Significant Biodiversity Area Descriptions:

Albany Pine Bush

Site Description:

The Albany Pine Bush includes the remaining undeveloped sandplain habitat in the Albany Pine Bush, including all parcels of the Albany Pine Bush Preserve, the intervening lands that connect these protected parcels, and some of the surrounding areas adjacent to the Preserve. The area encompasses the regionally rare pine barrens communities and interspersed forest and wetland communities that support rare and highly localized insect species populations as well as rare amphibians, reptiles, and plants. The area is about 6.54 miles long by 3.5 miles wide and covers about 9,000 acres.

Albany Pine Bush. Photo by Steve Young.

The Albany Pine Bush is underlain by shale (Normanskill shale) from the Ordovician period, however the overriding influence on the Pine Bush comes from the surficial deposits of sand. These are dune deposits formed when wind carried sand from drained glacial lakes about 10,000 years ago. The deep, well-drained sand deposits left poor soils that had a large influence on the communities that could establish there.

Site Location:

The Albany Pine Bush is located in eastern New York between the cities of Albany and Schenectady.

Towns:	Albany, Guilderland, Colonie		
Counties:	Albany		
Approximate Size:	14.3 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Albany Pine Bush Preserve	NYSDEC	2.27 mi^2
	Municipal/County Parks		0.81 mi^2
	Private Conservation Land		0.97 mi^2

Ecological Significance:

The Albany Pine Bush is regionally significant as the largest remaining inland pine barrens in the Hudson River Estuary corridor. The Albany Pine Bush contains exemplary occurrences of the globally rare pitch pine scrub oak barrens and several exemplary occurrences of pine-barrens vernal pools. A rare plant associated with pine-barrens vernal pools is the red rooted flatsedge. Other significant plant species in the area include the globally rare and federal species of special concern bog bluegrass, the globally rare orchid, Bayard's malaxis, and the only extant occurrence in the state of the globally rare adder's-mouth. The Albany Pine Bush is nationally recognized for its populations of rare

butterflies and moths (Lepidoptera). There are hundreds of Lepidoptera species found in the Pine Bush, including the federally listed Karner blue butterfly and over 40 noctuid moths (Noctuidae) considered to be pine barrens specialists. The Karner blue depends on dry, open, sandplain communities such as the pitch pine-scrub oak barrens found at the Albany Pine Bush.

Animal species of state special concern and on the NY Natural Heritage "watch list" found in the Albany Pine Bush include Jefferson's salamander, blue-spotted salamander, eastern spadefoot toad (one of only three occurrences known north of Long Island), spotted turtle and eastern hognose snake.

Fire suppression has resulted in the conversion of some of the pine barrens to successional hardwood forest. However, active management and the use of prescribed fire are restoring the area to a more characteristic and functioning pine barrens. The restoration and repeated burning has created a complex of related communities that form a gradient from grassy openings to dense canopy forests. Part of this gradient is pitch pine-oak forest and pitch pine-scrub oak barrens that form a shifting mosaic. Nested within these areas are pine barrens vernal ponds that are important breeding habitat for amphibian species.

Conservation issues and recommendations:

Invasive exotic species, as well as native invasives such as aspens and black locust have altered the composition and structure of the ecological communities and the habitat of many rare species. Plant succession, often as a result of fire suppression, has had similar effects. The Albany Pine Bush Preserve Commission, a multi-agency team, has undertaken efforts for many years to address these concerns, resulting in the protection of many globally rare species and communities in the Pine Bush. The management plan for the Pine Bush developed by the Albany Pine Bush Commission should be supported and implemented. Prescribed burning and other management techniques in the Albany Pine Bush should be carried out to restore the successional forests to pine barrens and to maintain the mosaic of existing pine barrens communities. Ongoing protection efforts are focused on high priority parcels. See the management plan developed for the Albany Pine Bush Preserve Commission for additional information. Additional inventory work is needed.

Location Description:

This area is an expanded representation of the US Fish and Wildlife Service (USFWS) Albany Pine Bush Significant Habitat Complex. The site generally follows the Conrail railroad tracks on the north and the Albany city line on the south as far east as Interstate 87; the western portion of the site is defined by the outer limits of the Preserve and any adjacent natural areas that have the potential to be restored to a pine barren community type.

Arthur Kill

Site Description:

The Arthur Kill includes important nesting and foraging sites for several species of herons, egrets, and ibises as well as for gulls and waterfowl. The freshwater wetland areas and forested buffers are also extremely important as some of the only remaining open space in metropolitan New York suitable as feeding and roosting areas for waterbirds and migratory stopover habitat for songbirds and raptors. This area also contains several plants and natural communities reaching their northeast limit, thus making them rare in New York State.

Site Location:

The Arthur Kill includes the northwestern corner of Staten Island in New York City and adjacent portions of the Arthur Kill and Kill van Kull in both New York and New Jersey. Although not considered part of the Hudson River Estuary Watershed, this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Towns:	Borough of Staten Island (New York City)		
Counties:	Richmond		
Approximate Size:	7.45 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Clay Pit Ponds State Park	NYSOPRHP	0.17 mi^2
	Harbor Herons WMA	NYSDEC	0.06 mi^2
	Old Place Creek Tidal Wetlands Area	NYSDEC	0.09 mi^2
	Other State Tidal Wetlands	NYSDEC	0.04 mi^2
	Greenbelt	City of New York Parks and Recreation	0.05 mi^2

Ecological Significance:

The Arthur Kill is notable for the network of remaining upland and wetland open space within a highly industrialized area. These remaining natural communities support regionally significant fish and wildlife populations, especially wading birds. Of primary significance in this area is the presence of major nesting colonies and foraging areas of herons, egrets, and ibises in a complex of closely associated natural habitats occurring within a major metropolitan area. The three island colonies established in the area represent the largest heronry complex in New York State and support thousands of pairs of a variety of species of colonial wading birds, many of which are of special concern in the region. The Arthur Kill also serves as an important location for nesting waterfowl and many neotropical migrant songbirds. Examples of significant and regionally rare species and communities occurring in this area include red maple sweet gum swamp, southern leopard frog, and the globally rare Nantucket juneberry.

Conservation Issues and Recommendations:

This unique and regionally significant wetlands and heronry complex is within one of the most intensively industrialized and urbanized corridors in the northeastern United States, and is subject to both physical and qualitative losses of habitat due to chemical and nutrient pollution stresses, storm water and sewage discharges, stream channelization, nonpoint source runoff, illegal filling and dumping activities, fragmentation and loss of connecting corridors, loss of upland buffers, invasive species, mammalian predators, uninformed or poorly planned land and waterfront development, human related disturbances, and dredging and other changes in channel flows, among other impacts. Protection of the heronries, wetland foraging areas, and rare plants and communities of this regionally significant habitat complex should be accorded high priority and sought through a multitude of appropriate land protection mechanisms, including cooperative conservation and management agreements with land owners, improved local zoning and land use regulations, easements, land exchanges and, in some cases, acquisition. Additional inventory work is needed.

Great blue heron. Photo by Mary Tremaine.

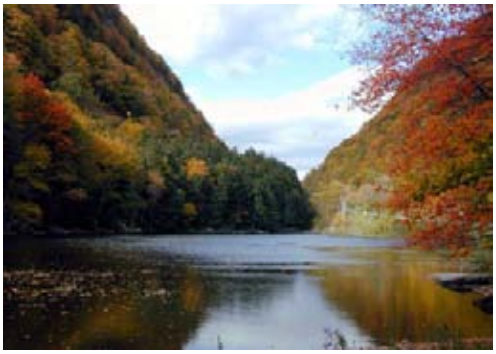
Location Description:

This area is included in the USFWS Arthur Kill Significant Habitat Complex. The area consists of a contiguous area on the northwest corner of Staten Island, the entire length of the Arthur Kill from its junction with Newark Bay south to the Outerbridge (Route 440) on the south, and several tributary corridors to the Arthur Kill in New Jersey. The contiguous Staten Island area is bounded by the Kill van Kull and Newark Bay on the north, by Fresh Kills and Isle of Meadows on the south, and by several road systems on Staten Island on the east. On the western side of the Arthur Kill, the area includes several New Jersey tributary corridors.

Catskill Mountains

Site Description:

The Catskill Mountains contain major unfragmented forests, including first growth forest, as well as alpine communities, gorges, pristine headwater streams, and reservoirs; the area supports regionally significant populations of forest interior nesting birds, bald eagle, large mammals, coldwater fish, reptiles, and rare communities and plants. The Catskill Mountains significant biodiversity area is roughly circular and about 40 miles across at its widest point. The entire area coves 485,000 acres, of which 361,000 acres fall within the Hudson River Estuary conservation area (435,000 acres are in Greene and Ulster Counties).



Catskills lake. Photo by Elizabeth Hill.

Schoharie Creek runs out of the Catskill Mountains to the north. Esopus Creek drains the majority of the mountain range as it runs through its center and into Ashokan Reservoir at the southeastern edge of the area. Rondout Creek fills Rondout Reservoir at the southwestern border of the area. The Catskill Aqueduct, a major water source for New York City, begins at Ashokan Reservoir.

Two community types occur as matrix forests in the Catskills. Beech-maple mesic forest is common on the valleys and slopes while hemlock-northern hardwood forest is common in cool ravines and steep-sided slopes. The rare Bicknell's thrush breeds in mountain spruce fir and mountain fir communities on Hunter Mountain and its satellite peaks. Large patch communities include chestnut oak forest, mountain spruce-fir forest, red maple-tamarack peat swamp, and spruce-northern hardwood forest. Small patch communities include cliff community, ice cave talus community, hemlock-hardwood swamp, mountain fir forest, mountain spruce-fir forest, spruce-fir rocky summit, pitch pine-oak-heath rocky summit, and sedge meadow. Many of these patch communities occur in relatively stable, bounded geographic regions defined by the mountainous landscape.

The Catskills make up the eastern edge of the Allegheny Plateau in New York. This plateau is of Devonian age (410 to 360 million years ago) and formed when New York was covered in a shallow sea; the Catskill deposits were mainly from the mouths of rivers and the edge of the sea. Surface deposits are shallow and usually classified as rock or til.

Site Location:

The Catskill Mountains are in eastern New York on the west side of the Hudson River Valley.

Towns: Cairo, Catskill, Denning, Halcott, Hardenbergh, Hunter, Hurley, Jewett, Lexington, Middletown, Neversink, Olive, Rochester, Saugerties, Shandaken, Wawarsing, Windham, Woodstock

Counties: Delaware, Greene, Sullivan, Ulster

Approximate Size: 758 mi^2

Land Stewardship:

Name or Classification	Manager	Area
Forest Preserve	NYSDEC	0.55 mi^2
Balsam Lake Mountain	NYSDEC	20.13 mi^2
Belleayre Day Use Area	NYSDEC	0.5 mi^2
Big Indian	NYSDEC	53.0 mi^2
Blackhead Range	NYSDEC	17.72 mi^2
Bluestone	NYSDEC	0.01 mi^2
Colgate Lake	NYSDEC	0.93 mi^2
Devils Tombstone Campground	NYSDEC	0.28 mi^2
Dry Brook Ridge	NYSDEC	0.8 mi^2

Halcott Mountain	NYSDEC	7.33 mi^2
Hunter Mountain	NYSDEC	16.65 mi^2
Kaaterskill	NYSDEC	12.33 mi^2
Kenneth Wilson Campground	NYSDEC	0.93 mi^2
Little Pond Campground	NYSDEC	0.32 mi^2
Middle Mountain	NYSDEC	0.70 mi^2
North Mountain	NYSDEC	5.81 mi^2
North/South Lake Campground	NYSDEC	1.74 mi^2
Overlook	NYSDEC	0.87 mi^2
Peekamoose Valley	NYSDEC	3.16 mi^2
Phoenicia	NYSDEC	11.64 mi^2
Pine Hill	NYSDEC	3.8 mi^2
Plateau Mountain	NYSDEC	26.18 mi^2
Shandaken	NYSDEC	4.36 mi^2
Slide Mountain	NYSDEC	79.08 mi^2
Sundown	NYSDEC	37.28 mi^2
Westkill Mountain	NYSDEC	27.18 mi^2
Willowemoc	NYSDEC	2.39 mi^2
Windham High Peak	NYSDEC	6.11 mi^2
Woodland Valley Campground	NYSDEC	0.18 mi^2
Vinegar Hill WMA	NYSDEC	0.67 mi^2
Ashokan Reservoir	NYCDEP	8.11 mi^2
Rondout Reservoir	NYCDEP	0.65 mi^2
Publicly Owned Water Bodies		15.0 mi^2
Public Easements		0.79 mi^2
Private Conservation Lands		1.26 mi^2

Ecological Significance:

The ecological significance of the Catskill Mountains relates to its large, continuous forest and pristine headwater stream habitats, and the species dependent on these habitats. The Catskill area includes important areas of old-growth forest (areas that were never logged due to their inaccessibility), of which less than 1% remains in the eastern deciduous forest region of eastern North America. The total area of first growth forests in the Catskills is estimated to be between 53,400 and 63,300 acres. The Catskills are home to numerous rare plant species. Examples include the federally listed threatened Northern monk's hood, the globally rare Jacob's ladder, the state-listed endangered roseroot stonecrop, and the state-listed threatened fragrant cliff fern. East of the Mississippi River, muskroot is only known from within refrigerated talus slopes within the Catskills. Some of the world's best populations of the federally protected Northern monk's hood are found within the Catskills. In fact, the only places within the northeast to see this plant in its native landscape are within the Catskill Mountains. Additionally, exemplary occurrences of a number of significant communities can be found in the Catskills. Examples include many ecologically significant cliff and ledge communities associated with steep-sided ravines, and exemplary occurrences of red maple-tamarack peat swamp and hemlock-hardwood swamp.

