperiled animal" that is subsequently state listed as threatened.

Many, but not all, of the species tracked by NY Natural Heritage are listed as "endangered" or "threatened" under the state Environmental Conservation Law (E.C.L.). Listing is a legal process that is conducted by the state agency with authority over the species in question, and for animals confers important protection requirements. While significant natural communities are recognized as an important facet of biodiversity in the law creating the NY Natural Heritage Program (E.C.L. §11-0539), they do not receive any other legal protection. They are,



however, an important consideration within any land management decision.

Most of New York's rare plant species are listed as "endangered," "threatened," or "rare" under E.C.L. §9-1503. In addition, plant species may be designated as "exploitably vulnerable" if there are ongoing threats that could lead them to being listed as rare or threatened. The DEC Division of Lands & Forests oversees the listing of these species. State-listed plant species may not be legally collected without the consent of the landowner.

The DEC Division of Fish, Wildlife, and Marine Resources has jurisdiction over imperiled animal species listed as "endangered" or "threatened" under E.C.L. §11-0535. Animals listed as endangered or threatened receive notable legal protection, for it is illegal to take or possess any of these species or their parts without a permit from DEC. The Division of Fish, Wildlife, and Marine Resources also lists animal species that face the prospect of becoming endangered or threatened as "special concern."

A subset of the plant and animal species listed under New York state law are also recognized under federal law. These species are so seriously imperiled across their entire range that they face the very real prospect of extinction. Species are listed as federally endangered or threatened by the U.S. Fish & Wildlife Service in consultation with state agencies and other experts, and the Service works closely with DEC on the protection of federally listed species in New York.

Ultimately, protection of New York's biodiversity lies with landowners and land managers regardless of state or federal listings. How private and public landowners manage their properties will ultimately determine what species and natural communities persist into the future. This situation is both a great opportunity and a serious challenge.

## DEFINING BIODIVERSITY

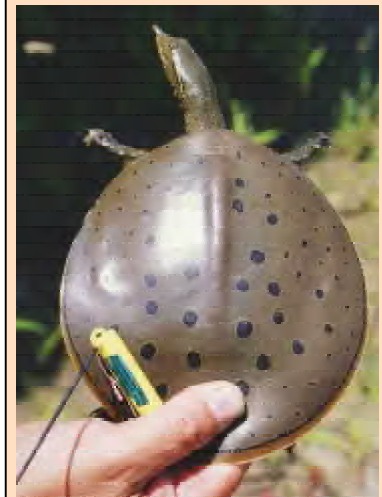
Biodiversity is the full spectrum of life on Earth, encompassing the genetic differences within populations, the different species of plants and animals, and the mosaic of ecosystems that stretch across landscapes (Stein *et al.* 2000). The term was originally coined by E.O. Wilson in 1988 (Wilson 1988), making it a relatively new term in the English language. For this project, we focused on rare species and significant natural communities because they combine to provide an effective "coarse filter/fine filter" approach for identifying, prioritizing, and protecting the broad spectrum of biodiversity.

Natural communities are effectively a "coarse filter" for capturing biodiversity, for they are an amalgamation of biodiversity at a larger scale than the species level. Their identification and documentation describe whole assemblages of plant and animal species, both common and rare. The

### Biodiversity Highlight

## *Spiny Softshell Turtles – Tough but Flexible*

Whereas most of New York's turtles have a hard shell (called carapace), the spiny softshell turtle's carapace is rubbery and leathery. The reason for the soft carapace is not clear, but some biologists have surmised that it gives them greater freedom of movement (and spiny softshells do swim faster than any of New York's other turtles). Spiny softshells have narrow, up-turned snouts that are excellent snorkels when they are hiding in shallow water. This turtle is highly aquatic, spending almost all of its time in rivers, streams, and lakes which have sandy or muddy bottoms. They are shy and quickly dive when people are near, but if captured are known for biting and scratching as aggressively as snapping turtles. Spiny softshell turtles were observed in Tunungwant Creek in Allegany State Park, and are state-listed as special concern.



Eastern spiny softshells are shy but can be aggressive when captured.



