Summary Table: Characteristics of the Ecoregions of New York

58. NORTHEASTERN HIGHLANDS

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
58a. Taconic Mountains	151	Low mountains and high hills, gently rounded to steep slopes; narrow valleys. Moderate to high gradient bedrock, boulder, and cobble-bottomed streams. Wild rainbow trout inhabit many streams. Few to no lakes. Some springs and caves.	1000–2100 / 600–800	Pleistocene loamy till, discontinuous loamy till, some sandy loamy till, valley bottom deposits of alluvium. Ordovician graphitic phyllite, schist, slate, quartzite, and some minor limestone; Cambrian metagraywacke and gneiss-cobble conglomerate.	Inceptisols (Dystrudepts)	Nassau, Bernardston, Taconic, Macomber	Mesic, some Frigid / Udic	34–56	90–135	10/28; 54/79	Northern hardwoods at middle and upper elevations; more mesic sites have sugar maple, beech, yellow birch, and basswood, with some eastern white pine and hemlock. Some southern-influenced forests with oaks and hickories on lower, drier slopes (more prevalent farther south), including red oak, white oak, and chestnut oak, along with shagbark, bitternut, and pignut hickory. Some montane spruce-fir at highest elevations in the north. Southern summits support pitch pine-scrub oak rather than spruce-fir.	Deciduous forest, mixed deciduous and evergreen forest, some minor pasture and cropland in narrow valleys. Forestry, recreation, hunting.
58b. Western New England Marble Valleys	158	Steep-sided valleys with floodplains, terraces, and rolling to hilly terrain. Low to moderate gradient streams with bedrock, boulder, cobble, and sandy substrates. Numerous springs, seeps, and wetlands. A few lakes and reservoirs.	500–1000 / Mostly 200–500, some hills to 900	Pleistocene ground moraine, sandy loamy till; ice-contact gravel, sand, and silt; lake silt and clay; Holocene alluvium. Ordovician and Cambrian dolomite marble, calcite marble, dolostone, limestone, quartzite, phyllite, and schist.	Inceptisols (Eutrudepts, Dystrudepts)	Stockbridge, Farmington, Nassau, Hollis, Chatfield, Copake	Mesic / Udic	36–48	135–170	11/33; 58/84	Species-rich transition hardwoods forests with sugar maple, white ash, basswood, bitternut hickory, hophornbeam, and alternate-leaved dogwood. Calcareous rock outcrops with eastern red cedar, purple clematis, and roundleaf shadbush. On well-drained calcareous slopes, sugar maple, chinkapin oak, white ash, shagbark hickory, and hackberry. In lowlands, calcareous red maple-tamarack swamps with red maple, tamarack, black ash, northern white cedar, willows, and hemlock. On floodplains, silver maple, cottonwood, American elm, and sycamore.	Pasture and cropland, mixed and deciduous forest, urban, suburban, and rural residential development, rock quarries.
58e. Berkshire Transition	46	Hills, low mountains, and narrow valleys. Some steep slopes. Moderate gradient bedrock, boulder, and cobble-bottomed streams. Some natural lakes and ponds, and a few larger reservoirs.	400–1700 / 600–1000	Pleistocene sandy loamy till, some ice-contact sand and gravel. Devonian schist, micaceous quartzite, quartz schist, calcareous granofels, quartzose marble, granite, and gneiss; Ordovician to Cambrian schist, gneiss, amphibolite, and marble; Precambrian gneiss and schist.	Inceptisols (Dystrudepts, Eutrudepts)	Hollis, Charlton, Chatfield, Stockbridge	Mesic / Udic, some Aquic	45–51	150–165	14/34; 59/81	Mix of northern, transition, and central hardwoods-conifer forests. Northern hardwoods-hemlock-white pine forest on dry to mesic mostly north-facing slopes and ravines. Red oak-sugar maple transition forest on mesic mid-slopes with northern red oak, sugar maple, beech, black birch, and some white pine and hemlock. Oak-hemlock-white pine forest with white oak, chestnut oak, northern red oak, and black birch. Some ridgetop pitch pine-scrub oak woodland. On stream slopes and terraces, red maple, silver maple, American elm, basswood, sugar maple, shagbark hickory, and black cherry.	Deciduous forest, some mixed and evergreen forest, hay/pasture, some urban land. Forestry, rural residential, tourism, recreation. Some public state forest and state park lands.
58i. Glaciated Reading Prong/Hudson Highlands	551	Hills and low mountains, steep narrow valleys. High lake density, some with blue-spotted sunfish and, historically, banded sunfish. Drinking water storage reservoirs. Moderate gradient boulder and cobble-bottom, cool water streams support trout.	450–1664 / 300–1000	Pleistocene gravelly and sandy glacial till. Proterozoic hornblende granite and granitic gneiss, biotite-quartz-feldspar gneisses, quartzite, amphibolite; some sandstone and conglomerate.	Inceptisols (Dystrudepts)	Hollis, Chatfield, Charlton, Paxton	Mesic / Udic, some Aquic	41–55	130–180	19/35; 64/86	Transition hardwood forest of sugar maple, American beech, black birch, tulip tree, oaks (red, white, and chestnut oak) and hickories (shagbark and pignut hickory). Hemlock and northern hardwoods on north slopes and red maple, green ash, swamp white oak, and tupelo in wooded swamps. Mountain laurel, flowering dogwood, black huckleberry, and blueberry grow in the understory. Shadbush, chokecherry, black cherry, and scrub oak grow in exposed rocky bald areas.	Deciduous forest, some evergreen forest on north slopes. Wildlife habitat, tourism, and recreation. Some rural residential development. Public land in state parks, the largest being Harriman State Park, and privately-owned conservation land.
58j. Upper Montane/ Alpine Zone	205	Glaciated rocky peaks and ridges. High mountains with steep slopes. High gradient headwater streams with boulder, cobble, and bedrock substrates.	2800–5344 / 1500–2500	Pleistocene surficial deposits mostly absent; some thin and discontinuous deposits of sandy loamy till separated by extensive bedrock outcrops. In the Adirondack high peaks, Proterozoic metanorthosite and anorthositic gneiss. Occasional inclusions of metasedimentary rocks.	Spodosols (Humicryods, Haplocryods, Haplohumods, Haplorthods, Endoaquods), Histosols (Cryofolists)	Ricker, Rawsonville, Surplus, Sisk, Saddleback, Skylight, Ampersand, Wallface, Esther	Cryic, some Frigid / Udic, some Aquic	52–86	40–80	−3/24; 44/60	Between 2800 and 3500 feet, dominant forest species include red spruce, balsam fir, and yellow birches, with mountain ash, mountain holly, and creeping snowberry. Above 3500 feet to timberline, subalpine forests of balsam fir and mountain paper birch. Near timberline above about 4500 feet, alpine krummholz and heath communities with stunted balsam fir, black spruce, and birch, Labrador tea, sheep laurel, and black crowberry. Alpine meadow areas above 4500 feet with low mat-forming shrubs, sedges, rushes, grasses, mosses, and lichens, including diapensia, Bigelow's sedge, highland rush, Lapland rosebay, and alpine bilberry.	Evergreen forest, some mixed deciduous and evergreen forest, shrubland and grassland, bare rock. Recreation, wildlife habitat, some forestry. Public land in Adirondack Park.