The Catskills are home to more than 120 species of breeding birds including the rare Bicknell's thrush and several regionally rare raptors such as bald eagle (also a large wintering population), red-shouldered hawk, broad-winged hawk, sharp-shinned hawk, and barred owl. Other important animals that live in the Catskills include regionally rare reptiles and amphibians such as timber rattlesnake, eastern hognose snake, spotted turtle, wood turtle and spotted salamander, and several large mammals such as black bear, bobcat, and fisher. Black bear and bobcat depend on the large tracts of unbroken forest that this region provides.

Recent surveys resulted in the discovery of the White Mountain tiger beetle, a globally rare species that occurs on the vegetated sections of stream cobble bars, along Esopus Creek (Howard et al. 2002). A survey for rare Lepidoptera species (butterflies and moths) resulted in the discovery of West Virginia White in this area (Howard et al. 2002). This species is recorded from only three other locations in the state and this location is the only within the Hudson River Estuary corridor.

Conservation Issues and Recommendations:

Agricultural, residential, and commercial activities and roads are most concentrated in the Catskill valleys. The highest conservation priorities in the Catskills are the protection of riparian and upland habitat in the valleys, old growth forests, and habitats of rare plants and animals. This should be accomplished through cooperative efforts among the state, New York City, local communities, and private landowners. Additional inventory work is also needed.

Location Description:

This area is also identified by the USFWS as the Catskill High Peaks Significant Habitat Complex. The Catskill Mountains significant area is a roughly circular area about 40 miles in diameter that includes the core forested high elevation area of the eastern Catskill Mountains and adjacent reservoirs and reservoir lands. The site follows the break in slope along the escarpment between the Catskills and the Hudson Valley on the east, the southern boundaries of the Ashokan and Rondout Reservoir watersheds on the south, and generally follows the 2,000 foot contour on the west and north. With the exception of the reservoir lands, this area generally corresponds to the Catskill High Peaks Ecozone as defined by the New York State Department of Environmental Conservation.

Delaware/Mongaup Rivers

Site Description:

The Delaware/Mongaup Rivers includes the New York State bald eagle buffer protection zone and the New York State Mongaup Wildlife Management Area (WMA). This area is nationally and regionally significant for its pristine landscape. It contains exemplary populations of state and federally listed plant and animal species and regionally rare ecological communities. Although not considered part of the Hudson River Estuary corridor,

this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Site Location:

Along the border of New York and Pennsylvania, near the tri-state junction of New York, Pennsylvania, and New Jersey.

Towns:	Deerpark, Greenville, Port Jervis		
Counties:	Orange		
Approximate Size:	78.7 mi^2 (including the Pennsylvania portion)		
Land Stewardship:	Name or Classification	Manager	Area
	Mongaup Valley WMA	NYSDEC	2.38 mi^2

Eaglets on the Mongaup River.

Ecological Significance:

The Delaware River is the longest free-flowing river in the northeastern United States. It supports the largest wintering bald eagle concentrations in New York State and one of the largest in the northeastern United States. Other regionally rare animal species in the area include the red-shouldered hawk and the timber rattlesnake. The area also contains exemplary occurrences of significant ecological communities including pitch pine-oak-heath woodland community and riverside ice meadow community.

Conservation Issues and Recommendations:

Encourage landowner practices that protect wildlife habitats in riparian buffer zones. Additional inventory work is needed.

Location Description:

The Delaware/Mongaup River significant area is a 2-mile (radius) buffer that begins at the Shawangunk Ridge significant area boundary and follows the Upper Delaware National Scenic and Recreational River for the length of Orange County and then follows the Mongaup River extending from the Delaware north to the Mongaup Falls Reservoir.

Dutchess County Wetlands

Site Description:

The Dutchess County Wetlands area is a network of four major wetland complexes that provide important habitat for a variety of amphibian, reptile, and bird species. This area contains the highest diversity of turtles in New York State. The significant area encompasses several wetlands and their watersheds, and wetland buffer zones that are biologi-

cally significant for breeding waterfowl, rare turtles, plants, and other species, as well as intervening areas that contain potential habitat for these species. Floodplain forest communities also exist within this area.

The four separate wetland complexes total 66,000 acres. Two of the complexes (Milan Window and Stissing Mountain sites) feed Wappinger Creek, which then flows along the eastern edge of Poughkeepsie and through Wappinger Falls before flowing into the Hudson River. The southernmost complex (La Grange/East Fishkill site) contains wetlands that flow into Fishkill Creek, which flows through Beacon and then directly into the Hudson River about 8 miles after leaving the area. The East Park/Hyde Park site encompasses most of Crum Elbow Creek, from its beginning near Wurtemburg to approximately 0.5 mile of the Hudson River.

The Dutchess County Wetlands fall mostly in the lowlands of the Hudson River Watershed, and consist mainly of soft sedimentary rocks that are easily eroded and with relatively little topography. These lowlands tend to facilitate slow moving water and extensive wetland formation. Some of the Dutchess County Wetland sites, particularly Stissing Mountain, are part of the Taconic ranges more resistant metamorphic rocks. The high variety in rock types helps support a high diversity of flora and fauna.

Site Location:

The wetlands occur east of the Hudson River in western Dutchess County from Interstate 84 north to the Dutchess Columbia county line.

Towns:	Beekman, Clinton, East Fishkill, Fishkill, Hyde Park, La Grange, Milan, Pine Plains, Pleasant Valley, Rhinebeck, Stanford, Wappinger		
Counties:	Dutchess		
Approximate Size:	102.56 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	James Baird State Park	NYSOPRHP	0.93 mi^2
	Reforestation Area	NYSDEC	0.91 mi^2
	Private Conservation Land		1.24 mi^2

Ecological Significance:

Dutchess County is made up of wetland complexes with many habitats that are unusual or scarce in the region. In addition to being valuable in their own right, these wetlands support a number of local populations of the state listed threatened Blanding's turtle, one of the few sites for this species in the northeastern United States. These wetlands also support the state-endangered bog turtle. Other rare reptile and amphibian species in this area include the state listed northern cricket frog (the only known occurrence of this species east of the Hudson River), and the regionally rare blue-spotted salamander, marbled salamander, four toed salamander, spotted turtle, wood turtle, eastern box turtle, red

bellied snake, and eastern ribbon snake. The only documented consistent overwintering by golden eagles in the region occurs in this area. Additionally, pied-billed grebe nesting sites and great blue heron rookeries have been documented in the area. The extensive complex of diverse wetlands and upland forests include rich red maple hardwood swamps containing the state rare swamp cottonwood, floodplain forest, deep emergent marsh, rich sloping fen, and medium fen communities. Other rare plant species include prairie sedge and the state listed rare smartweed dodder.

Conservation Issues and Recommendations:

Swamp cottonwood. Photo by Steve Young.

Suburban expansion, along with runoff from nearby roads, agricultural lands, and developed areas, pose the most serious threats to this wetland ecosystem. Further study of the distribution, population status, habitat use, and movement patterns of the bog and Blanding's turtles, and other species, is needed. Protection of wetlands and their buffer zones, as well as of the movement corridors and road crossings between wetlands, is the highest priority. Additional inventory is greatly needed, especially with respect to amphibians and reptiles, and mapping of habitat complexes for the Blanding's turtle.

Location Description:

This area is similar to the USFWS Dutchess County Wetlands Significant Habitat Complex. The four wetland complexes included within this area are, from south to north: La Grange/East Fishkill, East Park/Hyde Park, Milan Window, and Stissing Mountain.

Esopus/Lloyd Wetlands and Ridges

Site Description:

Esopus/Lloyd Wetlands and Ridges contain wetland and upland habitat that is of particular importance to amphibian species and breeding waterfowl. Upland communities include ridges, ledges, and a mature hemlock-northern hardwood forest. The area has 32,391 acres. The main drainages in this area are the Swarte Kill, which flows into the Wallkill River to the north and Black Creek, which flows into the Hudson River to the east.

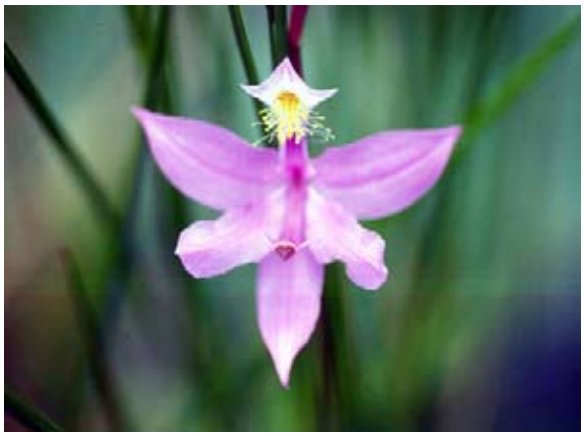
Most of this area is underlain by glacial till with large sections of soil underlain by bedrock along the eastern side of the area. Also of continental glacial origin, there are many small kame deposits; these are deposits with similar components of glacial till, but with the fine grains (silts and clays) removed by water action. These fine-grained materials were re-deposited in places such as the lacustrine (lake) silt and clay, lacustrine delta, and lacustrine sand deposits. More recent surficial deposits are the 'swamp deposits' high in organic matter, and the river and stream deposits labeled as 'recent alluvium." The bedrock geology consists of shale (Normanskill shale and Austin Glen formation) in the

western lowland portion of the area and more resistant quartzlike (Quassaic quartzite) in the hills in the eastern section of the area. The quartzlike localities were more resistant to the erosional forces of the glaciers and thus are now elevated above the nearby locales and are not buried in till. Communities on the quartzite deposits consist of more upland and drier community types, while those on the lowland-till-overlaying-shale substrate will be more mixed, with wetland and upland communities.

Site Location:

Towns:	Esopus, Lloyd, Marlborough, New Paltz, Plattekill		
Counties:	Ulster		
Approximate Size:	51 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Forest Preserve	NYSDEC	0.1 mi^2
	Municipal/County Parks		0.02 mi^2
	Private Conservation Land		1.47 mi^2

Ecological Significance:



Grass pink. Photo by Troy Weldy.

The area encompasses significant wetland communities that serve as critical habitat for threatened amphibian species as well as breeding populations of waterfowl. The state-threatened small flowered crowfoot has been documented in this area. Only 16 sites are known for this species statewide, all of which occur within the Hudson River Estuary corridor. This area provides crucial habitat for the state-listed northern cricket frog. The northern cricket frog prefers shallow vegetated shorelines and bays. It also includes several significant and rare ecological communities including one of the largest dwarf shrub bog occurrences in the Hudson River Valley. The area contains a mature, good condition hemlock northern hardwood forest and good condition red maple hardwood swamp, Appalachian oak-hickory forest, and beech-maple mesic forest. One of the wetlands contains one of the largest populations of the state-rare twayblade (*Liparis lilfolia*) in the Northeast. In general, these wetlands contain many regional rare or uncommon plants with specific habitat requirements (e.g. grass pink, pitcher-plant, rose pogonia). Without proper protection, these plants are likely to be placed on the state rare plant list.

Conservation Issues and Recommendations:

Suburban expansion, along with runoff from nearby roads, agricultural lands, and developed areas, pose the most serious threats to the wetland ecosystem and associated cricket frog populations and other species and communities. Local planning and the reduction of polluted runoff in the vicinity of the wetlands will support the viability of these elements of biodiversity. Additional inventory work is needed.

Location Description:

The Esopus/Lloyd Wetlands and Ridges significant area is bounded by the Thruway on the west, route 9W on the east, Hardenburg, Union Center, and Esopus Avenue on the north and Route 44 to the south.

Harlem Valley Calcareous Wetlands

Site Description:

The Harlem Valley Calcareous Wetlands are composed of the valleys and adjacent ridges in the Taconic Highlands. Wetland communities include red maple-hardwood swamp, floodplain forest, fens, and shallow emergent marsh. These areas contain high quality habitat for a number of wetland-dependent species and some of the best bog turtle habitat in the Hudson River Valley. This area also includes adjacent upland ridge and ledge habitat that is especially important for northern copperhead, timber rattlesnake, and five lined skink.

The area is made up of two separate wetland complexes totaling 94,000 acres. Both complexes occur in the valleys and adjacent ridges of the southern Taconic Highlands. The Northeast-Ancram fen complex occurs in Columbia and Dutchess Counties (the northern complex). The portion within the Hudson River Estuary Watershed includes wetlands drained by Punch Brook Swamp, the Noster Kill, and the Roeliff Jansen Kill. The Great Swamp area (the southern complex) is in Dutchess and Putnam Counties. The portion within the Hudson River Estuary Watershed includes the headwaters of the Croton River and the “South Flow” of the Great Swamp. The portion in the Connecticut River Watershed includes the “North Flow” of the Great Swamp and the headwaters of the Housatonic River.