## Dwarf Pine Ridges Are Lessons in Survival

The trees in dwarf pine ridges resemble natural bonsai. They are small, usually much less than 15-feet tall, and twisted. These forms are reflections of how hard it is to grow in some parts of the Shawangunk Ridge. The hard bedrock gives little room for soil to develop, and where it does form in cracks it is quickly dried by the hot summer sun. Strong winds and periodic wildfires make the area untenable for all but the hardiest plants.

Dwarf pine ridges only occur in New York within Minnewaska State Park and at the Sam's Point Reserve. The natural community type is rare globally as well, occurring in fewer than 10 places on earth.



Dwarf pine ridges are only known from the Shawangunk Ridge in eastern New York.

conservation of good examples of natural communities ensures the protection of most of the species that make up New York's biological diversity.

Imperiled animals and rare plants, however, often have narrow or unusual habitat requirements. These species may fall through the coarse filter for they are sometimes not protected in the representative communities. Identifying and documenting viable populations of each of these rare species serves as the "fine filter" for protecting the state's biological diversity. This coarse filter/fine filter approach to a natural resources inventory is an efficient means of capturing the breadth of an area's biodiversity.

## PROJECT METHODOLOGY

The primary goal for this project was to document the rare species and significant natural communities that occur within New York's system of state parks and historic sites. Information obtained from the state park system also contributes to biodiversity knowledge on a statewide basis and will be used by NY Natural Heritage to address biodiversity issues across the state. Another goal of the project was to map all of the natural communities for many state parks, determine the conditions of these communities, and consider how they might be affected by management activities. In all aspects of this project, NY Natural Heritage used a prioritized approach to data collection, focusing first on those species and communities of global significance and later on those of regional and state importance. OPRHP, in consultation with NY Natural Heritage, selected the state parks to be surveyed.

The type of work conducted within parks selected for surveys was determined through a series of annual planning meetings. Rare species and community surveys were conducted in 183 of 229 state parks. The remaining 46 parks (5,243 acres), boat launches, and historic sites were not surveyed due to their small size, poor landscape context, or level of development. The scope of survey work for each park surveyed was assigned to one of three different categories:

- (1) ***In-Depth Surveys*** – Mapping all natural communities (and areas heavily influenced by human activities, such as playing fields) and documenting significant natural communities and rare species encountered. These state parks were mostly the larger facilities with substantial natural land area, such as Allegany State Park with 67,000 acres.
- (2) ***Targeted Surveys*** – State parks assigned to this category were visited and searched for rare species and significant natural communities, and maps of their locations were prepared. These state parks were typically smaller, ranging from five acres to 1,750 acres in size, and/or contained a limited amount of natural area.
- (3) ***Reconnaissance Surveys*** – Reconnaissance surveys were conducted in properties determined to have a low

## White Camas Wildflowers Contain Deadly Poison

The state-threatened white camas is a rare but showy resident of seepy, calcium enriched banks in Robert Moses State Park on the St. Lawrence River, in Letchworth State Park, and in Whirlpool State Park. Like the rose's thorns, however, the wild camas has a darker side: the wildflower is reportedly one of New York's most poisonous plants.

White camas plants contain steroidal alkaloids that decrease blood pressure by dilating arteries, constricting veins, and slowing the heart rate. People who have unintentionally eaten it in the past usually confused its leaves with those of wild onions.



White camas flowers are about an inch wide.



likelihood of supporting unknown rare species or significant natural community occurrences due to their small size, poor landscape context (e.g., in urban settings), or management emphasis. Reconnaissance parks ranged from less than one acre to 900 acres in size and included small historic sites, boat launches, trail parks, and parks in urban settings. Each reconnaissance site was visited by an ecologist and, in many cases, also a botanist and/or zoologist to determine whether or not potential rare species habitat was present.