58x. Taconic Foothills	1240	Rolling hills with convex tops and steep side-slopes. Narrow valleys. Moderate gradient bedrock, boulder, and cobble-bottomed trout streams. Some natural lakes and ponds.	500–1400 / 50–500	Pleistocene coarse loamy till, discontinuous in areas. Glacial outwash channels, sand and gravel deposits between hills. Ordovician slate and graywacke; Cambrian quartzite, slate, phyllite, schist, and graywacke.	Inceptisols (Dystrudepts)	Nassau, Bernardston, Hoosic, Pittstown	Mesic / Udic, some Aquic	30–50	120–180	13/33; 57/80	Chestnut oak, red oak, and formerly American chestnut on steep slopes. Hemlock on northern slopes. On lower slopes and more infertile soils, Appalachian oak-hickory forest with white oak, black oak, pignut hickory, and historically, American chestnut. Abandoned farm fields colonized by red maple, eastern white pine, and sugar maple. North of Columbia County, northern hardwood forest begins to replace Appalachian oak-hickory forest.	Deciduous forest, some mixed deciduous and evergreen forest, pastureland, minor cropland for small grains and dairy forage crops. Small towns and rural residential areas.
58y. Catskill High Peaks	817	Stepped ridges and high peaks surrounded by radiating ranges and ridgelines. Few to no lakes. Cold to cool water high gradient streams with bedrock, boulder, cobble, and gravel substrates. Waterfalls common.	1000–4180 / 1100–2000	Pleistocene glacial till shallow, discontinuous, or absent. Exposed bedrock common. Upper Devonian shale, sandstone, and conglomerate.	Inceptisols (Dystrudepts, Fragiudepts)	Vly, Oquaga, Lackawanna, Lewbeach, Mongaup, Halcott, Arnot, Elka, Willowemoc	Frigid, Mesic on lower slopes / Udic, some Aquic	47–60	90–125	9/27; 51/72	Above 3000 feet, red spruce, balsam fir, and yellow birch. Witch hobble common in the understory. Shrub cover on rocky summits includes huckleberry, lowbush blueberry, and mountain laurel with pitch pine and scrub oak. On north slopes and in cool moist areas, northern hardwoods occur, with bigtooth and quaking aspen, paper birch, and black ash. A mix of northern and central hardwoods occurs below 3000 feet, including American beech, sugar maple, red maple, hemlock, white pine, basswood, American elm, and sycamore.	Deciduous forest, mixed forest, and evergreen forest. Bare rock. Little to no land clearing for agriculture. Rural residential, tourism, recreation, public water supply, wildlife habitat. Public land in Catskill Park and Forest Preserve.
58z. Adirondack High Peaks	453	High glaciated mountains, with steep-sided narrow valleys. High gradient bedrock, boulder, and cobble-bottomed streams. A few mid-elevation lakes. Majority of lake fish species are nonnative. Brook trout naturally reproducing in 12% of ponds, stocked in others. Threatened round whitefish and summer sucker in a few ponds.	1500–2800 / 800–1800	Pleistocene glacial till, exposed bedrock, lacustrine sand and gravel, fluvial sand and gravel. Proterozoic metanorthosite and anorthositic gneiss; inclusions of charnocktite, mangerite, and syenitic gneiss.	Spodosols (Haplorthods, Haplohumods)	Mundal, Mundalite, Rawsonville, Hogback, Ampersand, Knob Lock	Cryic, some Frigid / Udic, some Aquic	40–60	60–120	3/24; 53/76	Between 1500 and 2500 feet, northern hardwood forest composed of sugar maple, beech, and yellow birch, mixed with red spruce, hemlock, and white pine. Between 2500 and 2800 feet, red spruce, balsam fir, and yellow birches increase in transition to high elevation spruce-fir forest. Understory plants include mountain ash, mountain holly, and creeping snowberry.	Deciduous forest, mixed forest, and evergreen forest. Bare rock. Little to no land clearing for agriculture. Tourism, recreation, wildlife habitat. Public land in Adirondack Park.
58aa. Acid Sensitive Adirondacks	3275	Low to moderate-relief mountains and knobby hills interlaced by numerous rivers and streams. High density of lakes and wetlands. Lakes and streams with low pH and low acid neutralizing capacity are common. About 38% of smaller ponds are fishless. Brook trout are more tolerant of acidic stress than sensitive minnows.	1300–3900 / 100–1900	Pleistocene glacial till, exposed bedrock, kame deposits, lacustrine sand and gravel, fluvial sand and gravel. Proterozoic metasedimentary rocks, biotite, amphibolite; charnockitic, granitic, mangeritic, and quartz syenitic gneisses.	Spodosols (Haplorthods, Haplohumods)	Becket, Tunbridge, Skerry, Mundalite, Rawsonville, Hogback	Frigid / Udic, Aquic	45–60	60–120	2/25; 53/75	Red, white, and black spruce and balsam fir grow in saturated or shallow soils. Red maple, yellow birch, black cherry, and an understory of sheep laurel and blueberries may be associated with the conifers. Black spruce and tamarack occur in bogs and swamps with shrubs such as sheep laurel and labrador tea. Deeper soils support northern hardwoods such as sugar maple, beech, and yellow birch.	Deciduous forest, mixed forest, and evergreen forest. Little to no land clearing for agriculture. Logging, wildife habitat, tourism, recreation. Public land in Adirondack Park.
58ab. Northern and Western Adirondack Foothills	2390	Ridges, foothills, and mountains of low to moderate relief. Deranged stream drainage and a network of intersecting glacial outwash channels. High water table with many wetlands and scattered larger lakes. Lake trout found in a few medium-sized lakes. Moderate gradient, tannic, sandy and cobble-bottomed streams, with some impounded reaches.	750–2000, isolated mountains to 2800 and 3300 / 75–600	Pleistocene glacial till, kame deposits, fluvial outwash sand and gravel, lacustrine sand and gravel. Proterozoic amphibolite, charnockitic, mangeritic, and quartz syenitic gneisses; biotite and hornblende granitic gneiss; calcitic and dolomitic marble in the northwest portion.	Spodosols (Haplorthods)	Potsdam, Tunbridge, Becket, Monadnock, Skerry, Adams, Colton	Frigid, some Mesic / Udic, some Aquic	35–55	90–145	2/25; 54/77	Second growth northern hardwoods such as sugar maple, beech, black cherry, and yellow birch. Significant amounts of white pine in western foothills and in northern outwash areas. Aspen and birch prominent in the northern foothills. Red, white, and black spruce and balsam fir grow in saturated or shallow soils. Black spruce and tamarack occur in bogs and swamps with understory shrubs such as sheep laurel and labrador tea. Historically, spruce dominated in this region, but it has not returned after logging.	Deciduous forest, evergreen forest, and some mixed deciduous and evergreen forest. Logging, wildlife habitat, tourism, recreation, some minor cleared land for forage crops. Public land in Adirondack Park.