The majority of the Harlem Valley Calcareous Wetlands biodiversity area consists of Stockbridge Marble, a metamorphic rock composed of the minerals calcite or dolomite. It is formed when limestone is treated to very high temperature and pressure, such as the Taconics mountain forming process. Because of the proximity of this area to the Taconic Mountains, other bedrock components of the area are also mostly metamorphosed rocks (e.g., gneiss, schist, and to a lesser extent, quartzite). These materials are more resistant to erosion than their non-metamorphosed relatives, however their basic (non-acidic) composition maintains wetlands high in pH. Interestingly, because of the nearby Taconic Mountains and the convoluted nature of the bedrock (many layers, wide ranges in metamorphism), water upwellings and springs are common in this region. The result is a preponderance of communities dependent on freshwater upwellings of high pH water, namely fens. Other calcareous regions (Hudson Valley Limestone and Shale Ridges, Dutchess County Wetlands, Esopus Lloyd Wetlands) have much fewer occurrences of fen communities than the Harlem Valley Calcareous Wetlands biodiversity area. Most of the surficial geology deposits are of glacial origin, such as till, kame deposits, and outwash sand and gravel. Other deposits, such as those in the wetlands, consist of more recent alluvium and organic deposits.

Calcareous wetlands. Photo by Paul Jensen.

Wetland matrix communities consist of red maple-hardwood swamp and floodplain forest. The upland matrix community tends to be Appalachian oak-hickory forest. Patch communities include inland Atlantic white cedar swamp, red maple-tamarack peat swamp, rich graminoid fen, rich shrub fen, rich sloping fen, and shallow emergent marsh. Upland patch communities include pitch pine-oak-heath rocky summit, rocky summit grassland, and hemlock-northern hardwood forest.

Site Location:

This area is within easternmost Putnam, Dutchess, and Columbia Counties. Two separate wetland complexes are recognized: the Great Swamp from Brewster, New York north to South Amenia, New York, and the Northeast Ancram fen complex from Sharon, Connecticut, north to Copake Falls, New York. The lowlands occupy a long north south valley west of the Taconic Mountains called the Harlem Valley (after the railroad line) from which this complex takes its name.

Towns: Amenia, Ancram, Dover, Northeast, Patterson, Pawling, Pine Plains, Southeast, Washington

Counties: Putnam, Dutchess, Columbia

Approximate Size: 117.53 mi^2

Land Stewardship:

Name or Classification	Manager	Area
Taconic State Park	NYSOPRHP	1.0 mi^2
Bog Brook Unique Area	NYSDEC	0.21 mi^2
Cranberry Mountain WMA	NYSDEC	0.23 mi^2
Great Swamp WMA	NYSDEC	0.45 mi^2
Wassaic MUA	NYSDEC	0.14 mi^2
Municipal/County Parks		0.3 mi^2
Private Conservation Land		8.95 mi^2

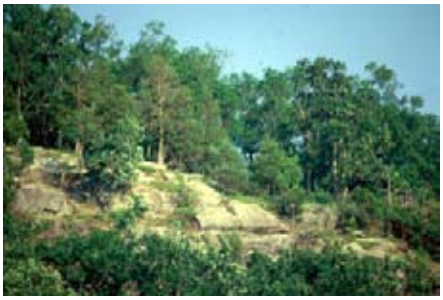
Ecological Significance:

The site encompasses the calcareous wetlands and uplands and ridgetop habitat that support rare reptiles, waterfowl, and raptors, as well as rare plant habitats and communities.

The mosaic of calcareous wetlands and adjacent uplands in the Harlem Valley supports regionally significant rare reptile populations and rare calcareous communities and plant species. These calcareous wetlands have truly exceptional concentrations of rare elements. The significant area is considered to contain the best bog turtle habitat in this Hudson Valley region. Three additional fens within the area were recently found to contain

the state endangered (federally listed threatened) bog turtle (Howard et al. 2002). In all, 26 occurrences of bog turtle have been recorded for the Harlem Valley Calcareous Wetlands biodiversity area. This area also contains 11 hibernacula for the state-threatened timber rattlesnake. Other rare animals recorded include Eastern pondmussel and upland sandpiper. Recently, The Nature Conservancy purchased a very significant rich sloping fen with a bog turtle population, increasing protection of the bog turtles, fen communities, and rare plants present there.

Some of the fens and fen like areas of the site also support regionally rare plants. Great Swamp has several rare calcareous communities and plants. In addition to timber rattlesnake populations, the ledges, talus, acidic rocky crest savannas, woodlands, burn areas, and associated habitats also support northern copperhead and five lined skink. The area supports several regionally rare species such as bladderwort, three toothed cinquefoil, and the dogwood thyatirid moth. The deeper marshes and some of the ponds in this area are important habitats for waterfowl and marsh birds. The extensive wooded swamps support breeding red shouldered hawk and concentrations of migrating warblers. Also notable in the region is an extensive, old growth, hardwoods floodplain savanna with huge ashes and maples, unlike anything else in the region.



Ledge habitat. Photo by Paul Jensen.

Conservation Issues and Recommendations:

Suburban expansion and invasive species are the two central conservation issues in this area. Further study and field surveys of the distribution, population status, habitat use, and movement patterns of the bog turtle, in particular, and other species are needed throughout the entire complex of calcareous wetlands in the tri state region. Protection of wetlands, their buffer zones, and movement corridors connecting wetlands, is a high priority. These efforts should help direct suburban development to less sensitive areas.

Location Description:

This area is similar to the USFWS Harlem Valley Calcareous Wetlands Significant Habitat Complex. The Great Swamp follows the ridgetops that form the immediate watershed of the wetlands. Great Swamp habitat area includes the wetlands of the Harlem Valley adjacent and proximate to the East Branch of the Croton River, Swamp River, and Ten Mile River; marble hills emerging from the floor of the Harlem Valley; and mountainous slopes on the east and west sides of the Harlem Valley. There is a drainage divide between the Hudson River and the Housatonic River Watersheds at the village of Pawling where the East Branch of the Croton River flows to the south into the Hudson and the Swamp River flows to the north into the Housatonic Watershed. Although the watersheds are separate, the swamp itself is continuous over both watersheds.

The Northeast Ancram fen complex follows the ridgetop of the Taconic Mountain range (Washburn, Alander, Brace, and Thorpe Mountains) from Copake, New York, southward to State Line, Connecticut. Included is the wetland complex at State Line and the ridges just west of Indian Lake south to Sharon Station Road. This site includes the wetlands and immediate watershed of the Drowned Lands Swamp, Punch Brook, and Bashbish Brook on the western half of this complex, and the chain of wetlands along the Noster Kill and Webatuck Creek on the eastern half of this complex; it includes the Panhandle or Oblong of the northeastern corner of Dutchess County southward towards Millerton, and the western escarpment of the Taconic Mountains. The southern portion of the Panhandle wetlands and the wetlands south of Millerton drain southeastward to the Housatonic Watershed. The northern portion of the Panhandle wetlands and the Drowned Lands area drain into the Roeliff Jansen Kill, which is part of the Hudson River Watershed.

Highlands

Site Description:

The Highlands are noteworthy as a relatively undeveloped corridor of forests, wetlands, and grasslands of regional importance to breeding and migratory birds, resident amphibians and reptiles, and rare plants and communities close to the New York City metropolitan area. It is significant for its high concentration of species and communities of special regional emphasis dependent on large, unfragmented forest and wetland habitats.

The Highlands. Photo by Paul Jensen.

The portion of the Highlands west of the Hudson River includes 190,243 acres within the State of New York and continues west to cross the entire State of New Jersey. The portion of the Highlands east of the Hudson River totals 215,137 acres in Dutchess, Putnam, and Westchester counties extending from the Hudson River to the Connecticut border. Ridgelines and valleys, including stream courses and wetlands and lakes are generally in a northeast to southwest alignment. Streams run directly into the Hudson River Estuary, otherwise they generally run into the Ramapo River, which flows south through the center of the Highlands west of the Hudson River. Major streams east of the Hudson River include Canopus Creek, Peekskill Hollow Creek, and the Croton River. The Delaware Aqueduct, a major water source for New York City, begins at the West Branch Reservoir within the Highlands.

There is a large diversity of bedrock types in the Highlands. These rocks are the oldest in the Hudson River Estuary corridor at 1.3 billion years old; they were formed during the same process that formed the Adirondack Mountains in northern New York. The high complexity indicates that these layers have been compressed, bent, twisted, and otherwise

metamorphosed into erosion-resistant bedrock that form the mountains of southeastern New York. The folds and faults in the bedrock are generally parallel to each other and generally determine the positions of the ridges and valleys. A large fault, the Ramapo Fault, coincides with the path of the Hudson River and separates the Highlands East from the Highlands West. The complexity of the Highlands bedrock acts to increase the diversity of the communities and taxa (animal and plant species and subspecies) present by increasing the types and range of minerals and nutrients available. Areas on the surface that are not bedrock outcrops usually consist of glacial till or more recent riverine or lake deposits.

Acidic talus slope woodland.

The matrix communities of the Highlands include Appalachian oak-hickory forest, chestnut oak forest, and oak-tulip tree forest. Recently, a 5,681-acre chestnut oak forest was documented, along with a 2,071-acre Appalachian oak-hickory forest. A large matrix chestnut oak forest of 45,000 acres links the West Point Military Academy with the occurrence of this community in Black Rock Forest and Harriman and Bear Mountain State Parks. Hemlock-northern hardwood forest acts as a large patch community here, in comparison to the more northern Catskill Mountains where it may be matrix forest as well. Dispersed among the matrix forests are patch communities such as pitch pine-oak-heath rocky summit, rocky summit grassland, and acidic talus slope woodland, which may be either large patch or small patch, and red cedar rocky summit, inland white cedar swamp, rich graminoid fen, dwarf shrub bog, highbush blueberry bog thicket, and cliff community, which tend to be small patch communities.

Site Location:

In southeastern New York State, within the Highlands physiographic region.

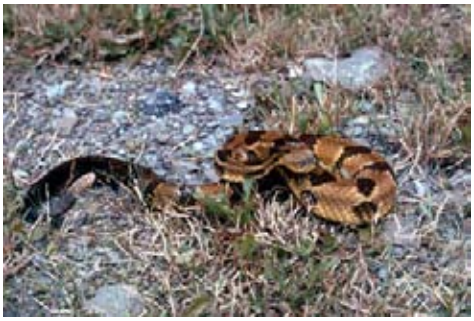
Towns:	Beacon, Beekman, Blooming Grove, Carmel, Chester, Cornwall, Cortlandt, East Fishkill, Fishkill, Haverstraw, Highlands, Kent, Monroe, North Salem, Patterson, Pawling, Peekskill, Philipstown, Putnam Valley, Ramapo, Somers, Southeast, Stony Point, Tuxedo, Warwick, Woodbury, Yorktown		
Counties:	Dutchess, Orange, Putnam, Rockland, Westchester		
Approximate Size:	619.14 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Clarence Fahnestock State Park	NYSOPRHP	16.86 mi^2
	Franklin D. Roosevelt State Park	NYSOPRHP	0.47 mi^2
	Hudson Highlands State Park	NYSOPRHP	5.95 mi^2

Wonder Lake State Park	NYSOPRHP	1.49 mi^2
Donald Trump State Park	NYSOPRHP	0.44 mi^2
Bear Mountain State Park	NYSOPRHP	7.16 mi^2
Goose Pond Mountain State Park	NYSOPRHP	7.16 mi^2
Harriman State Park	NYSOPRHP	74.09 mi^2
Sterling Forest State Park	NYSOPRHP	22.44 mi^2
Storm King State Park	NYSOPRHP	2.84 mi^2
Big Buck MUA	NYSDEC	0.23 mi^2
California Hill MUA	NYSDEC	0.47 mi^2
Depot Hill MUA	NYSDEC	0.42 mi^2
Ninham Mountain MUA	NYSDEC	2.56 mi^2
Pudding Street MUA	NYSDEC	0.11 mi^2
White Pond MUA	NYSDEC	0.45 mi^2
Castle Rock Unique Area	NYSDEC	0.24 mi^2
Black Rock Forest Preserve		6.0 mi^2
Camp Smith State Military Reservation	Division of Military and Naval Affairs	3.0 mi^2
West Point Military Academy	U.S. Department of Defense	25.22 mi^2
NYC Watershed Protection	NYCDEP	8.55 mi^2
Municipal/County Parks		5.02 mi^2
Publicly Owned Water Bodies		7.37 mi^2
Private Conservation Land		20.31 mi^2

Ecological Significance:

This significant area represents one of the largest unfragmented landscape blocks in New York State that creates an important landscape corridor that links the mid-Atlantic states (New Jersey and Pennsylvania) with New England. Along with the continuous and relatively unfragmented forests, the area contains higher elevation ridges and several networks of relatively undisturbed wetlands in the valleys. The ecological significance of this area relates to its large, contiguous forest and wetland habitats and the disturbance sensitive species dependent on these habitats, as well as the diversity of plants, communities, and animals unique to this region.

Species populations in the Highlands are indicative of large contiguous areas of undisturbed forest and wetland habitats and include wood turtle, timber rattlesnake, red shouldered hawk, barred owl, warblers and thrushes, black bear, and bobcat. The rare cerulean warbler, a forest-interior specialist, has a thriving population in the deciduous forests of the Highlands, one of the few concentrations of this species in the state.



Timber rattlesnake.

There are numerous abandoned mines in the Highlands, many of which are currently being used as winter bat hibernacula. The federally listed endangered Indiana bat and the state special concern eastern small-footed bat are known to occur in the Highlands. Regionally rare ridge top communities include rocky summit grasslands and pitch pine-oak-heath rocky summit community. The great species diversity that is supported throughout the region is an indication of the high ecological value of the area's habitat.