This biodiversity inventory represents an initial effort to document the significant natural communities, rare plants, and imperiled animals within the OPRHP properties. As mentioned above, species surveys for this project were based largely on existing information and leads, focusing on the rarest species first and secondarily on those that are rare or of limited distribution in New York, but believed to be globally secure. Rare species surveys conducted for this project provide a snapshot of environmental conditions at the time the surveys were conducted. It is possible that other rare plants and animals exist or could be found in the future. It is also possible that the boundaries of the communities identified and mapped under the scope of this project will need modification as further data on natural communities across New York State are gathered, existing information is updated, and new community descriptions are developed. Further species surveys, natural community documentation, and monitoring are highly encouraged. Any observations of rare plants, imperiled animals, or significant natural communities should be reported to NY Natural Heritage in order to update the information in our database and provide a clearer picture of the status of imperiled biodiversity in New York.

### NATURAL COMMUNITY SURVEYS & MAPPING

We conducted natural community field surveys according to current program and NatureServe standards (Sneddon 1994; Grossman *et al.* 1998; Edinger *et al.* 2000) and all communities were classified following the NY Natural Heritage ecological community classification (Edinger *et al.* 2002; Reschke 1990). Community surveys included: collecting data on plant species composition and structure for all vegetative strata; sampling and noting important soil properties observed within the community; and recording information on surficial and bedrock geology, slope, aspect, elevation, and hydrologic regimes for the area. We used all of these data to identify and delineate the community. We also recorded information on the maturity of the occurrence, anthropogenic and natural disturbances influencing the community, and the condition of the surrounding landscape. Combined with the detailed information on the biological and physical properties of the community, data documenting landscape condition allowed a complete assessment of the ecological quality of the occurrence.

## *More than 300 Indiana Bats Have Been Found Hibernating in 1-Square Foot*

Sometimes, finding and protecting biodiversity requires people to strap on hard hats and go underground. Indiana bats range throughout the eastern United States, but they hibernate in only a few sites, with 85% of all Indiana bats nationwide using just seven caves and mines, and nearly half of all Indiana bats using just two caves. The caves at Thacher State Park support one of only eight known hibernacula for Indiana bats in New York (even though more than 120 mines and caves have been surveyed for them).



Indiana bats are known to winter in only eight mines and caves in New York.

The collection of a consistent set of data on each natural community allowed quick and accurate comparisons between communities of the same type, which ultimately determined the overall quality rank of the occurrence.

Communities were generally delineated onscreen in ArcView using 1:12,000 color infrared digital orthophoto quarter quads (in the 1983 North American Datum) obtained through the United States Geological Survey (USGS) EROS Data Center. The screen digitizing process allowed simultaneous use of aerial photography and several additional supplemental data layers useful in delineating community boundaries, including digital USGS quadrangle maps, NYS Department of Transportation digital road coverages, digital hydrology coverages, and New York State regulated freshwater wetlands. For regions and communities that were difficult to distinguish onscreen, we used 1:40,000 color infrared National Aerial Photography Program photos in stereo to aid in the delineation. All polygons were attributed with a community code at the time of digitizing. The attribute table was populated with the area (m<sup>2</sup>), perimeter (m), and total acres for each polygon.

### **RARE PLANT SURVEYS**

Field surveys for rare plants involved mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics, including topography, geologic features, and associated species and natural communities. We also recorded observations on disturbances, threats, and general site quality. All of the information gathered was then compared to other populations of the species across its range and used to assign an overall rank to the population. We reviewed this information in order to recommend management actions if needed. Specimens were collected when population sizes are large enough to ensure that collection would not adversely impact the occurrence. All voucher specimens were mounted, labeled, and deposited in the New York State Museum herbarium and local herbaria when possible. Where collection was not possible due to population size or perceived vigor, photographs were taken and deposited in the NY Natural Heritage digital images database.

### **IMPERILED ANIMAL SURVEYS**

Field surveys for imperiled animals were based on a review of records in NY Natural Heritage files, records obtained through the NYS-DEC Endangered Species and Nongame and Habitat Units, Breeding Bird Atlas records, and consultation with other scientists and field biologists familiar with imperiled species locations and habitat within the local area. We completed systematic searches for priority species during the season when the species of interest were most easy to detect, applying methods typically used for the taxa sought.



Field surveys involved mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics as time permitted. We also recorded observations on disturbances, threats, and general site quality. Voucher specimens were collected for some rare insects or fish, particularly for those species that were extremely difficult to identify in the field or where confirmation by a specialist was required to confirm a tentative identification made in the field. Voucher specimens were deposited in the New York State Museum.