58ac. Eastern Adirondack Foothills	1768	Ridges, foothills, and rounded low mountains with steep-sided narrow valleys in the south and the broader Ausable and Saranac valleys in the north. Moderate lake density. Some big lakes, like Lake George, stocked with non-native landlocked salmon. Many streams have naturally reproducing brown and rainbow trout.	350–2650 / 200–2300	Pleistocene glacial till, exposed bedrock, kame deposits, lacustrine sand and gravel, and fluvial outwash sand and gravel. Proterozoic hornblende and pyroxene granitic gneiss, anorthosite, Cambrian sandstone in the north; Proterozoic calcitic and dolomitic marble, charnockitic, granitic, and quartz syenitic gneisses, and metagabbro in the south.	Spodosols (Haplorthods), Inceptisols (Dystrudepts)	Bice, Tunbridge, Lyman, Becket, Skerry, Pyrities, Kalurah, Charlton, Hollis	Frigid, Mesic on lower slopes / Udic, some Aquic	30–45	90–145	4/28; 56/80	Northern hardwoods forest with some elements of Appalachian oak forest on slopes above the Hudson Valley and Champlain Lowlands. White pine is a prominent species, along with red maple, white ash, and northern red oak. Other Appalachian species found near 1000 feet include butternut, witch hazel, and eastern redcedar.	Deciduous forest, mixed forest, and evergreen forest. Some farmland in river valleys in the north cultivated for forage crops and pasture. Tourism, recreation, wildlife habitat. Public land in Adirondack Park.
58ad. Central Adirondacks	1437	Low to moderate-relief mountains and hills. Moderate gradient cobble-bottomed streams. Lakes and streams have moderate to high acid neutralizing capacity. Concentration of large lakes in the north.	1450–3360 / 45–1050	Pleistocene glacial till, exposed bedrock, kame deposits, lacustrine sand and gravel, and fluvial outwash sand and gravel. Proterozoic anorthosite, calcitic and dolomitic marble, charnockitic, granitic, mangeritic, and quartz syenitic gneisses.	Spodosols (Haplorthods, Haplohumods)	Hermon, Becket, Monadnock, Tunbridge, Skerry, Mundalite, Rawsonville	Frigid / Udic, Aquic	34–60	90–150	3/24; 52/75	Northern hardwoods such as sugar maple, beech, and yellow birch, mixed with red spruce, hemlock, and white pine. Red and black spruce and balsam fir grow on shallow or saturated soils. Red and white pine are abundant on lake shores. White pine and spruce, once abundant in the headwaters of the Hudson River, have been replaced by successional hardwoods after logging.	Deciduous forest, mixed forest, and evergreen forest. Little to no cleared land for agriculture. Wildlife habitat, tourism, recreation, and logging. Public land in Adirondack Park.
58ae. Tug Hill Plateau	486	Gently sloping, relatively flat-topped plateau. High density of streams and bogs. Radial stream drainage pattern; cool to coldwater streams with moderate to high acid neutralizing capacity. Numerous beaver ponds and reservoirs. Diverse fish assemblages, including pearl dace and blacknose shiner.	980–2000 / 50–300	Dense Pleistocene glacial till, kame deposits, fluvial outwash sand and gravel, lacustrine sand, and peat deposits. Upper Ordovician sandstone; inclusions of siltstone and shale.	Spodosols (Fragiorthods, Fragiaquods)	Worth, Empeyville, Westbury	Frigid, Mesic on lower slopes / Udic, Aquic	40–55	90–130	7/25; 56/76	Historically, red spruce was mixed with a hemlock-northern hardwoods forest of sugar maple, beech, birch, and hemlock. Today, after extensive logging, sugar maple dominates in a beech-maple mesic forest, along with other successional hardwoods, such as black cherry, white ash, and red maple. In state reforestation areas, forest plantations contain native white and red pine, with non-native Austrian pine, jack pine, Scotch pine, Norway spruce, white spruce, and European larch. Local conditions determine the occurrence of various types of swamps and bogs: spruce-fir, hemlock-hardwood, and red maple-hardwood swamps, black spruce-tamarack bogs, alder shrub swamps, and sedge meadows along streams.	Deciduous forest, evergreen forest. Little agricultural clearing or cultivation. Wildlife habitat, recreation, wind-farming, and logging. Public land in state forests and wildlife management areas.
58af. Tug Hill Transition	657	East to west sloping plateau, or cuesta, with eastern escarpment. Moderate to high gradient cool water, boulder, cobble, and gravel-bottomed streams. Few natural lakes. Waterfalls and gorges (or "gulfs") occur in shale perimeter. Streams historically contained redside dace and blacknose shiner.	485–1904 / 50–750	Deep Pleistocene glacial till, kame deposits, lacustrine sand, fluvial outwash sand and gravel. Middle and Upper Ordovician siltstone, shale, and sandstone.	Spodosols (Fragiorthods), Inceptisols (Fragiaquepts, Fragiudepts)	Worth, Empeyville, Camroden, Pinckney	Frigid, Mesic on lower slopes / Udic, Aquic	35–48	100–140	8/28; 55/80	Historically, northern hardwoods forest of sugar maple, beech, birch, and hemlock. Today, woodlots and abandoned farms contain successional hardwoods, such as sugar maple, black cherry, white ash, and red maple.	Deciduous forest, evergreen forest, agricultural and rural residential land. Dairy farming and cultivation for associated forage crops.
58ag. Rensselaer Plateau	162	Elevated plateau with a rolling surface clearly defined by perimeter escarpment and deep valleys to the east. High density of wetlands and ponds. Moderate to high gradient cool water streams with boulder/ cobble substrate and numerous waterfalls at plateau escarpments.	1000–1800 / 20–50, 400 at escarpment	Pleistocene rocky glacial till; stagnant ice moraines; sand, clay, and silt. Cambrian quartzite greywacke with minor shale and conglomerate.	Inceptisols (Eutrudepts, Dystrudepts, Endoaquepts)	Buckland, Glover, Brayton	Frigid / Udic, Aquic	36–46	90–135	13/29; 58/78	Northern hardwoods forest mixed with red spruce and balsam fir. Spruce flats of red, white, and black spruce, and groves of balsam fir. Numerous hemlock-hardwood, red maple-hardwood, and spruce-fir swamps, black spruce-tamarack bogs, wet sedge meadows, and sphagnum bogs occur. Dry escarpments and south-facing slopes support Appalachian oak-hickory and chestnut oak forests.	Mostly forest, deciduous forest, some evergreen forest, barren rock outcrops. Minor clearing for hay or pasture; short growing season and stony soil limits farming. Rural residential development, tourism, recreation, and some mining for quartz sandstone (greywacke).