Conservation Issues and Recommendations:

The most significant threat to the Highlands is the continued conversion and fragmentation of the area's forests and wetlands. Conservation efforts should focus on maintaining the unfragmented forest core from the glacial moraine north to the Hudson and across the Hudson to the Connecticut border with linkages on forested ridges to the Delaware River to the south. Additional inventory work is needed.

Location Description:

This area is similar to the USFWS New York-New Jersey Highlands Significant Habitat Complex. The physiographic region of the Highlands follows the boundary between the Highlands and Piedmont physiographic provinces on the southeast, and between the Highlands and the Appalachian Ridge and Valley provinces on the northwest. Though the physiographic region proper extends from the Delaware River in New Jersey northeast across the Hudson River to Candlewood Lake in southwestern Connecticut, the extent of the Highlands biodiversity area described in this document is confined to the study area. The Highlands province is distinguishable from the adjoining provinces by differences in geology, topography, and geomorphology (landforms).

Hudson River Estuary and Tidal Wetlands

Site Description:

The Hudson River Estuary contains significant freshwater and brackish tidal wetlands, as well as other riverine and estuarine habitats, islands, riparian zones, and important tributaries. These habitats support a high diversity of fish, birds, and mammals. Tidal wetlands exist along the entire reach of the estuary and include some of the rarest ecological communities in the state. Some of the islands contain significant upland communities, including pitch pine-oak-heath rocky summit and hemlock-northern hardwood forest.

The Hudson River extends 152 miles from the mouth of the river to the Federal Dam near Troy, New York. The width of the river ranges from 1/6 mile to 2.5 miles and the surface area at high tide is 82,000 acres. Intertidal wetlands and subtidal shallows consist of 26% or 21,200 acres of this surface area.

The Hudson River Estuary has a four-foot tidal pulse that extends all the way to Troy. In years with average amounts of precipitation falling in typical seasonal patterns, the leading edge of salt water is held downriver between the Tappan Zee and Yonkers during spring runoff. As runoff slackens during the summer, the salt front pushes northward to Newburgh Bay, and during droughts to Poughkeepsie and beyond. Because of the changing levels of salinity and tidal nature of the Hudson River, species assemblages vary by locality and overall diversity is high. In addition to the tidal riverine community, brackish intertidal mud-flats, brackish tidal marsh, freshwater intertidal mudlflats, freshwater intertidal shore, freshwater tidal marsh, and freshwater tidal swamp all together form a matrix down the shoreline of the river. Brackish, or lower salinity, tidal wetlands are regularly flooded by ocean water that has been diluted by freshwater from upstream. These wetlands are found south of the Highlands down to Manhattan. Freshwater tidal swamps found along the Hudson are globally rare. Saltwater marshes are now rare in New York Harbor, although they once extended for thousands of acres around Manhattan. Patch communities within the tidal portion of the Hudson River include calcareous shoreline outcrop, cliff community, and tidal creek.

Osprey. Photo by O.S. Pettingill.

The Hudson River Valley is broad and gently rolling with a bedrock of shale, siltstone, sandstone, limestone, and dolostone. Most of these are relatively soft sedimentary rocks and easily eroded. These bedrock formations have been eroded away to low plains with the Hudson River flowing through them. Most of the surficial deposits near and within the river are modern river channel deposits. River margins are made nutrient rich as the river carries fresh sediment from the uplands and deposits them along the river's banks.

Site Location:

The Hudson River Estuary is the portion of the Hudson River extending from the Battery at the southern tip of Manhattan north to the Federal Dam in Troy, New York.

Towns:	Albany, Athens, Bethlehem, Bronx, Brunswick, Catskill, Clarkstown, Clermont, Coeymans, Colonie, Cornwall, Cortlandt, Coxsackie, Esopus, Fishkill, Greenburgh, Greenbush, Greenport, Haverstraw, Highland, Hyde Park, Livingston, Lloyd, Marlborough, Mount Pleasant, New Baltimore, New Windsor, Newburgh, North Greenbush, Nyack, Orangetown, Ossining, Peekskill, Philipstown, Poughkeepsie, Red Hook, Rhinebeck, Saugerties, Schodack, Stockport, Stony Point, Stuyvesant, Ulster, Wappinger, Yonkers
Counties:	Albany, Bronx, Columbia, Dutchess, Greene, New York, Orange, Putnam, Rensselaer, Rockland, Ulster, Westchester
Approximate Size:	110.66 mi^2

Land Stewardship:	Name or Classification	Manager	Area
	Storm King State Park	NYSOPRHP	2.97 mi^2
	Bear Mountain State Park	NYSOPRHP	7.48 mi^2
	Hook Mountain State Park	NYSOPRHP	1.31 mi^2
	Nyack Beach State Park	NYSOPRHP	0.17 mi^2
	Tallman Mountain State Park	NYSOPRHP	1.06 mi^2
	Palisades State Park	NYSOPRHP	0.004 mi^2
	Hudson Highlands State Park	NYSOPRHP	9.38 mi^2
	Rockefeller State Park	NYSOPRHP	0.07 mi^2
	Bristol Beach State Park	NYSOPRHP	0.004 mi^2
	Hudson River Islands State Park	NYSOPRHP	0.36 mi^2
	Schodack Island Sate Park	NYSOPRHP	1.83 mi^2
	Mills-Norrie State Park	NYSOPRHP	1.54 mi^2
	Quiet Cove State Park	NYSOPRHP	0.05 mi^2
	Riverbank State Park	NYSOPRHP	0.04 mi^2
	Hudson River State Park	NYSOPRHP	0.53 mi^2
	Moodna Creek Unique Area	NYSDEC	0.09 mi^2
	Kowawese Unique Area	NYSDEC	0.16 mi^2
	Rogers Island WMA	NYSDEC	0.49 mi^2
	Turkey Point State Forest	NYSDEC	
	Montrose Point State Forest	NYSDEC	
	Tivoli Bays WMA[1]	NYSDEC	2.69 mi^2
	Nutten Hook Unique Area	NYSDEC	0.05 mi^2
	Piermont Marsh[1]	NYSDEC	0.1 mi^2
	Stockport Flats[1]	See Below	2.41 mi^2
	Iona Island[1]	See Below	0.87 mi^2
	Public Easements	NYSDEC	0.24 mi^2
	Municipal/County Parks		3.26 mi^2
	Private Conservation Land		6.16 mi^2

[1]One of four tidal wetlands that make up the Hudson River National Estuarine Research Reserve, a collaborative effort involving the National Oceanic and Atmospheric Administration (NOAA), the Palisades Interstate Park Commission, NYSDEC, NYS Office of General Services, and NYSOPRHP (NYSDEC & NOAA 1993). An additional 1.5 mi^2 is included in Piermont Marsh and includes part of Tallman Mountain State Park.

Ecological Significance:

The Hudson River is one of the most extensive freshwater tidal river systems in the northeastern United States. The tidal communities found here are regionally and globally rare. Wetland habitats are the cornerstone of the Hudson River Estuary ecosystem because they play a critical role as nursery grounds for fish and shellfish species, nesting sites and migration stops for birds, and sources of nutrients to the food chain. The marshes and tidal flats of the Hudson River Estuary contribute essential nutrients to aquatic and terrestrial food webs that extend throughout the river system and far into the Atlantic Ocean.

Besides serving as important habitats, the wetlands that border the Hudson River Estuary perform other valuable services. Pollutants are filtered from water that flows through fresh and saltwater marshes, and these same wetlands buffer valuable real estate from floodwaters and storm surges. Estuarine plants also help to prevent erosion and stabilize the shoreline.

Estuaries are transition zones from inland freshwater ecosystems to saltwater ecosystems found in coastal environments. Estuarine environments are among the most productive on Earth, creating more organic matter each year than comparably sized areas of forest, grassland or agricultural land. Several measures of the importance of estuaries are that more than half of the commercial fish species caught globally and more than 75% of America's commercial fish catch spend part of their lives in an estuary. Key commercial and recreational species such as striped bass, bluefish, and blue crab depend on nursery habitat in the Hudson River Estuary.

During recent field surveys, populations of the state-endangered plant Hudson River water nymph were rediscovered in a freshwater intertidal mudflats community. The entire global range of this plant is limited to the Hudson River Valley; therefore, it is considered endemic. This is the only endemic plant to all of New York State. Other globally rare plants still found in the Hudson Rive Estuary include estuary begger-ticks, Long's bittercress, and salt-meadow grass. Rare animals of the Estuary include shortnose sturgeon, Atlantic sturgeon and Atlantic needlefish. Harbor seal are periodically reported and the Northern diamondback terrapin is present in some of the lower Hudson River Estuary tidal marshes.

The Hudson River Estuary ecosystem has been stressed by multiple activities such as the discharge of raw sewage that leads to high bacterial counts and low dissolved oxygen levels, landfilling that has destroyed valuable wetlands, cooling water intakes that kill millions of fish, and food webs contaminated by toxic chemicals. Among fish of commercial, recreational and ecological importance, the American shad, Atlantic sturgeon, river herring (blueback herring and alewife), American eel, and largemouth bass are in decline. Little is known of the status of blue crab, smallmouth bass, and other species. Striped bass have increased over the last few decades, but fishing pressure in the Estuary and along the Atlantic coast must be carefully managed or it could lower current population levels. Although tidal wetlands have been protected by state and federal law since the 1970s, erosion, sea level rise, changes in salinity, introductions of nonnative species and other factors have caused changes in wetland plant and animal communities over time.

Further description of the Hudson River Estuary is divided below into general salinity habitat zones based on average annual salinities.

- <u>Lower Hudson River Estuary</u>

  The lower Hudson River Estuary zone from Manhattan to Stony Point is an area that approaches marine habitat characteristics, having very strong semi diurnal (twice daily) tidal currents and moderate salinities. This section of the Hudson is gener-

ally the zone of greatest mixing of river water and ocean water. The lower Hudson is rich in benthic resources and provides a significant nursery for fish populations. It is an important source of food resources for populations of wintering and migratory birds. This stretch of the river has significant concentrations of wintering waterfowl, especially canvasback. Other important animal species living in this area include osprey, fiddler crabs, blue crab, and diamondback terrapin. There are several regionally significant plants that occur in the Lower Hudson including the state endangered cylindrical headed bulrush. Piermont Marsh is a sizeable intertidal brackish marsh community and one of the largest undeveloped wetland complexes on the Hudson. It includes the northernmost occurrence of salt marsh species on the Hudson. Because it represents an exemplary ecological community type, Piermont Marsh has been designated as one of four sites that make up the Hudson River National Estuarine Research Reserve.

- Mid-Hudson River Estuary

  The productive and regionally significant Mid-Hudson River estuary is generally fresh water in winter and has low salinity in summer. This section encompasses regionally significant spawning migratory and nursery habitat for anadromous, estuarine, and freshwater fish, important winter feeding and roosting areas for the federally listed threatened bald eagle, and globally and regionally rare brackish and freshwater tidal communities and plants. The open water and tidal wetlands in this reach are spawning and nursery habitats and a migratory pathway between the upper and lower estuary for anadromous and resident fish.

  The habitat contains many unusual features, including deep tidal river habitat that is a rare ecosystem type in the eastern United States, and an important winter foraging area for the bald eagle. The numerous creeks and tidal brackish and freshwater marshes in this stretch serve as breeding, nursery, and migration corridors for fish and wildlife. Iona Island supports important winter roost sites for bald eagles that feed in the adjacent deepwater segment of the river. Iona island also has several rare plants including Bush's sedge, slender knotweed, and pinweed. Con Hook Marsh is a small, brackish tidal marsh with several rare plants, including cylindrical headed bulrush, spongy arrowhead, necklace sedge, and pinweed. Con Hook Marsh is also an important wintering area for waterfowl, especially mergansers. Constitution Marsh is a freshwater to brackish tidal marsh and is the largest undeveloped brackish tidal wetland on the Hudson River. It is a prime breeding and feeding area for marsh nesting birds.

Muskrat. Photo by John Kanter.

- Upper Hudson River Estuary

  The open water, tidal wetlands, and tributaries in the upper reach of the Hudson are regionally important fish spawning habitats for anadromous fish, especially American shad, striped bass, Atlantic sturgeon and shortnose sturgeon, and provide habi-

tat for all life stages of resident freshwater species. The numerous creeks and tidal freshwater marshes in this stretch serve as breeding, nursery, and migration corridors supporting waterfowl, shorebirds, herons, raptors, and passerine birds. Regionally and globally rare tidal communities include freshwater tidal swamp, freshwater tidal marsh, freshwater intertidal mudflats, and freshwater intertidal shore. The Hudson River water nymph, a state-endangered endemic plant, was recently rediscovered in a freshwater intertidal mudflats community from the Upper Hudson River (Howard et al. 2002).

Conservation Issues and Recommendations:

All activities that degrade water quality in the Hudson River Estuary adversely affect the fish and wildlife that use this habitat for various life functions. Water pollution by chemical or oil spills; excessive turbidity; sedimentation; and other point and nonpoint source pollution degrade the quality and function of the estuarine habitat. Toxic contamination has long term effects on the safety of food and the health of consumers due to bioaccumulation and biomagnification. Water quality improvement efforts are needed throughout the estuary. Upgrades to sewage treatment facilities, control of point and nonpoint source pollution, and contaminant trackdown and clean-up should continue to be major goals throughout the watershed. Full restoration of the hydrologic continuum (wetlands and the river), especially hydrologic connections under the existing railroad beds, and restoration of riparian corridors along the tributaries to the Hudson, will increase available upland habitat, improve the quality of aquatic habitat in the tributaries, and reduce sediment and nutrient input into the Hudson. Improvement of habitat complexes for animals requiring both wetlands and uplands should be encouraged. Additionally, measures to conserve and educate the public about submerged aquatic vegetation (SAV) beds located throughout the estuary should be continued and expanded.