## SUMMARY OF FINDINGS

### PROJECT SCOPE

We conducted surveys in 183 state parks over the course of six years (1998-2004; see Appendix 2 for a list of all OPRHP sites considered and the level of inventory conducted at each, and Appendix 5 for a bibliography of state park reports). In-depth surveys were conducted in 105 state parks totaling 274,840 acres. Most of these state parks had a significant proportion of natural area within their boundaries. Rare species and/or significant natural communities were documented in 91 of these properties.

We undertook targeted surveys in 47 state parks with a combined total acreage of 18,555 acres. Rare species and/or significant natural communities were documented in 36 of these properties.

Reconnaissance surveys were conducted in 31 properties totaling 4,160 acres. We found rare species and/or significant natural communities in eight of these properties.

For each site with rare species and/or significant natural community occurrences, we developed a report which included (a) a map showing the location of the species or natural community, (b) a fact sheet about each of the rare species and natural communities found, and (c) management considerations to inform land managers as they balance different land-use objectives for the property. Full natural community maps (including areas heavily influenced by human activities) were prepared for 105 state parks regardless of rare species or significant natural community occurrences (see Figure 1).

### INVENTORY RESULTS IN THE CONTEXT OF A DYNAMIC DATABASE

The results presented here are based on rare species and significant natural community data in the NY Natural Heritage database as of April 1, 2004. Our database is dynamic and therefore changes through time. These changes may have created discrepancies between the rare species and natural community data presented in the individual reports for each state park and this comprehensive report.

## *Peregrine Falcons Are New York's Fastest Birds*

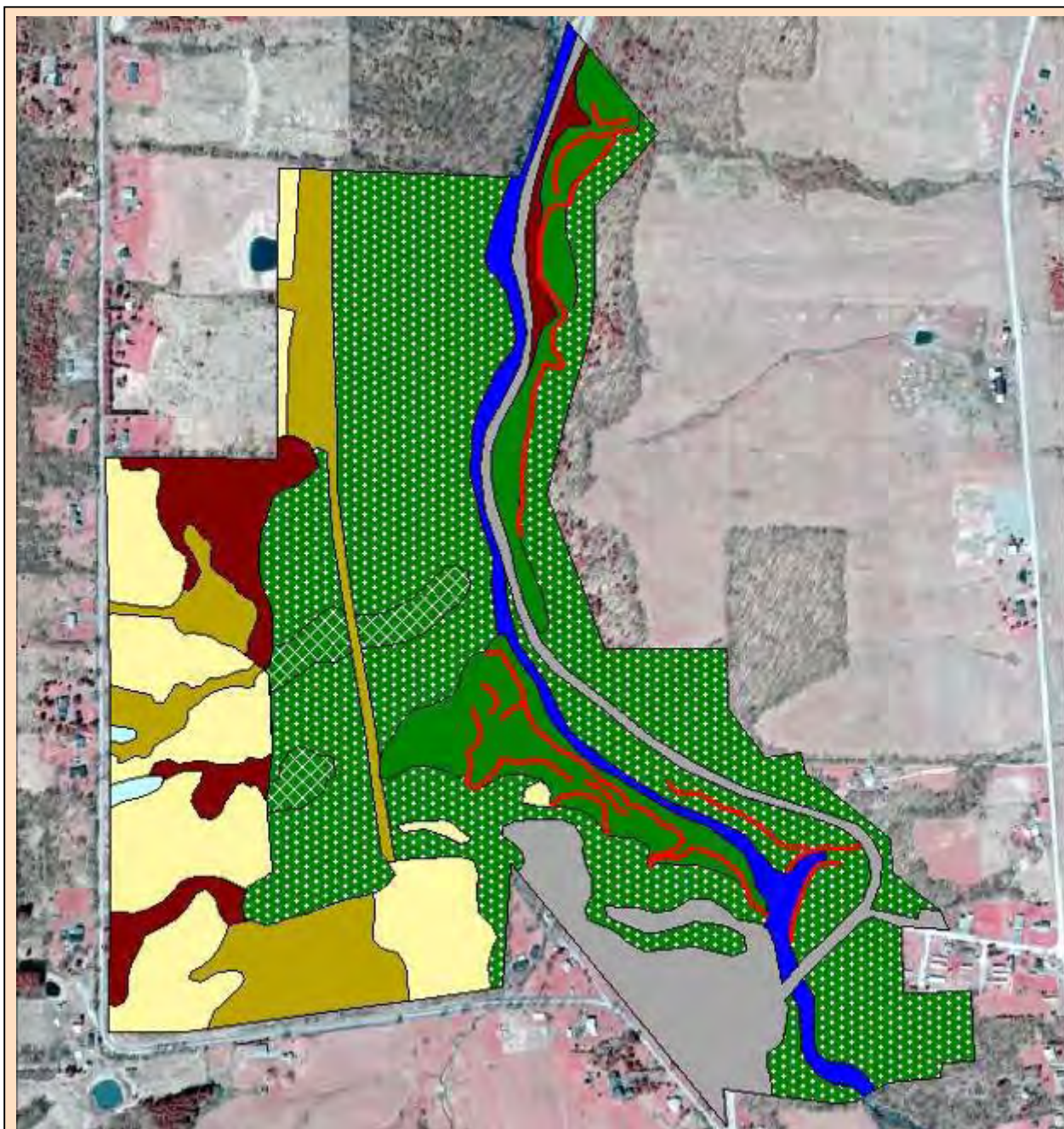
Few species can match peregrine falcons for pure speed. When diving after their prey, typically birds which they take on the wing, peregrines can reach 180mph.