59. NORTHEASTERN COASTAL ZONE

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
59c. Southern New England Coastal Plains and Hills	530	Irregular plains with some low hills. Numerous glacial drumlins. Ponds, small lakes, reservoirs, and wetlands are abundant. Extensive reservoir system for New York City and local uses. Low to moderate gradient streams with silt, sand, gravel, cobble, and bedrock substrates. A number of streams support wild brown trout.	40–800 / 100–300	Pleistocene sandy till; ice-contact gravel, sand, and silt; sandy loamy till. Southeastern NY: Proterozoic gneiss; Cambrian biotite-quartz-plagioclase gneiss and dolomitic marble; Ordovician schist and amphibolite.	Inceptisols (Dystrudepts, Endoaquepts)	Woodbridge, Paxton, Ridgebury, Hollis, Chatfield, Charlton	Mesic / Udic, some Aquic	46–52	150–180	15/35; 61/82	Appalachian oak-pine forests with various combinations of red, white, scarlet, black, or chestnut oaks, white pine, red maple, hickories, and other central or transition hardwoods. On shallow dry rocky soils on upper slopes, chestnut oak, northern red oak, black oak, and some pitch pine. Oak-hickory forests with northern red oak, white oak, pignut hickory, shagbark hickory, or mockernut hickory. On midslopes, oak-hemlock-white pine forests that also include some black birch, black cherry, and red maple. A few areas of moist forests with sugar maple, northern red oak, American beech, and white ash. Swamps with red maple, green ash, hemlock or Atlantic white cedar. On small river floodplains, pin oak-green ash forest with some swamp white oak, American sycamore, red maple, and American elm.	Deciduous forest, woody wetlands; urban, suburban, and rural residential land. Hay, pasture, and some minor amounts of cropland. Some public state forest and state park lands.
59g. Long Island Sound Coastal Lowland	517	Flat to irregular plains, coastal beaches, bays, and tidal flats. Low gradient streams with silt, sand, and gravel substrates.	0–250 / 20–50	Pleistocene sandy till; sandy loamy till; moraine gravel, sand, and silt; outwash gravel, sand, and silt; saline or estuarine marsh deposits. Cambrian biotite-hornblende-quartz-plagioclase gneiss, amphibolite, schist; coastal plain clay, sand, and gravel.	Entisols (Quartzipsamments), Inceptisols (Dystrudepts)	Plymouth, Montauk, Haven, Chatfield, Riverhead, Charlton	Mesic / Udic, some Aquic	44–48	170–220	20/38; 63/82	On uplands, coastal oak-hickory or oak-tulip tree forests with various combinations of red, white, scarlet, black, or chestnut oaks, white pine, red maple, hickories, and other central hardwoods. Black oak increased after disappearance of American chestnut. Coastal forests may have dense shrub layer and vines. Some moist forests with northern red oak, white oak, American beech, tulip tree, and flowering dogwood. In wetter areas, red maple, sweet gum, and pin oak. On coastal bluffs, pitch pine, eastern redcedar, post oak, and hickories with some northern bayberry and seaside goldenrod. On well-drained moraines, shrubs of northern bayberry, beach plum, poison ivy, beach rose, winged sumac. On low dunes, American beach grass, beach pea, seaside goldenrod. On low marshes and creek borders, smooth cordgrass. In high marshes, saltmeadow cordgrass, spikegrass.	Deciduous forest, evergreen shrublands, woody wetlands, emergent herbaceous wetlands, salt marsh, beaches, some pasture and minor amounts of cropland. Urban, dense suburban, and some rural residential land, coastal resorts and tourism, some commercial fishing.
59i. Hudson Valley	2126	Irregular valley, plains broken by hills and terraces; flatter glacial lake plain in the north. Narrow floodplain along the Hudson River. Estuarine species include shortnose sturgeon, American eel, and American shad. Upper Hudson River connected to Lake Champlain basin through the Champlain Canal.	165–700 / 25–350	Pleistocene glacial till, exposed bedrock, lacustrine sand, silt, and clay, fluvial outwash sand and gravel, sand dunes. Devonian limestone, chert, and dolostone. Ordovician shales, greywacke, and siltstones. Cambrian shale and slate.	Inceptisols (Dystrudepts), Entisols (Udipsamments), Alfisols (Hapludalfs)	Charlton, Chatfield, Hollis, Oakville, Nassau, Hudson, Vergennes, Windsor	Mesic / Udic, some Aquic	26–45	120–185	15/34; 60/84	In the south, an extension of Appalachian oak-hickory forest with black and white oak and pignut, mockernut, and shagbark hickories. To the north, northern hardwoods forest predominates. Pitch pine-scrub oak barrens can still be found in sandy areas on the glacial lake plain, particularly at Albany Pine Bush and Wilton Preserves. Freshwater tidal marshes and mudflats occur along the river as far north as Troy, New York.	Pasture and cropland, deciduous forest, mixed deciduous and evergreen forest, major urban, suburban, and rural residential land. Farming for dairy, livestock, grains, hay, soybeans, corn, fruit, and nursery stock.