Location Description:

- Lower Hudson River Estuary

  This area is also identified by the USFWS as the Lower Hudson River Estuary Significant Habitat Complex. The area for the lower Hudson River follows the shores of the Hudson River from the tip of Battery Park, Manhattan, generally referred to as river mile 0, north to the Stony Point area river mile 41. The area includes all riverine and estuarine habitats, including open water and tidal wetlands in this stretch of the river.

- Mid-Hudson River Estuary

  This area is identified by the USFWS as the Mid-Hudson River Estuary Significant Habitat Complex. The mid Hudson River estuary follows the shores of the Hudson River from Stony Point, river mile 41, to Poughkeepsie, river mile 75. The significant area includes all riverine and estuarine, open water and tidal wetland habitat in this stretch of the Hudson.

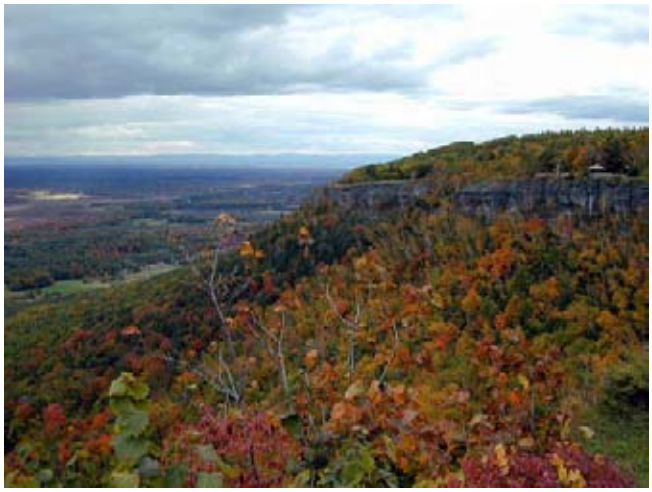
- Upper Hudson River Estuary

  This area is identified by the USFWS as the Upper Hudson River Estuary Significant Habitat Complex. The upper Hudson River estuary follows the shores of the Hudson River from Poughkeepsie at river mile 75 to the northern inland extent of the tidal Hudson River at Troy Lock and Dam, river mile 152. The significant area includes the tidal freshwater portion of the Hudson River, including all riverine, open water, and tidal wetlands in this stretch of the river as well as supratidal wetlands and some adjoining uplands and nontidal wetlands. The significant area also includes the lower portion of major and minor tributaries feeding into this part of the Hudson, up to the first impediment to fish passage in each tributary.

Hudson Valley Limestone and Shale Ridges

Site Description:

The Hudson Valley Limestone and Shale Ridges consist of the limestone areas that parallel the New York State Thruway, mainly to the east of the Thruway, and the parallel shale ridge west of the Thruway. This area is a regionally significant geologic feature that contains habitats that support several rare mammal, amphibian, reptile, bird, and plant species. The area covers about 127,000 acres in a curved line about 54 miles long and 5.6 miles wide at its widest point. The northern section consists of the band of cliffs known as the Helderberg Escarpment and the southern section extends along the Potic Mountain ridge.



Hudson Valley shale ridges. Photo by Elizabeth Hill.

Significant natural communities in this area include red maple-black-gum swamp, vernal pool, chestnut oak forest, Appalachian oak hickory forest, and pitch pine-oak-heath -rocky summit. In addition, small patch communities in the Potic range to the south include shale cliff and talus community and shale talus slope woodland. In other areas, calcareous cliff community, calcareous talus slope woodland, red cedar rocky summit, and rocky summit grassland communities have been documented in the upland and bedrock outcrop localities. In the lowlands, floodplain forest, limestone woodland, maple-basswood rich mesic forest, red maple-hardwood swamp, and silver maple-ash swamp have been documented.

The bedrock of the Hudson Valley Limestone and Shale Ridges mainly consists of limestone from the early to mid Devonian Period (approximately 400 million years ago). These rocks were produced when the area was covered by shallow seas and fossils are not uncommon. The limestone acts as a buffer to neutralize the increased acid precipita-

tion in the region, a helpful characteristic to the local flora and fauna. The boundaries of this area also include Ordovician (450 million years ago) deposits of shale, sandstone, siltstone, and limestone. The surficial deposits consist mainly of till and river and lake bottom deposits in the lowlands, with bedrock in the uplands.

Site Location:

The Hudson Valley Limestone and Shale Ridges are about 11 miles west/southwest of Albany.

Towns: Athens, Berne, Bethlehem, Coeymans, Knox, Guilderland, New Baltimore, New Scotland, Athens, Catskill, Coxsackie, Saugerties, Westerlo

Counties: Albany, Greene, Ulster

Approximate Size: 199 mi^2

Land Stewardship:

Name or Classification	Manager	Area
John B. Thacher State Park	NYSOPRHP	2.0 mi^2
Thompson's Lake State Park	NYSOPRHP	0.24 mi^2
Forest Preserve	NYSDEC	0.14 mi^2
Black Creek Marsh WMA	NYSDEC	0.12 mi^2
Great Vly WMA	NYSDEC	0.30 mi^2
Louise E. Keir WMA	NYSDEC	0.18 mi^2
Margaret Burke (Knox)	NYSDEC	0.22 mi^2
Municipal/County Parks		0.99 mi^2
Private Conservation Land		2.31 mi^2

Ecological Significance:

The limestone bedrock supports a wide variety of diverse communities, many of which are rare in New York State and the Hudson River Estuary corridor. These include calcareous cliffs, calcareous talus-slope woodlands, and red cedar rocky summits. The shale ridge contains what may be the best examples of shale cliffs and talus slopes in the region. Several sizable limestone caves occur on the Helderberg Escarpment where eight species of bats are known to occur including the federally endangered Indiana bat. The limestone cliffs are one of only two areas in the Hudson River Estuary corridor to support a winter hibernaculum for the Indiana bat (the other is the Rosendale Limestone Cave Complex) and also includes three sites for the state special-concern eastern small-footed bat. Other rare animal residents include Henslow's sparrow, upland sandpiper, sedge wren, and least bittern. One waterfowl concentration area is present within this area.

Wood turtle. Photo courtesy of Cornell University.

Numerous species of amphibians and reptiles are commonly found within the Hudson Valley Limestone and Shale Ridges, including the spotted salamander and several other rare species such as Jefferson salamander, blue spotted salamander, and wood turtle. Numerous rare plants occur in the area, including the smooth cliff brake, ram's head lady's slipper, and American ginseng. More rare plant species are found throughout the rich uplands and lowlands.

Conservation issues and recommendations:

Habitat conversion as a result of suburban expansion is of greatest concern in the largely unprotected lands of this significant area. Exploring opportunities for conservation agreements (easements or acquisition) that ensure the continued existence of the least disturbed and unfragmented examples of the state-rare communities listed above is recommended. Exotic species including garlic mustard and tree-of-heaven are common throughout the area. Management efforts to reduce and prevent the spread of these exotic species in the highest quality areas are recommended. Implementing the Helderberg Escarpment Planning Guide will help to protect the unusual resources found here. More complete surveys of the karst areas, escarpment wetlands, and other significant habitats are needed.

Location Description:

This area is a modification and extension of the USFWS Helderberg Escarpment Significant Habitat Complex. The northern portion of the habitat area consists of the Helderberg Escarpment itself and the land both above and below the escarpment within approximately 3 miles of the escarpment face from Dormansville north to the Albany Schenectady County line. South of the Helderberg Escarpment, the site extends along the Potic Mountain ridge and extends as far south as Marion Mountain. From the Potic Mountain Ridge, the site follows south along the limestone escarpment to the Schoharie Turnpike. It proceeds east and then south on Hans Vosenkill Road until just north of Catskill and then east on Huckleberry Hill Road a short distance to Route 9W. It proceeds south on 9W until Saugerties and continues south to Esopus Creek. It follows Esopus Creek west and south to Plattekill Creek, west on Plattekill Creek to the shale escarpment. It follows the western shale escarpment line north to the Helderberg Escarpment.

Jamaica Bay and Beaches

Site Description:

Jamaica Bay and Beaches encompass important breeding and juvenile nursery habitat for fisheries as well as year round foraging areas for waterfowl, shorebirds, and colonial nesting waterbirds. The extensive salt marsh and upland islands in the bay provide nesting habitat for gulls, terns, waterfowl, and herons; foraging and roosting habitat for shorebirds and waterbirds; upland sites for grassland bird nesting and foraging areas; and butterfly concentration areas. This is an extremely valuable area for resident and migratory fish and birds and for other wildlife and plant populations.

Site Location:

Jamaica Bay is located on the southwestern tip of Long Island in the boroughs of Brooklyn and Queens, New York City and the town of Hempstead, Nassau County. The bay connects with Lower New York Bay to the west through Rockaway Inlet and is the westernmost of the coastal lagoons on the south shore of Long Island. Although not considered part of the Hudson River Estuary Watershed, this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Towns:	Boroughs of Brooklyn and Queens, New York City, Town of Hempstead		
Counties:	Kings, Nassau, Queens		
Approximate Size:	17.52 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Gateway National Recreation Area	U.S. DOI	10.28 mi^2
	Bayswater Point State Park	NYSOPRHP	0.02 mi^2
	Healy Avenue Tidal Wetlands Area	NYSDEC	0.02 mi^2

Ecological Significance:

The location of Jamaica Bay and the rich food resources found there make it a regionally important area for fish, wildlife, and plants. This area contains species dependent on coastal and beach habitats found nowhere else within the Hudson Estuary corridor conservation area. Its geographic location acts to concentrate marine and estuarine species migrating between the New York Bight portion of the North Atlantic and the Hudson Raritan Estuary. Shorebirds, raptors, waterfowl, landbirds, and various migratory insects are concentrated by the coastlines in both directions. These migratory species are further concentrated by the surrounding urban developed land into the remaining open space and open water of Jamaica Bay. The waters and sediments of Jamaica Bay are a highly productive and regionally significant habitat for finfish, shellfish, and wildlife. The rare Northern diamondback terrapin uses habitats throughout the bay for nesting and feeding. Jamaica Bay is also one of the most important migratory shorebird stopover sites in the region, especially during fall migration (July to November).

Conservation issues and recommendations:

Land-use conflicts in this area result from the high-density human population. Recreational overcrowding, shoreline hardening, extensive dredging and dredge soil deposition, and invasive species are all a result. The bay continues to be threatened by poor water quality, loss of upland and wetland buffer, and disturbance of habitat areas. Virtually the entire watershed of Jamaica Bay is urban, developed land and the bay receives substantial pollution from a variety of point and nonpoint sources. Recommendations include directing recreational use away from areas determined to be most biologically sensitive,

Jamaica Bay. Photo courtesy of Kathryn Schneider.

developing monitoring programs to study the impacts of recreation and invasive species on biodiversity, and exploring opportunities to mediate the impacts of recreation and other activities. Additionally, efforts to improve the water quality in the bay and throughout the watershed should be strongly encouraged. Recommendations for restoring the water quality, habitat quality and quantity, and species diversity are detailed in the Jamaica Bay Watershed Management Plan published by the New York City Department of Environmental Protection. Additional inventory work is needed.

Location Description:

This area was also identified by the USFWS as the Jamaica Bay and Breezy Point Significant Habitat Complex. This significant area includes the entire Jamaica Bay estuarine lagoon, part of Rockaway Inlet, and the western part of the Rockaway barrier beach. The area generally follows the shoreline of Jamaica Bay and includes most of the tidal creeks and undeveloped upland areas adjacent to the bay; these serve as buffers for the bay, as upland habitat, and as existing and potential restoration sites. This complex also contains the western end of the Rockaway barrier beach and the Marine Park/Plumb Beach area just to the west of the main body of Jamaica Bay to include beach and dune habitat for nesting bird and rare plant species.

Narrows

Site Description:

The Narrows is notable for its wading colonial bird rookeries, island heronries, and significant coastal habitats.