Peregrine falcons are a conservation success story. The species disappeared from New York in the early-1960s after decades of exposure to DDT and other chemicals that made egg shells so fragile that they cracked when incubated.

In the 1970s, state and federal government biologists began releasing peregrine falcons into the state, and more than 40 eyries (nesting sites) are scattered across New York today. Peregrine falcons build their nests on ledges 50 to 200 feet above the ground. Some are on natural cliffs – such as in Minnewaska, Storm King, and Niagara Reservation State Parks – while others are on tall buildings and bridges.



Courting peregrine falcons engage in an acrobatic displays of whirling spirals and rapid dives.



**Figure 1.** Full Natural Community Map of Chittenango Falls State Park.

- Calcareous cliff community\*
- Calcareous talus slope woodland\*
- Developed
- Hemlock-northern hardwood forest
- Maple-basswood rich mesic forest
- Rocky headwater stream
- Shallow emergent marsh
- Successional northern hardwoods
- Successional old field
- Successional Shrubland

\* Significant natural community occurrence

Scale: 1" = 700 feet

↑ North



**Map created by the NY Natural Heritage Program**

The 2003 60-centimeter resolution color infrared orthoimagery was used courtesy of the NYS Office of Cyber Security & Critical Infrastructure Coordination.



Changes to the NY Natural Heritage database can result from a variety of factors. Further surveys on properties may reveal new rare species and significant natural community occurrences (for example, we found a new rattlesnake location at Sterling Forest State Park in 2004). While unusual, new data on species once considered by the scientific community to be rare may lead us to determine that the species is actually secure, and in turn to drop that species from our database. For communities, the size, condition, or landscape context of an occurrence may worsen to the point that the occurrence no longer meets the specifications for qualifying as “significant”; these degraded community occurrences would be removed from our database.

The individual state park reports and this comprehensive report provide overviews of NY Natural Heritage data that are accurate to the date of their publication. We recommend that state park managers and researchers also contact us to get the most current information available for their work.

## **DISCOVERIES & UPDATES BY THE NUMBERS**

NY Natural Heritage has records of 924 existing occurrences of rare plants, imperiled animals, and significant natural communities that are completely or partially within 132 state parks. Of these, 487 were first documented during this project:

- 213 significant natural community occurrences;
- 131 imperiled animal populations; and
- 143 rare plant populations.

We updated the information on 403 rare species and natural community occurrences that had already been documented in the NY Natural Heritage database:

- 65 significant natural community occurrences;
- 110 imperiled animal populations; and
- 228 rare plant populations.