60. NORTHERN ALLEGHENY PLATEAU

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
60a. Glaciated Low Allegheny Plateau	7934	Dissected plateau with glacially-smoothed rolling hills and narrow to wide valleys. Streams subject to flooding and scouring. Low gradient headwater streams may have diverse aquatic vegetation and support swallowtail and bridle shiners. Few natural lakes; Otsego Lake has lake trout and longnose sucker.	900–2515 / 190–1000	Pleistocene glacial till, some exposed bedrock, some kame deposits, glacial lacustrine sand, fluvial outwash sand and gravel. Devonian shale, siltstone, sandstone, and conglomerate.	Inceptisols (Dystrudepts, Fragiudepts)	Mardin, Bath, Volusia, Lordstown, Solon, Valois, Chenango, Lackawanna, Wellsboro, Willdin, Lewbath, Napoli, Almond, Yorkshire	Mesic, some Frigid / Udic, Aquic	32–48	110–150	14/31; 57/80	Appalachian oak forest on drier slopes and northern hardwoods on north slopes and moist locations. Historically, American chestnut, beech, sugar maple, white and black oak, white pine, and hemlock were common. Today, successional hardwoods dominate with more red maple and black cherry and less hemlock than in the past. Groundwater-fed depressions support hemlock-hardwood swamps with hemlock, red maple, yellow birch, black gum, highbush blueberry, great rhododendron, and cinnamon fern.	Deciduous forest, mixed deciduous and evergreen forest, wooded wetlands, and cleared land for agriculture. Dairy and livestock farming with cultivation of forage crops; rural residential and urban centers.
60b. Delaware-Neversink Highlands	465	Dissected plateau expressed as rolling flat-topped ridges of moderate relief and slope. Streams are adversely affected by acidic runoff. The Delaware River supports American shad, American eel, and a few bridle shiners and bluespotted sunfish.	1000–1700, isolated ridge to 2231 / 130–700	Pleistocene glacial till, minor exposed bedrock, minor kame deposits and fluvial outwash sand and gravel. Devonian shale, sandstone, and conglomerate.	Inceptisols (Fragiudepts, Fragiaquepts, Dystrudepts)	Wellsboro, Wurtsboro, Volusia, Arnot, Oquaga, Lordstown	Mesic / Udic, some Aquic	32–46	110–165	11/31; 56/79	Northern hardwoods forest of sugar maple, beech, and birch on north slopes and in moist areas. Appalachian oak forest on south-facing slopes and at lower elevations. Species include several species of oak (red, chestnut, scarlet, and white), black gum, tulip tree, four species of hickory, flowering dogwood, and redbud. Historically, American chestnut was common. Hemlock grows with northern hardwoods forest on north slopes, in ravines, and in moist sites.	Deciduous forest, mixed deciduous and evergreen forest, pasture and cropland, rural residential. Higher ratio of woodland to farmland than in Ecoregion 60a. Rural residential and urban centers.
60c. Catskills Transition	1404	Dissected plateau in the west with rolling, flat-topped ridges and steep slopes; plateau escarpment in the east; mid-elevation ranges and ridgelines in the north. High to moderate gradient cool water streams with bedrock, boulder, and cobble substrates. Occasional natural lakes and ponds. Streams and impoundments renowned for brown trout fishery.	400–2400, isolated peaks to 3345 / 350–900	Pleistocene glacial till, exposed bedrock, minor kame deposits, fluvial outwash sand and gravel. Devonian shale, sandstone, and conglomerate.	Inceptisols (Fragiudepts, Dystrudepts)	Willowemoc, Lewbath, Lewbeach, Halcott, Mongaup,Vly, Arnot, Lordstown, Wellsboro, Valois, Mardin, Volusia	Frigid, Mesic lower slopes / Udic, some Aquic	35–60	90–120	11/32; 54/80	Central hardwoods or Appalachian oak forest at lower elevations or on south- and west-facing slopes. Species include several species of oak (red, chestnut, scarlet, and white), black gum, tulip tree, four species of hickory, flowering dogwood, and redbud. Historically, American chestnut was common. Dense laurel brakes (groves of mountain laurel) form beneath oak canopies. Hemlock-northern hardwood forest grows on north slopes, in ravines, and in moist sites.	Deciduous forest, some mixed and evergreen forest. Some pasture and hay land. Limited farming for dairy and livestock. Recreation, wildlife habitat, rural residential development.
60d. Finger Lakes Uplands and Gorges	2732	Northern edge of dissected Allegheny Plateau, rolling, glacially-smoothed hills and north-flowing drainageways. Large glacially carved lake beds, hanging valleys, and waterfall-eroded gorges. Streams tributary to the Finger Lakes may have migratory non-native rainbow trout, but historically had native Atlantic salmon. Two of the smaller Finger Lakes have ninespine stickleback.	382–2196 / 200–600	Pleistocene glacial till, some exposed bedrock, kame deposits, glacial lacustrine sand, silt, and clay, fluvial outwash sand and gravel. Devonian shale, siltstone, and limestone.	Inceptisols (Dystrudepts, Fragiudepts), Alfisols (Hapludalfs)	Bath, Mardin, Lansing, Ontario, Honeoye, Lima, Hudson, Collamer, Schoharie, Valois, Erie, Langford, Manlius, Darien	Mesic / Udic, some Aquic	30–45	130–190	14/32; 58/81	Appalachian oak forest on drier slopes, including several oak species, oak/hickory, and, historically, oak/chestnut. Black, white, red, and chestnut oak mix with pitch pine and white pine on open ridges. Beech, sugar maple, hemlock, basswood, and tulip tree grow in soils with higher moisture content. Hemlock, basswood, bitternut hickory, and tulip tree in ravines with hemlock often dominating on ravine slopes. Black ash, silver maple, and elm occur in swamps on river floodplains and in the glacial troughs at the ends of the Finger Lakes.	In the south, a farm and woodlot mosaic, becoming more intensive in farming, residential, and urban development to the north. Deciduous forest, mixed deciduous and evergreen forest, wooded wetlands. Dairy farming, cultivation of forage crops, orchard fruit, wine grapes, truck crops, and nursery stock. Tourism, recreation, and wildlife habitat.
60e. Glaciated Allegheny Hills	641	High elevation section of glaciated Allegheny Plateau; plateau remnants, rolling hills, low mountains, and steep valley slopes. Occasional shallow lakes or ponds. Streams are of moderate gradient; some contain tonguetied minnow.	1400–2548 / 200–900	Pleistocene glacial till, some exposed bedrock, minor kame deposits, fluvial outwash sand and gravel. Devonian shale, siltstone, and sandstone.	Inceptisols (Fragiudepts, Dystrudepts)	Lewbath, Lewbeach, Willowemoc, Vly, Mongaup, Bath, Mardin, Ontusia, Napoli	Frigid, Mesic lower slopes / Udic, some Aquic	35–60	90–120	11/30; 54/78	Northern hardwoods predominate. Beech, sugar maple, hemlock, basswood, and tulip tree grow in soils with higher moisture content. Appalachian oak forest occurs on drier slopes, including red, white, and chestnut oaks, shagbark and pignut hickory, and historically, American chestnut. Understory shrubs include witch hazel, maple-leaf viburnum, shadbush, chokecherry, and flowering dogwood.	Deciduous forest, some mixed deciduous and evergreen forest. Some agriculture for dairy, livestock, and forage crops. Rural residential development, timber production, and oil fields.
60f. Cattaraugus Hills	774	Dissected plateau; broad rolling hills and plateau toeslopes. Incised stream channels. Low gradient streams with silty and gravelly substrates empty into Lake Erie. Rainbow trout migrate upstream from Lake Erie. Eastern sand darter once collected in Cattaraugus Creek.	900–1800, isolated high point 1935 / 200–500	Pleistocene glacial till; large gravel and sand kame deposits, glacial lacustrine silt and clay, fluvial outwash sand and gravel. Devonian shale, siltstone, and sandstone.	Inceptisols (Fragiudepts, Dystrudepts)	Mardin, Volusia, Valois, Chenango, Erie, Manlius	Mesic / Udic, some Aquic	32–48	110–150	12/28; 57/77	Northern hardwoods forest, consisting of sugar maple, beech, white pine, white, red, and chestnut oak, with eastern hemlock. Understory shrubs include mountain laurel and mapleleaf viburnum. On fine-textured soils, cucumber magnolia, red maple, white ash, and black birch may co-dominate. The shale cliff and talus community, consisting of red cedar, mountain maple, white ash, and slippery elm, occurs on the steep slopes of streams incised in the soft shales. Wetlands appear as fens, which are not as acidic as bogs. Fen vegetation includes red maple, speckled alder, green ash, and tamarack.	Deciduous forest, mixed deciduous and evergreen forest, pasture and cropland. Emergent herbaceous wetlands. Dairy and livestock farming with some cultivation for forage crops; rural residential and urban centers; natural gas fields.