Site Location:

The Narrows constitutes the westernmost section of Long Island Sound between Hell Gate, at the convergence of the Harlem and East Rivers, and the Hempstead Sill, a major shoal area extending north and south across the Sound from Matinecock Point on Long Island, near Glen Cove, Nassau County, to the New York Connecticut line. This significant area also includes a small area of southwestern coastal Connecticut in the vicinity of Greenwich. Although not considered part of the Hudson River Estuary Watershed, this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Towns:	Bronx, New Rochelle, North Hempstead, Mamaroneck, Queens, Rye		
Counties:	Bronx, Nassau, Queens, Westchester		
Approximate Size:	65.62 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Fort Totten	U.S. DOD	0.15 mi^2
	Udall's Wetland	NYSDEC	0.06 mi^2
	Municipal/County Parks		4.34 mi^2
	Private Conservation Land		0.05 mi^2

Ecological Significance:

The principal habitat types of significance in this area are offshore islands with colonial wading bird rookeries; rocky intertidal areas; and tidal wetland areas consisting of various combinations of associated salt and brackish marshes, mudflats, tidal creeks, and protected open water coves. The wetlands systems in this area are diverse and relatively undeveloped, with tidal rivers and creeks, salt marshes, mudflats, freshwater marshes and shallow water areas occurring over the general area. The three north shore bays, Little Neck Bay, Manhasset Bay, and Hempstead Harbor, are collectively among the most important waterfowl wintering concentration areas in the surrounding region. Sand beaches in this area provide essential nesting habitat for piping plover, a federally listed threatened species, least tern, and Northern diamondback terrapin. Marshlands associated with the bays are valuable feeding and nesting areas for green backed heron, clapper rail, American black duck, and are feeding areas for several species of wading birds. North and South Brother Islands are the site of the largest black crowned night heron colony in New York State. The wetlands along the mainland in this area provide important nesting habitat for several species of special emphasis in the region, including green backed heron, yellow crowned night heron, American bittern, Canada goose, American black duck, and clapper rail. Several regionally rare plants occur at Pelham Bay Park, including purple milkweed, persimmon, Bush's sedge, globose flatsedge, slender blue flag, short fruited rush, yellow giant hyssop , and woodland lettuce.

Conservation Issues and Recommendations:

Industrial, commercial, and residential expansion in the extremely urbanized environment of the Narrows continues to influence existing natural ecosystems and fish and wildlife populations. In spite of this, many important and regionally significant areas persist, although their future appears uncertain without intensive and coordinated protection, management, and environmental safeguard programs in place. Protective measures should be taken, whether by regulation, zoning, planning, cooperative agreements, or initiatives such as the National Estuary Program, to restore, maintain, enhance, and protect the aquatic, terrestrial, insular, and benthic habitats of the Narrows, the major bays, and the lesser embayments and coves along the mainland. Protective measures will ensure that these areas continue to support the regionally significant populations of waterfowl, fish, and colonial breeding birds that utilize and depend upon these habitats. Additional inventory work is needed.

Location Description:

This area was also identified by the USFWS as the Narrows Significant Habitat Complex. The site corresponds approximately with that of the Narrows proper, and includes most of the mainland wetlands and nearshore waters and islands of western Long Island Sound and portions of the East River within this area. Specifically included in this area are the three major bays on the north shore of western Long Island, in Nassau and Queens Counties: Little Neck Bay, Manhasset Bay, and Hempstead Harbor, which are recognized here as an interrelated complex of regionally significant fish and wildlife aquatic habitats. Although the overall area of this complex is considerably more extensive than the individual significant habitat areas identified in the East River section and the Westchester/Bronx and Connecticut shorelines of the Narrows, these habitats were felt to be linked, or potentially so, and thus were included together.

Neversink River

Site Description:

The Neversink River flows into the Delaware River and contains globally significant populations of the dwarf wedgemussel, as well as other rare mussels including the brook floater and alewife floater.

Neversink River. Photo by William Rudge.

Site Location:

The Neversink River runs along the west side of the Shawangunk Mountains joining the Delaware River near the tri-state junction of New York, Pennsylvania, and New Jersey. Although not considered part of the Hudson River Estuary Watershed, this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Towns:	Deerpark
Counties:	Orange
Approximate Size:	0.46 mi^2

Ecological Significance:

The Neversink River is most notable for its exemplary occurrences of the globally rare dwarf wedgemussel. It also contains several significant communities including floodplain forest, and shale cliff and talus community. Regionally rare animal species in this area include the bald eagle and timber rattlesnake.

Conservation Issues and Recommendations:

Changes in water level, flow, or chemistry in the Neversink River would likely impact the rare mussel populations found there. A management plan for the lower Neversink River

involving federal, state, county, and local agencies and organizations focused on protecting the habitat and water quality for mussels would be beneficial. The lower Neversink River, floodplain, and adjacent uplands need to be protected through a variety of mechanisms, including acquisition and easements, to prevent impacts to the globally significant mussel population. The water quality, water flow, and water chemistry must be maintained, and appropriate flows from the Neversink Reservoir must be maintained. Research should be conducted to determine host fish and other life history requirements of all the rare mussel species in the lower Neversink River. Additional inventory work is needed.

Location Description:

The Neversink River significant area follows the Shawangunk Ridge significant area boundary on the east down to the boundary for the Delaware/Moungaup rivers significant area. The Neversink River significant area conservatively follows route 209 on the west and extends up the western reach of the Neversink for approximately 3.3 miles.

Palisades

Site Description:

The Palisades include regionally rare talus slope and traprock communities, and is an important open space within the urbanized zone along the Hudson River Estuary. It is used by migratory and resident raptors and songbirds. The entire Palisades area consists of a 12,000-acre region in Rockland County and adjacent New Jersey and of this, 8,600 acres fall within New York State. In New York, the Palisades biodiversity area is about 18 miles long and 1.5 miles wide at its widest point.

The Palisades is a narrow ridge along the western shoreline of the Hudson River consisting mainly of upland, outcrop, cliff, and talus slope communities. The matrix communities consist of Appalachian oak-hickory forest and chestnut oak forest. Good quality rocky summit grassland patch communities have been documented.

View of the Hudson River Estuary from the Palisades. Photo by Steve Stanne.

About 195 million years ago, liquid magma pushed into a large fracture somewhat near the surface of the earth. The magma cooled to form a very resistant rock called diabase. Because the magma filled a relatively horizontal fracture at the current ground surface, this “intrusion” is termed a sill. The Palisades Sill forms an east-facing cliff 120-130 meters thick. The diabase appears with column-like structures formed when the magma cooled, contracted and subsequently cracked in the regular column-like

pattern. On both sides of the Palisades Sill are reddish brown mudstones and sandstone that formed about 200 million years ago, when dinosaurs roamed the land. For today's plants, animals, and communities, the diabase offers a very different rock type than most in the region to grow on. This igneous rock offers cliff habitats and the potential for communities quite different from the standard, calcareous substrate common in the region.

Site Location:

The Palisades is a narrow ridge located along the western shoreline of the Hudson River Estuary in southeastern New York, at the northern end of the metropolitan New York City region.

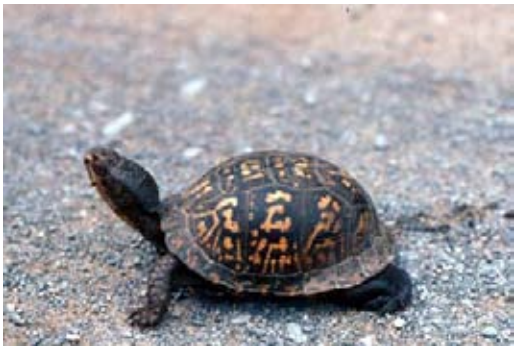
Towns: Clarkstown, Haverstraw, Orangetown, Ramapo
Counties: Rockland
Approximate Size: 13.96 mi^2
Land Stewardship:

Name or Classification	Manager	Area
Blauvelt State Park	NYSOPRHP	0.89 mi^2
Haverstraw Beach State Park	NYSOPRHP	0.04 mi^2
High Tor State Park	NYSOPRHP	1.05 mi^2
Hook Mountain State Park	NYSOPRHP	1.31 mi^2
Rockland Lake State Park	NYSOPRHP	0.35 mi^2
Nyack Beach State Park	NYSOPRHP	0.17 mi^2
Tallman Mountain State Park	NYSOPRHP	1.06 mi^2
Palisades State Park	NYSOPRHP	0.03 mi^2
Municipal/County Parks		1.55 mi^2

Ecological Significance:

The Palisades biodiversity area supports several significant ecological community types and numerous regionally significant species including several federally and state listed species. One of the highlights of this area includes the 1998 discovery of the globally rare basil mountain mint as well as seven other rare plants. Fewer than 25 populations are known worldwide for the basil mountain mint and Torrey's mountain mint and two of the largest remaining populations exist within this area of the Hudson River Estuary corridor. Prior to this find, basil mountain mint was last seen in New York in the late 1800s.

Talus slope communities and rocky summit grassland communities occur in only a few locations in the region. The talus slope community provides dens and basking areas for regionally rare reptiles including the northern copperhead and five lined skink. The only known remaining occurrence for the Allegheny woodrat in the region occurs in the Palisades. The Allegheny woodrat was thought to be extirpated from New York, until a survey and trapping effort in 2001 found the only known extant woodrat population in the state (Howard et al. 2002). The Palisades Ridge is also important as a migratory corridor and nesting area for raptors and songbirds. The hawk watch each fall at Hook Mountain



Box turtle. Photo courtesy of Cornell University.

counts about 25,000 hawks, as well as other landbirds and waterfowl, and constitutes the largest fall counts of any hawk watch in New York State. The relatively unfragmented forest habitats on the Palisades also support populations of two declining turtle species, the wood turtle and the eastern box turtle.

Conservation issues and recommendations:

Several management issues on the public lands of this area could be improved to reduce threats to many of the rare plant occurrences. Invasive exotic species and natural successional processes threaten to crowd and overtop rare species populations. Misplaced bike trails and hiking trails can threaten to trample and erode sensitive populations. Trail re-routing, exotic species removal, and brush clearing activities should be designed to benefit rare species' populations. The Allegheny woodrat population is also threatened, probably by parasitic roundworm. Active protection of the Allegheny woodrat may be necessary, including trapping and removing raccoons, inoculating rats against roundworm, and reintroducing them to historically occupied habitats. Additional inventory work is needed.

Location Description:

This area was also identified by the USFWS as the Palisades Significant Habitat Complex. The eastern portion of the Palisades significant area follows the west shore of the Hudson River from just south of the George Washington Bridge in Fort Lee, New Jersey, north about 22 miles to Haverstraw, New York, and then west another 4 miles. The inland (western) portion of the site parallels the river boundary; the two encompass the open space on the Palisades Ridge. The significant area ranges from about 0.6 mile to 1.5 miles in width.

Rensselaer Plateau

Site Description:

The Rensselaer Plateau contains a diverse mix of wetland and upland communities that are more common in northern New York and New England, including spruce-fir swamp, shallow emergent marsh, sedge meadow, hemlock-northern hardwood forest and spruce flats. The large, contiguous nature of this area provides habitat for a number of large-ranging mammals and forest-interior bird species.

The Rensselaer Plateau is an expansive plateau of contiguous high elevation northern forests. In comparison with the nearby more mountainous Taconic range, the topography

is rolling and contains many swamps and lakes among the forests. The area is 121,236 acres. The Little Hoosic River drains the northeast side of the Rensselaer Plateau, while the Poesten Kill, Quacken Kill, and tributaries to Kinderhook Creek (Black Brook, Roaring Brook, Black River, West Brook) flow from the west and southern portions.

Matrix forest in the Rensselaer Plateau contains hemlock-northern hardwood forest communities (including two large blocks of 2,400 and 2,500 acres) and spruce flats community. Many patches of other community types exist within the matrix forests, such as hemlock-hardwood swamp, spruce-fir swamp, shallow emergent marsh, and sedge meadow. Other patch communities include talus cave community, calcareous talus slope woodland, oligotrophic dimictic lake, inland poor fen, dwarf shrub bog, black spruce-tamarack bog, and maple-basswood rich mesic forest.

The majority of the Rensselaer Plateau is covered by glacial till from the last glaciation. Till usually consists of a mixture of material ranging in size from large boulder-sized rocks to very fine silt and clay. Nearly the entire area (including all the bedrock outcrops) consists of a bedrock of Rensselaer Graywacke, a dark gray, clay-rich sandstone or fine-grained conglomerate. This one region is the only remnant of this rock type, and was originally formed about 540 million years ago, during the early Cambrian Period. This ancient sedimentary rock is more resistant to erosion than other rocks to the west, resulting in the higher elevations on the Plateau. Other major bedrock components include shale and quartzite.

From a biological perspective, all of the bedrock components tend to have good buffering capabilities against acid deposition. The extensive surficial deposits of till produce rocky soils that are difficult to farm, likely one of the main reasons the forests remain so extensive on the Rennselaer Plateau. However, the mix of silts, clays and sands in till deposits result in good quality soils for the natural communities.

Site Location:

Ten miles east of Albany, NY.

Towns:	Berlin, Brunswick, Grafton, Hoosick, Nassau, Petersburg, Pittstown, Poestenkill, Sandlake, Stephentown,		
Counties:	Rensselaer		
Approximate Size:	189.5 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Cherry Plain State Park	NYSOPRHP	0.25 mi^2
	Grafton Lakes State Park	NYSOPRHP	3.60 mi^2
	Pittstown State Forest	NYSDEC	1.86 mi^2
	Capitol District WMA	NYSDEC	6.32 mi^2
	Municipal/County Parks		0.24 mi^2
	Private Conservation Land		1.06 mi^2

Ecological Significance:

Rensselaer Plateau represents one of the larger unfragmented forested areas of high quality in the region. The ecological significance of this area relates to its large, contiguous forest and wetland habitats and the species dependent on these habitats, as well as the diversity of plants, communities, and animals unique to this region. Area-sensitive animals found in this area include a variety of forest interior songbirds as well as large mammals that occur in low densities such as moose, black bear, bobcat, fisher, and river otter. In addition to the continuous and relatively unfragmented northern forests, the area contains regionally significant boreal wetland communities that occur within the forests. Examples include dwarf shrub bog, sedge meadow, spruce-fir swamp, and inland poor fen. The acidic ponds within the Rensselaer Plateau contain some of the best populations of Farwell's water milfoil, a state-threatened aquatic plant, and algae-like pondweed, an aquatic plant recently moved to the NY Heritage Program watch-list.