There were 34 occurrences in our database that were not changed through the course of this project and 567 that were classified as failed to find, historical, or extirpated. For a complete listing of each individual occurrence by state park and state park region, see Appendix 4.

As noted above, 213 new significant natural community occurrences were discovered in state parks and 65 occurrences that were in the NY Natural Heritage database before beginning this study were updated. These natural communities cover a total area of 121,761 acres within state park boundaries.

The state park system has at least one outstanding example of 90 of the 167 different natural community types that are currently tracked by NY Natural Heritage. State parks, therefore, include at least one significant, representative example of more than 50% of New York’s natural community types. These 90 natural community types are listed in Appendix 3 along with their global and state ranks.

During the course of this project, 131 new imperiled animal populations and 110 of 158 imperiled animal records already on record in the NY Natural Heritage database were updated (12 existing records remained unchanged). An additional 115 animal populations in the NY Natural Heritage database were ranked as historical or failed to find.

Overall, at least one existing occurrence of 91 different imperiled animals were documented within the state park system. These species represent more than 20% of the 433 total animal species tracked by NY Natural Heritage.

We discovered 143 new rare plant populations and updated our existing records of 228 other rare plant populations in state parks (11 existing records were not changed). In addition to tracking the precise locations of known rare plant occurrences, we keep records of museum specimens that often are very old and have very general location information. For example, a specimen of the orange fringed orchis (*Platanthera ciliaris*) was collected at “Napeague” in 1929 in “dark sour gum woods.” This population might have been in the area that is now Napeague Beach State Park, or not. We simply do not have enough data to know. Another reason that we

## Extremely Rare Wildflowers Grow Just 20 Miles from Manhattan

Extremely rare species grow near the nation's largest urban area too. NY Natural Heritage Program botanists working in collaboration with the Torrey Botanical Society and the New Jersey Natural Heritage Program discovered two extremely rare wildflowers on the outskirts of New York City. Both wildflowers – basil mountain-mint and Torrey's mountain-mint – grow in only a few places on the planet, but some of their largest populations were discovered in High Tor State Park in Haverstraw. The wildflowers grow in dry grasslands and open woods, and bloom in the late summer. These discoveries show that unusual biodiversity occurs throughout the state, not just in untouched forests.



Basil mountain-mint



Torrey's mountain-mint

have so many plant populations noted as historical or failed to find is that there are many more museum records of plants than of animals. Yet we cannot automatically discount historical information, because the species may actually be present. During each year of the project, NY Natural Heritage botanists relocated historical populations of at least one species that had last been seen in New York more than 50 years ago. For example, botanists found a population of clustered sedge (*Carex cumulata*) in Taconic State Park that had last been recorded in 1937.

Overall, at least one existing population of 178 different rare plant species (including five mosses) were found in the state park system. These species represent nearly 25% of the 745 total plant species we track.

The imperiled animals and rare plant species for which there is at least one occurrence within state parks, along with their global and state ranks, and current state and federal listing status, are listed in Appendix 3.

### CONTRIBUTION TO BIODIVERSITY CONSERVATION ON PUBLIC LANDS

Based on records in the NY Natural Heritage database, there are 4,182 occurrences of 690 different rare species and natural community types on public (federal, state, and local) lands in New York. The state park system harbors 924 of these occurrences, representing 359 different rare species and natural community types. These numbers reveal that state parks harbor:

- 22% of the 4,182 total occurrences found on public lands in New York; and
- 52% of the 690 rare species and natural community types found on public lands across the state.

These figures are even more striking when one considers that the state park system comprises less than 7% of the state's 4,513,961 acres of public lands. While it was not in the scope of this project to determine why the state park system supports such a high proportion of the state's known rare and significant biodiversity, we surmise that it is the result of several factors, including: (a) only the state park system and Wildlife Management Areas (which cover approximately 200,000 acres) have been intensively assessed by NY Natural Heritage; (b) the system encompasses some unique natural features, such as the Niagara Gorge and Shawangunk Ridge; (c) the system includes numerous river stretches and land/pond shores; and (d) OPRHP has acquired and managed lands in a manner that protects large, contiguous forest tracts. We discuss each of these factors in more detail in the Conclusion section.