61. ERIE DRIFT PLAIN

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
61c. Low Lime Drift Plain	1090	Rolling landscape of ridges, moraines, and hummocky terrain. Meandering streams and floodplain swamps with fine-textured substrates. Occasional kettle ponds. Several biologically diverse streams supporting threatened darters and mussels.	1000–2000 / 250–400	Pleistocene glacial till; stratified drift of sand, silt, and clay; moraines, kettles, kame deposits, lacustrine silt and clay, and fluvial sand and gravel. Upper Devonian shale, siltstone, and sandstone.	Inceptisols (Fragiaquepts, Dystrudepts, Endoaquepts, Eutrudepts), Alfisols (Fragiaqualfs)	Volusia, Chadakoin, Schuyler, Fremont, Chautauqua, Busti, Venango, Erie, Chenango	Mesic / Udic, Aquic	32–48	120–160	14/31; 58/80	Beech-maple forest in moist locations. Northern hardwoods with some hemlock on better drained sites. Understory in upland forest dominated by witch hazel, mapleleaf viburnum, and ferns. Riparian forests of sugar and red maples, hawthorn, and sycamore. Red maple, silver maple, black willow, American elm, and green and white ash occur in wetland areas.	Deciduous forest, pasture and cropland, and rural residential land. Dairy farming and associated production of forage crops, timber and maple syrup production, rural residential centers, wildlife habitat, and recreation.

62. NORTH CENTRAL APPALACHIANS

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
62b. Low Poconos/ Mongaup Hills	433	Dissected plateau with areas of hummocky topography. Moderate to high gradient streams with boulder and cobble substrates. Larger streams deeply incised. Many kettle lakes and wetlands. Stream water cool enough in uplands for wild and hatchery trout.	500–1675 / 50–800	Pleistocene glacial till, kame deposits, and fluvial sand and gravel. Middle and Upper Devonian shale, sandstone, and conglomerate.	Inceptisols (Fragiudepts, Dystrudepts)	Wurtsboro, Wellsboro, Oquaga, Lackawanna, Arnot	Mesic / Udic, some Aquic	32–50	130–165	11/31; 56/79	Northern hardwoods of sugar maple, American beech, and birch; Appalachian oak forest of red, white, black, and chestnut oak and hickory species. Oaks grow on slopes and south-facing aspects. Hemlock grows in moist areas and on north slopes. River birch, sycamore, and green ash occur in riparian areas. Common understory shrubs in the uplands include witch hazel, rosebay rhododendron, mountain laurel, partridgeberry, and hillside blueberry.	Deciduous forest, mixed deciduous and evergreen forest. Tourism, recreation, rural residential, and wildlife habitat.
62d. Unglaciated High Allegheny Plateau	758	Deeply dissected plateau, narrow valleys, and steep valley sideslopes. Entrenched, high gradient streams with gravel and cobble substrates. Few to no natural lakes, but a few impoundments. Streams with a diversity of darters, minnows, and redhorse suckers.	1350–2350 / 500–1000	Unglaciated. Colluvium, alluvium, and exposed bedrock. Pleistocene glacial outwash, fluvial sand and gravel fill major drainage channels. Kame deposits and minor inclusions of glacial till near drainageways. Upper Devonian shale, siltstone, and sandstone. Minor inclusions of Lower Pennsylvanian conglomerate.	Ultisols (Hapludults, Fragiudults)	Rayne, Kinzua, Carrollton, Cookport, Ernest, Buchanan, Portville, Onoville, Shongo, Mandy, Gilpin	Mesic, Frigid / Udic, some Aquic	30–60	90–150	11/30; 54/78	Forest cover historically high in hemlock and beech with American chestnut also represented. Today, oaks, pitch pine, white pine, mountain laurel, and hickory grow on drier slopes; hemlock, beech, sugar maple, and birch grow in areas with more moisture. Red maple and black cherry are more adaptable to frequent disturbance and they now dominate forests in the region.	Deciduous forest and some mixed deciduous and evergreen forest. Public land in national and state forests. Timber production; minor areas of dairy and forage crop agriculture. Small urban centers in the Allegheny River valley.

64. NORTHERN PIEDMONT

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
64b. Trap Rock and Conglomerate Uplands	18	Rocky, steep-sided ridges, hills, and palisades of the Hudson River. Region generally too narrow, uplifted, and rocky for significant water resources.	50–675 / 100–500	Thin to discontinuous Pleistocene glacial till; exposed bedrock. Upper Triassic diabase (intrusive lava or traprock).	Inceptisols (Dystrudepts)	Holyoke, Wethersfield	Mesic / Udic	40–55	135–195	23/38; 65/85	Ridgetops and upper slopes support mixed oak forests of red, white, and black oak with sugar maple, black birch, white ash, and tulip tree. Understory plants include maple-leaved viburnum, poison ivy, catbriar, and wild grape. In ravines and on north-facing slopes, hemlocks and mixed hardwoods occur. On dry slopes, chestnut oak, red oak, red cedar, hickory, and grassland openings with bluestem grasses and Indian grass. Talus slope habitats support hemlock, paper birch, black birch, white pine, and basswood.	Deciduous forest, some mixed forest, barren rock outcrops and cliffs. Wildlife habitat, urban open space, and recreation. Public land in High Tor, Hook Mountain, Rockland, and Tallman Mountain State Parks.
64e. Glaciated Triassic Lowlands	153	Flat to irregular plains, moist depressions, low hills and ridges. Low gradient streams with silt, sand, gravel, and bedrock substrates. Lowland streams once contained unique coastal plain species such as mud sunfish and ironcolor shiner.	50–480 / 25–50	Pleistocene glacial till of gravel, sand, silt, and clay; stratified drift in valleys; outwash and till plains, deltas, kame deposits, and moraines. Upper Triassic sandstones, siltstones, mudstones, arkose, and conglomerates. Lower Ordovician serpentinite.	Inceptisols (Dystrudepts), Histosols (Haplosaprists)	Wethersfield, Watchaug, Carlisle	Mesic / Udic, some Aquic	40–50	170–190	15/35; 60/84	Remaining fragmented woodlands transitional between Appalachian oak forest and hemlock-northern hardwoods forest. Oak forest on drier sites with red, white, and black oaks, hickories, and historically, American chestnut. Moist valleys, ravines, and northern slopes contain sugar maple, beech, birch, and hemlock. On Staten Island, remnant serpentine barrens-grassland-savanna communities. Red maple-sweetgum swamps with swamp cottonwood, swamp white oak, pin oak, and black gum.	Mostly urban land in New York; some agriculture, residual truck farming and nursery crops, scattered woodlots. Public land in Great Kills Park.
64g. Hackensack Meadowlands	10	Low-lying wetland and marsh. Freshwater ponds and brackish lagoons, tidal creeks.	0–10, bedrock outcrops and landfills to 100 / 0–10	Pleistocene proglacial lake bed with sandy and silty substrates. Upper Triassic sandstone, siltstone, and mudstone.	Histosols (Sulfihemists), Inceptisols (Dystrudepts), Entisols (Udorthents)	Pawcatuck, Ipswich, Wethersfield, Greenbelt, Kleinekill	Mesic / Udic, Aquic	42–48	180–220	26/38; 68/85	Historically, Atlantic white cedar swamps, floodplain forests of pin oak, red maple, and swamp white oak. Presently, cattail, phragmites, and saltmarsh cordgrass cover various marshlands. Other vegetation includes seashore saltgrass, blackgrass, sea lavender, saltwort, and seaside goldenrod.	Salt, brackish, and freshwater marsh. Industrial and commercial development, landfills, wildlife habitat, and fishery.