Rensselaer Plateau meadow. Photo by Andy Finton.

Conservation Issues and Recommendations:

The conservation of habitat corridors that link intact forest blocks is of particular importance. Additional inventory work is needed.

Location Description:

The Rensselaer Plateau significant area is similar to the Rensselaer Hills ecozone (Will et. al 1982). This area encompasses the expansive plateau of contiguous and largely roadless high elevation forests (approximately 180 square miles). Elevations start at 700 feet, however, most of the area is above 1,000 feet.

Rosendale Limestone Cave Complex

Site Description:

This area encompasses a series of extensive abandoned limestone mines that serve as critical habitat for several native bat species. Wetlands within the area provide habitat for a number of animal species, including the state-listed endangered northern cricket frog. The state-rare plant species goldenseal occurs in this significant area.

The Rosendale Limestone Cave Complex occurs right over a lower Devonian limestone formation called the Rondout Formation. This formation contains a very high quality limestone once used in extensive production of an early type of cement and was mined extensively. The resulting mine shafts and rooms are the 'caves' the bats use as hibernacula. The surficial geology consists mostly of limestone outcrops (e.g., bedrock), but

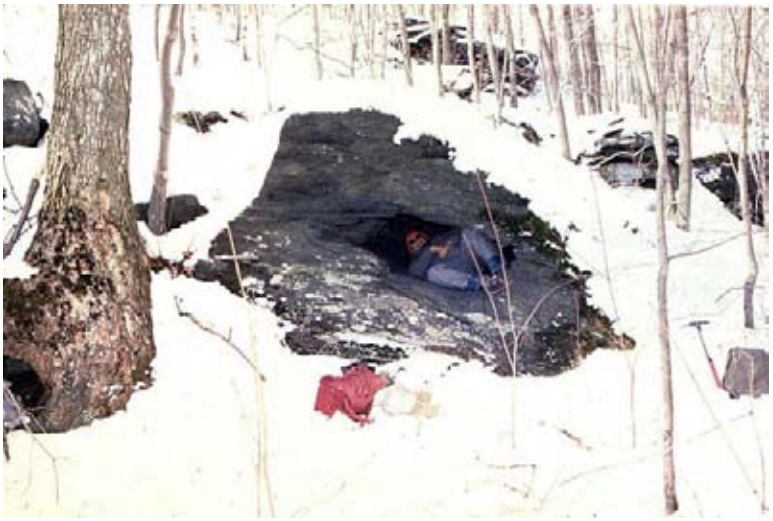
some areas also have deposits of glacial till, outwash sand and gravel, and one small kame deposit. These glacial deposits facilitate the wetland communities where cricket frogs occur.

Site Location:

Towns:	Rosendale, Hurley		
Counties:	Ulster		
Approximate Size:	9.13 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Rosendale Bat Cave WMA	NYSDEC	0.02 mi^2
	Private Conservation Land		1.79 mi^2

Ecological Significance:

The Rosendale Limestone Cave Complex is most noted for providing critical winter hibernacula for several bat species including the federally listed endangered Indiana bat and a state species of special concern, the eastern small-footed bat. The caves in this area are among the top 15 sites in the world for hibernating populations of both Indiana bat and small-footed bat. In 2000, a new bat hibernaculum was discovered that contained more than 10,000 Indiana bats as well as eastern small-footed bats. The population estimate makes this hibernaculum one of the top 10 sites in the U.S. for Indiana bats (Howard et al. 2001). These caves also serve as regionally significant hibernaculum for several other bat species including long-eared myotis, little brown bat, eastern pipistrelle, and big brown bat. All species combined, this area has the second largest total number of hibernating bats of any site in New York State.



Limestone cave. Photo by Ted Kerpez.

The wetland communities in this area are also notable for supporting regionally significant animal species. Principle among them is the state listed endangered northern cricket frog. The northern cricket frog was discovered during 2000 surveys at two locations and was until then thought to be extirpated from the wetlands (Howard et al. 2002). Another rare animal reported from the area is pied-billed grebe. A population of goldenseal, a plant often collected and used within herbal medicinal products, was also recently found. This plant is usually located within a forested landscape on top of calcareous soils and near wet seeps or adjacent to wetlands. Discovery of the population raises speculation that additional rare plants of calcareous bedrock might exist within the area.

Significant natural communities of the area include calcareous talus slope woodland, hemlock-hardwood swamp, limestone woodland, red maple-hardwood swamp, and hemlock-northern hardwood forest.

Conservation Issues and Recommendations:

Land protection may be implemented through a variety of methods including acquisition (on a voluntary, willing seller basis), conservation easements, cooperative land agreements, and outreach. Additional inventory work is needed, particularly for winter bat hibernacula.

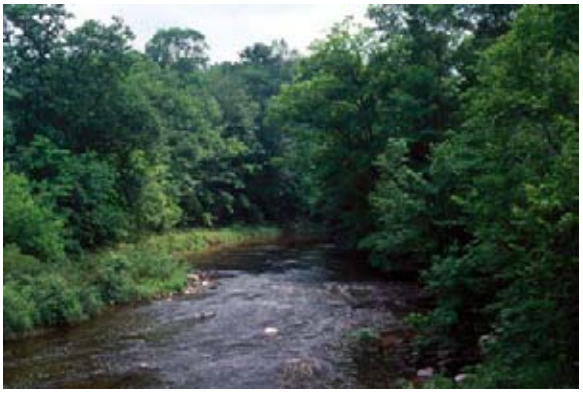
Location Description:

The Rosendale Limestone Cave significant area is defined by the limestone physiographic belt. It is bounded by the Thruway (I-87) to the east, the Rosendale town line to the west, Route 28 to the north and Rondout Creek to the south.

Shawangunk Kill/Shawangunk Grasslands

Site Description:

The Shawangunk Kill is a relatively undisturbed Hudson River Estuary tributary. It flows to the northeast between the Shawangunk Ridge and Wallkill River, which drains into the Hudson River. Its relatively low nutrient levels, cool water, and lack of a major water control structure allow the lower Shawangunk Kill to support a regionally rare biological community. This site includes Shawangunk grasslands, immediately adjacent to the Shawangunk Kill, that are important for a number of grassland bird species. Additionally, wetlands within this area support a number of rare plant species. This biodiversity area covers 11,470 acres and encompasses approximately 14 miles of the lower Shawangunk Kill with a 0.62 mile buffer on either side of the river and an enlargement near the middle to include the Shawangunk grasslands (formerly the Galeville Military Airport).



Shawangunk Kill. Photo by Paul Jensen.

The bedrock underlying the area easily erodes (Normanskill shale and Austin Glen formation), explaining the relatively low elevation and general lack of topography. In accordance, surficial deposits cover all the bedrock. In addition to glacial till, deposits of fine sediments (silt and clay) from proglacial lakes and variable sediments from the current river channel are present.

Site Location:

The Shawangunk Kill is a tributary of the Wallkill River and its headwaters originate on the east slope of the Shawangunk Ridge. It is located in the Wallkill River valley and runs

along the base of the east slope of the Shawangunk Ridge about 12.4 miles west of the Hudson River, and about 62 miles northwest of New York City.

Towns:	Crawford, Gardiner, Shawangunk		
Counties:	Orange, Ulster		
Approximate Size:	17.44 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Shawangunk Grasslands NWR	U.S. DOI	0.90 mi^2
	Municipal/County Parks		0.08 mi^2
	Private Conservation Land		0.11 mi^2

Ecological Significance:

The Shawangunk Kill supports high diversities of fish and mussels, unusual for the Hudson River Estuary corridor. Six species of freshwater mussels have been identified in this stretch of the river, including the globally rare swollen wedge mussel. Populations of the brook floater which were previously found in several areas are likely in decline (Howard et al. 2002). Wood turtle occurs in riparian habitat of the Shawangunk Kill and its tributaries. The Shawangunk Kill supports a number of rare plants including the largest known populations of beakgrass east of the Mississippi.

Henslow's sparrow.

The Shawangunk grasslands support several rare or declining grassland bird species, including Henslow's sparrow, northern harrier, upland sandpiper, short eared owl, long eared owl, and rough legged hawk. Other grassland nesting birds likely use this site as well. The grasslands are an important raptor concentration area in the Hudson River Valley. Rare plants found in wetlands of the area include Frank's sedge.

Conservation Issues and Recommendations:

Excessive water withdrawals could have significant impacts on flow and water quality. Water withdrawals from the Shawangunk Kill would be detrimental to the rare species found there. Longer low flow periods would result in increased warming of the water, reduced dissolved oxygen, increased concentration of nutrients and silt, and changes in the patterns of sediment deposition. As much as possible, further development or agricultural use should be directed at least 1,000 feet from the river. Agencies and conservation organizations should work with farmers and landowners to improve stream bank buffering through fencing, plantings of native shrubs and trees, and other methods. The local communities along this stretch of the river are encouraged to develop a regional plan to reduce impacts on the Shawangunk Kill. Additional studies of the flora and fauna of this stretch of the river, as well as of other locations in the upper Shawangunk Kill and other locations in the Wallkill River Valley, are needed.

Agreements and easements should be developed with willing farmers to delay the first cutting of hay to avoid impacts on grassland nesting birds. Agricultural BMPs that minimize negative impacts on grassland birds should be developed cooperatively with producers. Educational and outreach programs that promote the coexistence of sound farming practices and grassland bird conservation should be provided to the agricultural community. This biodiversity area may provide an opportunity for state, federal and local conservation partners to coordinate their efforts. The US Fish and Wildlife Service is developing a management plan for the Shawangunk Grasslands National Wildlife Refuge which will include strategies for preserving wildlife habitat values, protecting rare, threatened and endangered species, and providing priority public uses on refuge lands.

Location Description:

The biodiversity area was also identified by the USFWS as the Shawangunk Kill Significant Habitat Complex. The Shawangunk Kill includes the lower 18 river miles segment from the village of Pine Bush downstream to its junction with the Wallkill River and a buffer 0.62 mile (1 kilometer) on both sides of the river. The site also includes the Dwaar Kill from the village of Dwaarkill downstream to its junction with the Shawangunk Kill. This area is intended to encompass the regionally rare animal and plant populations associated with the river and a buffer zone to protect the river corridor.

Shawangunk Ridge

Site Description:

Shawangunk ridge habitat. Photo by Steve Young.

The Shawangunk Ridge contains an unusual diversity of plant communities and a high diversity of associated plant and animal species. The high diversity in the area is due in part to the wide range of topography and substrate. The area contains communities that range from wetland to ridgetop, slope, and cliff. The forest habitats are important as a migration corridor for raptors, other migratory birds, and wide-ranging mammals. An adjacent portion of the lower Neversink River just west of the Shawangunk Ridge is included in this biodiversity area, because of the importance of the ridge in maintaining high water quality and the presence of globally significant mussel populations (see the Neversink River description).

The entire boundary of the Shawangunk Ridge extends into New Jersey and encompasses more than 205,000 acres. The portion within the Hudson River Estuary Watershed is over 87,000 acres in area and 44 miles long and 7 miles wide in its widest part. Streams within the area drain into Rondout Creek to the north and Shawangunk Kill and the Wallkill River to the south. The southern portion of the Shawangunk Ridge drains away

from the Hudson River Estuary Watershed to the Neversink River to the north, which in turn flows into the Delaware River.

The forest matrix for the majority of the Shawangunk Ridge is chestnut oak forest. This community covers more than 38,000 acres. Here, the most abundant tree species are chestnut oak and red oak and the most abundant shrub species are huckleberry and mountain laurel. Large patch communities include hemlock-northern hardwood forest, and pitch pine-oak-heath rocky summit. Hemlock-northern hardwood forest communities tend to occur in the cool, moist ravines and depressions in the uplands of the Shawangunk Ridge. The most abundant tree species tend to be hemlock and chestnut oak, with hemlock also dominating in the understory. In contrast, the pitch pine-oak-heath rocky summit communities occur in dry, well-drained uplands and rock outcroppings of the ridge. The largest patch of this community covers 4,000 acres. Pitch pine is the most abundant tree species, while scrub oak is the common tall shrub.

The Shawangunk ridge consists mainly of a bedrock type called the Shawangunk Conglomerate. This is made of quartz sand and pebbles held together strongly by a quartz cement. Because of the high percentage of quartz, this sedimentary rock is very resistant to erosion. Thus, as the other, less resistant, nearby formations were eroded away, this formation remained as a striking, very steep-sided ridge. Deposits on top of the bedrock are generally thin layered or even nonexistent. As a result, much of the surficial geology is simply considered bedrock. Glacial deposits, such as till and kame deposits are also present.

Site Location:

The Shawangunk Ridge is located in the Ridge and Valley physiographic province of southeastern New York, about 56 miles northwest of New York City.

Towns: Deerpark, Gardiner, Greenville, Mamakating, Marbletown, Mount Hope, New Paltz, Rochester, Rosendale, Shawangunk, Wawarsing

Counties: Orange, Sullivan, Ulster

Approximate Size: 134.34 mi^2

Land Stewardship:

Name or Classification	Manager	Area
Minnewaska State Park	NYSOPRHP	24.6 mi^2
Forest Preserve	NYSDEC	0.40 mi^2
Bashakill WMA	NYSDEC	0.03 mi^2
Shawangunk MUA	NYSDEC	0.09 mi^2
Shawangunk Ridge State Forest	NYSDEC	1.49 mi^2
Huckleberry Ridge State Forest	NYSDEC	0.79 mi^2
Private Conservation Land*		21.2 mi^2

*Includes the 6.78 mi^2 Sams Point Dwarf Pine Ridge Preserve managed by The Nature Conservancy and the private 13.1 mi^2 Mohonk Preserve.