The state park system is critical to the long-term protection of numerous rare species and community types in New York and, in many cases, throughout the Northeast. In some instances, state parks are important to preserving our nation's biological diversity.

- State parks are home to 504 separate populations of plants and animals that are listed as state endangered or threatened, 25% of the total occurrences known on public lands in New York (Table 2). These populations represent 31 imperiled animals (five of which are also federally listed) and 165 rare plants (four of which are also federally listed). Some of these species may be restored to the point where de-listing is possible, such as bald eagles (*Haliaeetus leucocephalus*). Others are naturally rare, often because they have very specific habitat requirements, so conservation needs to focus on keeping current populations strong and viable. For example, white camus (*Zigadenus elegans* ssp. *glaucus*) only grows in moist areas on thin soils over limestone beneath a sparse tree canopy.
- State parks harbor seven species and natural communities that have just one known, existing occurrence in New York: post oak-blackjack oak barrens, Allegheny woodrat (*Neotoma magister*), Chittenango ovate amber snail (*Novisuccinea chittenangoensis*), green spleenwort (*Asplenium trichomanes-ramosum*), dwarf hawthorn (*Crataegus uniflora*), slender blazing-star (*Liatris cylindracea*), and shortleaf pine (*Pinus echinata*). Clearly, the persistence of these species and this natural community in New York depends on the state park system.
- State parks support the only known occurrences on public lands for 104 rare species and natural community types (15% of the rare species and natural community types known to occur on public lands). Only state-listed animals receive protection under the NYS Environmental Conservation Law, which leaves conservation of other species and significant natural communities at the discretion of private landowners. As such, rare plants, not-listed imperiled animals, and significant natural communities on public lands such as state parks have the highest likelihood of long-term survival.
- State parks include 191 occurrences of globally rare species and natural community types – 20% of the 927 locations known on all public lands in New York (Table 3). As these species and communities typically have fewer than 20 known occurrences in the world, each example in state parks has particular significance to their long-term conservation.

### POSSIBLE REASONS BEHIND THE STATE PARK SYSTEM’S RICH BIODIVERSITY

This project was not designed to explore the reasons behind the high concentration of rare and imperiled biodiversity in the state park system, and further research into this topic would be worthwhile. Nonetheless, we project that there are several contributing factors behind the state park system’s abundant biodiversity.

**Table 2.** Rare & Imperiled Species on State Park Facilities Relative to Other Public Lands.

The state park system has 21% of the state-listed animal and 21% of the state-listed plant populations on public lands in New York.

Public Land	Animals	Plants	Total
Federal	131	163	294
<b>State/OPRHP</b>	<b>151</b>	<b>353</b>	<b>504</b>
State/Other	255	497	752
County	95	190	285
Town or Local	86	110	196
Grand Total	718	1,313	2,031

**Table 3.** Globally Rare Species & Natural Communities on State Park Facilities Relative to Other Public Lands.

The state park system has 20% of the globally rare (G1-G3) species and natural communities on public lands in New York.

Public Land	Globally Rare Species & Communities
Federal	101
<b>State/OPRHP</b>	<b>191</b>
State/Other	418
County	140
Town or Local	77
Grand Total	927

First, the state park system includes many of New York's unusual natural features. Uncommon geological features include the quartzite conglomerate that caps the Shawangunk Mountains in southern New York. These erosion resistant rocks occur in New York only in the Shawangunks, and give Minnewaska State Park its distinctive mix of cliffs, talus slopes, and ravines – all of which provide unusual habitats for rare plants, imperiled animals, and significant natural communities. A similar situation is found on the Niagara Escarpment in western New York. This escarpment is composed of erosion-resistant limestones and dolomites. Niagara Reservation, Devil's Hole, Whirlpool, and Earl W. Brydges Artpark all occur along the Niagara Escarpment where the Niagara River has cut a deep gorge that is filled with many different habitats for plants and animals.