67. RIDGE AND VALLEY

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
67j. Northern Glaciated Limestone Valleys	72	Broad, flat to gently rolling valleys with a smoothed surface. Some karst areas; free interchange between surface stream flow and ground water. Streams have gentle gradients, extensive meanders, oxbows, and fine-textured substrates. Some wetlands; lakes uncommon.	480–620 / 20–120	Pleistocene loamy, calcareous glacial till; lakebed sediments and ground moraine. Cambrian limestone and dolostone; Proterozoic calcitic and dolomitic marble.	Inceptisols (Eutrudepts), Histosols (Haplosaprists)	Pittsfield, Stockbridge, Georgia, Palms, Carlisle	Mesic / Udic, some Aquic	35–50	140–180	18/35; 60/84	Forest vegetation limited to scattered woodlots of sugar maple and central Appalachian hardwoods. Upland forests are typically mixed-hardwood, dominated by sugar maple with white, black, and red oak, white ash, tulip tree, black birch, yellow birch, red maple, basswood, beech, and hickories. Understory trees include hop hornbeam and ironwood, and shrubs include maple-leaved viburnum, black haw, spicebush, and beaked hazel. Calcareous wetland types include swamps, fens, and sinkholes. Red maple, yellow birch, ash, basswood, tulip tree, and black gum grow in forested wetlands.	Deciduous forest, some mixed deciduous and evergreen forest, wooded, shrubby, and herbaceous wetlands. Pasture and cropland, urban, suburban, and rural residential development.
67k. Northern Glaciated Shale and Slate Valleys	558	Broad, irregular, rolling to hilly valley. Meandering, low-gradient streams with steep banks and bedrock, boulder, gravel, sand, and clay substrates. Warmwater fishery in the Wallkill River of smallmouth bass, pickerel, and yellow perch.	300–778 / 50–300	Pleistocene glacial till, kames, lacustrine sand, silt, and clay, fluvial sand and gravel. Ordovician shale, argillite, siltstone, and greywacke.	Inceptisols (Dystrudepts, Fragiudepts, Endoaquepts), Alfisols (Endoaqualfs)	Nassau, Mardin, Canandaigua, Niagara, Hoosic	Mesic / Udic, some Aquic	30–50	130–190	17/35; 64/85	Mixed oak-sugar maple-northern hardwoods forest. Chestnut, black, and red oak, hickories, and tulip tree grow in shallow soil. Upland forests are typically mixed-hardwood, dominated by sugar maple with white, black, and red oak, white ash, tulip tree, black birch, yellow birch, red maple, basswood, beech, and hickories; understory trees include hop hornbeam and ironwood, and shrubs include maple-leaved viburnum, black haw, spicebush, and beaked hazel. Red maple, yellow birch, ash, basswood, tulip tree, and black gum grow in forested wetlands.	Deciduous forest, some mixed deciduous and evergreen forest, pasture and cropland, urban, suburban, and rural residential land. Farming for dairy and truck crops. Some wildlife habitat.
67l. Northern Glaciated Limestone Valleys and Terraces	93	Limestone valley with fluvial terraces, interspersed ridges, and some karst terrain. Low gradient streams with gravel and cobble substrates.	260–500 / 10–60	Pleistocene glacial till, lacustrine silt and clay, fluvial sand and gravel. Devonian limestone, siltstone, and shale.	Inceptisols (Dystrudepts, Eutrudepts, Fragiudepts)	Arnot, Lordstown, Chenango, Bath, Mardin, Nassau, Stockbridge, Farmington	Mesic / Udic, some Aquic	30–45	130–180	17/35; 63/84	Forest vegetation in woodlots of sugar maple and central Appalachian hardwoods. Upland forests are typically mixed-hardwood, dominated by sugar maple with white, black, and red oak, white ash, tulip tree, black birch, yellow birch, red maple, basswood, beech, and hickories; understory trees include hop hornbeam and ironwood, and shrubs include maple-leaved viburnum, black haw, spicebush, and beaked hazel.	Deciduous forest, pasture, and cropland, urban, suburban, and rural residential land. Farming for dairy and truck crops. Some wildlife habitat.
67m. Northern Glaciated Ridges	131	Folded and faulted parallel ridges, exposed cliffs. High gradient streams have acidification risk.	500–2289 / 80–1700	Thin to discontinuous Pleistocene glacial till. Upper Silurian sandstone, shale, conglomerate, and quartzite.	Inceptisols (Dystrudepts, Fragiudepts)	Oquaga, Lordstown, Arnot, Wurtsboro, Nassau, Wellsboro, Morris	Mesic / Udic, some Aquic	35–50	130–185	17/32; 63/81	Pitch pine, chestnut oak, and scarlet oak on shallow, droughty soils. Mostly pitch pine on exposed ridges, may be dwarfed. Pitch pine-scrub oak forest in more protected areas with red maple, chestnut, scarlet, and white oak. Hemlock, tulip tree, and white oak in moist depressions; hemlock and northern hardwoods in shaded ravines. On rocky ridges and talus slopes, dense blueberry shrubland. Mountain laurel understory common in woodland.	Deciduous forest, mixed forest, exposed bedrock, and cliffs. Recreation, tourism, and wildlife habitat. Public land at Minnewaska State Park, private conservation land.