Ecological Significance:

The Shawangunk Ridge is the northernmost ridge in the Appalachian Ridge and Valley physiographic province. There is a high diversity of vegetative communities on the ridge containing species and communities typically found north of this region alongside species and communities typically found to the south or restricted to the Coastal Plain. This results in an unusual area where many regionally rare plants and animals are found at or near the limits of their ranges. Other rare species found in the habitat area are those adapted to the harsh conditions on the ridge.

Regionally significant upland communities in this area include chestnut oak and mixed oak forest, pine barrens including globally and state rare dwarf pine ridges, hemlock northern hardwood forest, state rare pitch pine-oak-heath rocky summit and cliff and talus slope and cave communities. A variety of wetlands, small lakes, streams, and bogs occur in the area and contain regionally significant communities including state rare pitch pine blueberry peat swamps, globally rare inland Atlantic white cedar swamp, and red maple swamps. Numerous vernal pools are found on the ridge as well. These pools and their surrounding habitats support a variety of amphibian species, including regionally rare salamanders such as the spotted salamander, Jefferson salamander, and longtail salamander.

Timber rattlesnake, northern copperhead, and eastern hognose snake occur at several locations, as does five-lined skink. Turtles inhabiting the ridge include spotted turtles in the ponds and wetlands, and wood turtles in wooded riparian habitat all along the ridge. The diversity of relatively unfragmented, undisturbed, deciduous and coniferous forests and wetlands on the ridge support a variety of nesting bird species and also serves as an important corridor for many migrating species. There are several area-sensitive, large mammal species in the area including black bear, bobcat, and fisher.

Bobcat. Photo courtesy of Cornell University.

Rare species found in the area include state-rare dragonflies and arrowhead spiketail, which are found in the wetland communities. Other unusual animals include rare moths, peregrine falcon, and a bat hibernaculum. Recent findings include a new site for the state-threatened fern, mountain spleenwort, and two sites for the

state-threatened Appalachian sandwort (Howard et al. 2002). Within New York, known populations of the mountain spleenwort are restricted to the cliff faces of the Shawangunk Ridge. The arctic rush is also located on these cliff faces. The beautiful flowering shrub rhodora is fairly common between Lake Awosting and Sam's Point and these are the best areas in the state to see rhodora.

Conservation Issues and Recommendations:

Habitat conversion of land on the ridgetops would fragment both the forest and wetland habitats and reduce the suitability of the ridge to support its rare plant and animal populations. Deer grazing of rare plants such as the small whorled pogonia and broom crowberry could be a threat if the density of the deer population increases. Radio towers could present a hazard to migratory raptors and other landbirds. Hemlock wooly adelgid threatens the hemlock forests on the ridge. Although much of the land on the top of the ridges is protected, ways to prevent habitat fragmentation on the remaining areas should be explored. Significant habitat areas along the periphery of the publicly owned lands in the northern Shawangunks should be identified and considered for inclusion into adjacent protected areas. Additional inventory work is needed.

Location Description:

This area is similar to the USFWS Shawangunk-Kittatinny Ridge Significant Habitat Complex. The Shawangunk Ridge significant area includes the entire section of the ridge from its northernmost extent at the junction of Rondout Creek and the Wallkill River in the town of Rosendale, Ulster County, New York. The area includes only the portion of the ridge within New York; the ridge continues south via the Kittatiny ridge through New Jersey across the Delaware River at the southern end of the Delaware Water Gap into Pennsylvania and along the Appalachian Mountains, but that part of the ridge is beyond the geographic scope of this study. The boundaries of the significant area on either side of the ridge are generally based on the break in slope between the ridge and the adjacent valleys.

Staten Island Greenbelt

Site Description:

The Staten Island Greenbelt contains 4 of the 5 occurrences of the globally rare serpentine barrens community on Staten Island and is an important area for rare plant species. Additionally, the area contains a large forest block.

Site Location:

Located on Staten Island in the far southeastern corner of New York State. Although not considered part of the Hudson River Estuary Watershed, this site is included in this report due to its presence in the conservation area, which is defined as the counties bordering the Hudson River Estuary.

Towns:	Staten Island		
Counties:	Richmond		
Approximate Size:	3.53 mi^2		
Land Stewardship:	Name or Classification	Manager	Area
	Kaufman Camp Unique Area	NYSDEC	0.02 mi^2
	St. Francis Unique Area	NYSDEC	0.004 mi^2
	Greenbelt	City of New York Parks and Recreation	2.95 mi^2

Ecological Significance:

Although the majority of Staten Island is densely populated, there are numerous locations that contain rare species and rare communities, including the Staten Island Greenbelt. Staten Island is the southernmost land in New York State and contains many species and communities that are found nowhere else in the state, but are more common in the mid-Atlantic states to the south. The geology and coastal position of Staten Island add to its unique properties. Staten Island contains the only occurrence of serpentine bedrock in New York State, and the island occurs at the southern terminus of the most recent glaciation. This significant area includes four of Staten Island's five occurrences of the globally rare serpentine barrens community. This area also possesses the largest, more or less contiguous forested area on the Island. Found here is a large and diverse example of the southern variant of oak-tulip tree forest. This area has historic records for the globally rare adder's-mouth, as well as 13 other occurrences of 9 rare plant species.

Serpentine barrens. Photo courtesy of Kathryn Schneider.

Conservation issues and recommendations:

The growth of woody vegetation and the resulting succession of serpentine barrens to closed canopy communities, threatens their viability and the rare plants that utilize this habitat. Management plans for this area should include fire management or other means (cutting, brush hog, etc.) to keep woody vegetation from developing and to maintain the native grasses and forbs. Development of unprotected open space threatens the occurrences at this site, as do clearing or tree cutting operations, alterations in the hydrology of wetland areas, and invasive exotic species.

Additionally, management plans should allow the remaining native forest areas to mature without cutting and should include monitoring and removal activities of exotic species in high priority sites. Open space on Staten Island receives intense development pressure. While some forested tracts have recently been acquired by the state, additional forested lands, as well as wetlands, need further protection based on NY Heritage Program inventories and information from local biologists. Additional inventory work is needed.

Location Description:

The Staten Island Greenbelt significant area is similar to the New York City Parks and Recreation boundary. The area encompasses a relatively contiguous forest in a suburban/urban environment.

Taconic Ridge

Site Description:

The Taconic Ridge encompasses large areas of contiguous, high quality, northern hardwood forest underlain by complex metamorphic bedrock. It serves as a principle watershed and recharge area for numerous rich fens and associated rare plant and animal species. The Taconic Ridge extends nearly 60 miles along the eastern edge of New York State and is about 12 miles wide at its widest point. Within New York, it covers approximately 78,700 acres. Running along the divide between the Hudson and Connecticut River Watersheds, 53,600 acres of this area fall within the Hudson River Watershed.

Hemlock-northern hardwood forest and Appalachian oak-hickory forest are the most common matrix forest types. Patch communities include pitch pine-oak-heath rocky summit, acidic talus slope wetland, and rocky summit grassland.

The Taconics contain high topographic variability that enhances diversity of community types and associated species. About 450 million years ago (the Ordovician Period), colliding continents caused the formation of a mountain chain the size of the Himalayas in eastern New York and western New England. These mountains have eroded to what is now the Taconic Range. The bedrock geology consists of various types of metamorphic rocks; mainly deformed sedimentary rocks that were pushed up from the ocean floor from the advancing continent. These bedrock formations have less buffering capabilities against acid rain and other pollutants than the limestone-rich areas of the Hudson River Estuary corridor. Communities in the Taconics are likely to be more sensitive to chemical changes in atmospheric deposition. In the upper elevations of the Taconics, the surficial geology is mapped as bedrock, the lower elevations are generally considered to be glacial till. Although till is very rocky, the range of particle sizes (clay and silt all the way to boulders) and the recent exposure/creation of these particles increases the quality of the soil for the plant communities.

Site Location:

The Taconic Ridge is east/southeast of Albany and runs along the border between New York and Massachusetts.

Towns:	Ancram, Austerlitz, Berlin, Canaan, Copake, Hillsdale, New Lebanon, Northeast, Petersburg, Stephentown
Counties:	Columbia, Dutchess, Rensselaer
Approximate Size:	115.37 mi^2

Land Stewardship:	Name or Classification	Manager	Area
	Taconic State Park	NYSOPRHP	8.92 mi^2
	Taconic Ridge State Forest	NYSDEC	2.49 mi^2
	Berlin State Forest	NYSDEC	4.6 mi^2
	Beebe Hill State Forest	NYSDEC	6.1 mi^2
	Public Easement	NYSDEC	3.82 mi^2
	Municipal/County Parks		0.04 mi^2
	Private Conservation Land		0.91 mi^2

Ecological Significance:

The Taconic Ridge is notable for its large, contiguous northern hardwood forests. It is one of the best occurrences of northern hardwood forest communities in the region. It serves a diverse population of resident and migratory bird species as wintering and breeding habitat and as a migratory corridor. The area also supports regionally rare plant and animal species. Examples include bog turtle and timber rattlesnake, and the globally and state rare Ogden's pondweed and Hill's pondweed.

During recent biological surveys, a spruce-northern hardwood forest community, which is uncommon in these mountains, was documented on the summit of Berlin Mountain, and a relatively large beech-maple mesic forest was documented at The Knob in New Lebanon and Canaan (Howard et al. 2002).

Taconic Ridge migratory corridor. Photo by Andy Finton.

Conservation Issues and Recommendations:

Habitat fragmentation, especially on ridge tops, has been increasing in recent years. Protective measures for these ridge tops need to be explored. This area also needs additional inventory work.

Location Description:

The Taconic Ridge significant area is similar to the Taconic Mountains ecozone (Will et. al. 1982).

Van Cortlandt Park

Site Description:

Van Cortlandt Park is one of the largest parks within metropolitan New York City and supports relatively large areas of intact natural vegetation in an urban setting.

Site Location:

Metropolitan New York City.

Towns:	Borough of Bronx (New York City)
Counties:	Bronx
Approximate Size:	1.82 mi^2
Land Stewardship:	City of New York Parks and Recreation

Ecological Significance:

This site is one of the largest parks within metropolitan New York City having large areas of intact natural vegetation. The area has a mature to old-growth oak-tulip tree forest and 10-15 rare plant occurrences.

Conservation issues and recommendations:

Mowing activities and woody plant growth threaten rare plant occurrences. Mowing outside of flowering and fruiting season and preventing tree growth from shading plants will maintain rare plant occurrences. Invasive exotic species including garlic mustard, tree-of-heaven, purple loosestrife, and common reed threaten communities and rare species and should be reduced and/or removed where feasible. Additional inventory work is needed.

Location Description:

The Van Cortlandt Park significant area corresponds to the New York City Parks and Recreation boundary.

Ward Pound Ridge Reservation

Site Description:

Ward Pound Ridge Reservation supports exemplary populations of a variety of amphibians, reptiles, and insects (in particular butterflies and moths). This area consists of a 3,900-acre region in eastern Westchester County. Just east of the Cross River Reservoir, the Cross River flows through the northern section of the area.

Ward Pound Ridge is part of the geologic region called the Manhattan Prong. The rocks of the Manhattan Prong were tightly folded and metamorphosed during the Taconian mountain forming process about 450 million years ago. An especially weather-resistant bedrock formation, called poundridge gneiss, forms the backbone of this significant area's

hill. Other resistant rock, Fordham gneiss, occurs in the remainder of the area, with less-resistant Inwood marble occurring right along the edge. Because the Ward Pound Ridge mainly consists of upland, hilly terrain, the main surficial bedrock features are glacial till and rock outcrop.

Site Location:

Largest county park in Westchester County, NY; approximately 30 miles north of New York City.

Towns:	Lewisboro, Pound Ridge
Counties:	Westchester
Approximate Size:	6.15 mi^2
Land Stewardship:	Westchester CountyParks

Ecological Significance:

Ward Pound Ridge is a critical area in the region supporting a diverse community of moths, butterflies, and other insects. A notable example is the tiger spiketail dragonfly, which occurs in fewer than ten sites across New York State. Ward Pound Ridge also contains regionally significant community occurrences including chestnut oak forest and a rich variant of red maple-hardwood swamp. Rare plant occurrences include spotted pondweed, featherfoil, and rattlebox.

This area is a known breeding site for the state-protected Kentucky warbler. Watch list species that have been documented include the northern copperhead and four state-listed special concern species: marbled salamander, worm snake, hognose snake, and the eastern box turtle. Natural communities are relatively disturbed in the area, mainly from deer overbrowse. However, some of the wetlands are of good quality and one upland community, an acidic talus slope woodland, was recently discovered and transcribed as a significant community (Howard et al. 2002).

Conservation Issues and Recommendations:

A burgeoning deer population is a major threat to rare plant species and communities and wildlife species associated with these communities. Invasive plant species in this area are also a significant threat to native, rare plant species and subsequent insect populations. A management program is needed to effectively control the deer population and control invasive plant species. Additional inventory work is needed.

Location Description:

The Ward Pound Ridge Reservation significant area corresponds to the Westchester County Parks boundary for the Ward Pound Ridge Reservation.