The unique geology and glacial history of the Finger Lakes and Genesee Region is represented in several state parks. The gorges and waterfalls at Taughannock Falls, Watkins Glen, Buttermilk Falls, Stony Brook, Filmore Glen, Letchworth State Park, and others provide an abundance of rare plant and animal habitats and some of the state's best examples of calcareous shale cliff and talus slopes. In addition, an unusual northern shale gorge on the Tug Hill is represented at Whetstone Gulf State Park. This is one of the state's best examples of shale cliff and talus slope community, and is host to the state's only population of a state-endangered fern.

The Great Lakes shoreline and the Atlantic coastline are well represented in the state park system, and both contribute rare species and natural communities of statewide significance. Though limited in size and distribution, natural areas on Lake Erie such as Woodlawn Beach State Park and on Lake Ontario (Southwick Beach, Hamlin Beach, Selkirk Shores, Chimney Bluffs, and more) hold species and communities found at few other locations in the state, such as Great Lakes dunes. Similarly, the maritime systems and imbedded interdunal swales at Napeague, Hither Hills, Montauk Point, Hecksher, Jones Beach, Robert Moses, and Gilgo Beach State Parks harbor many rare species and significant natural communities. The coastal marshes and tidal areas on Long Island and on the Hudson River contain communities and plants with a limited distribution in New York.

The second factor is that the state park system has in many cases been built with water recreation as a focus. The shorelines of numerous rivers that bisect state parks, as well as the lakes and ponds that are often a focal point of recreation, not only provide recreational opportunities, but also harbor New York rarities. For example, OPRHP owns and manages small but significant portions of Finger Lakes, Lake Champlain, and Lake Ontario shorelines – all important contributors to the high biodiversity of the state park system. The cobble shores of large rivers such as the Genesee and St. Lawrence Rivers, the floodplain forests of the Allegheny River, and the coastal marshes at the mouth of the Salmon River all contain natural communities of statewide significance and provide habitat for several rare species.

Third, the state park system has been established over the decades through an incredible range of acquisition types. The agency has also taken into consideration the geographic distribution of additions to the state park system. Acquisitions over the years have resulted in large tracts of contiguous forest cover in the Hudson Highlands, Palisades, Allegany, and Saratoga-Capital Regions. Through generous donations of large tracts of land and diligent open space protection efforts, connected networks of nearly 90,000 acres of natural areas are now protected in the Hudson Highlands across southeastern New York. This large swath of forest just 30 miles from New York City is a critical center of biodiversity in the state. The 11,000-acre Minnewaska State Park Preserve links to neighboring conservation lands which are part of an extensive area of continuous canopy that extends south to the New Jersey border. The 67,000 acres of forested hills and valleys of the unglaciated region of the state at Allegany State Park abuts the Allegheny National Forest to the south in Pennsylvania.



Cobblestone tiger beetles have been found in only 20-50 places in North America.

### *Cobblestone Tiger Beetles Are Lightning Fast Predators*

Cobblestone tiger beetles live on sparsely vegetated gravel bars associated with islands or bends in rivers or large creeks. They are extremely selective about their habitat, however, living in fewer than 10 of New York's nearly 32,000,000 acres. Only two cobblestone tiger beetle populations persist in New York, and the largest was only recently discovered by NY Natural Heritage zoologists on the Genesee River in and around Letchworth State Park. These tiger beetles are rare beyond our state borders as well, having only a few populations in just 11 states. Like all tiger beetles, they are fast moving predators that feed on other insects. Little is known about their natural history, making tiger beetles as mysterious as they are elusive.



Figure 2  
**OFFICE OF PARKS, RECREATION, & HISTORIC PRESERVATION REGIONS**



**REGIONS**

- 1** Niagara Frontier
- 2** Allegany
- 3** Genesee
- 4** Finger Lakes
- 5** Central New York
- 6** Adirondack & Catskill
- 7** Taconic
- 8** Palisades
- 9** Long Island
- 10** Thousand Islands
- 11** Saratoga/Capital District
- 12** New York City

Scale: 1" = 60 miles

↑ North



**Map created by the NY Natural Heritage Program**

The hillshade feature was created by NY Natural Heritage from 70 meter digital elevation models courtesy of the U.S. Geological Survey and NYS Department of Environmental Conservation. The regions layer was provided by the NYS Office of Parks, Recreation, & Historic Preservation.