83. EASTERN GREAT LAKES LOWLANDS

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
83a. Erie/Ontario Lake Plain	1449	Flat lake plain interspersed with moraines or drumlins, bounded inland by Pleistocene beach ridges. Many small streams originating on beach ridges drain the narrow plain. Migratory species from Great Lakes into inland streams: sauger, black and silver redhorse, Atlantic salmon and steelhead (rainbow trout).	246–900 / 20–200	Pleistocene glacial till in scattered moraines and drumlins; lacustrine sand, silt, and clay; gravelly beach ridges. Devonian shale, siltstone, sandstone, and limestone. Upper Ordovician shale and siltstone.	Alfisols (Hapludalfs), Inceptisols (Eutrudepts), Entisols (Udorthents)	Collamer, Niagara, Hudson, Canandaigua, Rhinebeck, Howard, Phelps, Cosad, Alton	Mesic / Udic, Aquic	26–45	130–185	19/32; 62/82	Historically, before agricultural clearing, natural vegetation was largely beech-maple forest, with some chestnut and oak on gravelly soils. Today, these forest types are confined to woodlots. Elm, ash, and tulip tree may be present in the beech-maple forest, as is a diverse herbaceous layer, with spring-blooming ephemeral wildflowers. Silver and red maples, elm, and green, white, and black ash occur in wetland depressions. Beaches and dunes support sea rocket, beach grass, and bluestem grasses. Stabilized dunes may support red maple, yellow birch, eastern cottonwood, and sand dune willow.	Cropland and urban centers. Deciduous forest, wooded wetlands, grasslands, and beaches. Dairy farming and cultivation of specialty crops, including grapes, orchard crops, small fruits, and vegetables.
83b. Champlain Lowlands	879	Glaciated area of relatively low relief containing flat to gently rolling plains with some prominent hills. Low gradient streams and rivers with mostly sandy and silty substrates. Fish species include Atlantic salmon, muskellunge, and eastern sand darters.	95-720, isolated mountains to 1644 / 5-700	Pleistocene lake silt and clay, Pleistocene marine silt and clay, marine delta sand and gravel, quaternary glacial till. Ordovician limestone, dolomite, shale, slate, phyllite, and marble; Cambrian quartzite, limestone, dolostone, and sandstone.	Inceptisols (Dystrudepts), Alfisols (Hapludalfs, Endoaqualfs), Spodosols (Haplorthods)	Vergennes, Kingsbury, Hollis, Charlton, Tunbridge, Monadnock, Becket	Mesic, some Frigid north / Udic, Aquic	30–34	145–165	8/30; 60/81	Remnant valley clayplain forests of red maple, beech, hemlock, swamp white oak, bur oak, white oak, ash, and shagbark hickory. Small areas of pine-oak-heath sandplain forest with black oak, red oak, white pine, pitch pine, and red maple. Silver maple and green ash floodplain forests. On hills, northern hardwood forests of beech, yellow birch, sugar maple, and hemlock. Some limestone bluff cedar-pine forest with northern white cedar, red pine, white pine, hophornbeam, and hemlock. Dry oak forests of red oak, white oak, white pine, and heath shrubs. Jack pine dominates sandstone pavement barrens.	Mixed deciduous and evergreen forest, deciduous forest, hay and pasture land, cropland, and urban and residential land. Farming for hay, silage corn, dairy, livestock, nursery and greenhouse products, some vegetables, small fruits, and orchards.
83c. Ontario Lowlands	5895	Diverse physiography with drumlin fields, moraines, kames, glacial lake plains, sand dunes, kettle topography, and large wetland complexes. Low gradient streams converted to canals, which provide infestation routes for alien zebra mussel. Atlantic salmon once found in tributaries of eastern Lake Ontario.	246–1100 45–300	Pleistocene glacial till, kame deposits, lacustrine silt and clay, fluvial outwash sand and gravel, peat, and muck. Devonian shale and limestone; Silurian sandstone, shale, limestone, and dolostone. Ordovician limestone and dolostone.	Alfisols (Hapludalfs), Inceptisols (Eutrudepts)	Hilton, Ontario, Ovid, Collamer, Canandaigua, Niagara, Palmyra, Phelps, Lansing, Conesus, Honeoye, Lima, Kendaia, Manlius, Farmington	Mesic / Udic, Aquic	30–45	130–200	16/31; 61/80	Historically, beech and sugar maple grew on moist, fine-textured soils with smaller amounts of white oak on coarse-textured, drier sites. Basswood, elm, and white ash also occurred. Today, these forest types are confined to woodlots. Elm, black ash, and silver maple are still found in poorly drained hardwood swamps. East of Lake Ontario, areas of shallow soil over limestone pavement barrens (also called alvar grasslands) occur, dominated by grasses, sedges, prairie herbs, and shrubs. Trees, such as eastern red cedar, northern white cedar, bur oak, and paper birch root in crevices in the limestone rock. Other habitats found on the eastern Ontario shore include lakeshore dunes and rich herbaceous or shrub fens fed by limey seeps.	Deciduous forest, grassland, limestone (alvar) barrens, crop and pasture land, shrubby and herbaceous wetlands, beaches, rural residential and urban centers. Farming for dairy, livestock, forage crops, fruit, vegetables, and other specialty crops.
83d. St. Lawrence Lowlands	1591	Relatively flat to gently rolling lake plain interspersed with occasional low ridges. Large wetland complexes. Atlantic salmon historically in many tributaries; dams blocked their migration. Lake sturgeon and muskellunge present in some streams.	177–600 / 45–100	Glacial lake or marine plain sand, silt, and clay; Pleistocene glacial till, minor kame deposits, minor exposed bedrock, peat and muck. Proterozoic biotite or hornblende granitic gneiss, leucogranitic and plagioclase gneiss, biotite quartz, calcitic and dolomitic marble; Ordovician dolostone and sandstone; Cambrian sandstone.	Alfisols (Epiaqualfs), Inceptisols (Eutrudepts, Endoaquepts), Spodosols (Haplorthods, Endoaquods)	Hogansburg, Muskellunge, Insula, Adjidaumo, Naumburg, Croghan	Frigid / Udic, Aquic	30–42	120–140	5/25; 58/80	Remaining forests on clay soils include sugar maple, beech, hemlock, shagbark hickory, and bur and white oak. Sandy soils support black and red oak, white pine, pitch pine, and red maple. Red maple, swamp white oak, and white ash grow in wetland soils.	Crop and pasture land, deciduous forest, some mixed deciduous and evergreen forest, urban centers. Farming for dairy, livestock, forage crops, and potatoes.
83e. Upper St. Lawrence Valley	1365	Parallel low ridges in the west, terraces, rolling toeslopes of the Adirondack foothills in the east. Few lakes. Low to moderate stream drainage density. Cooler water temperatures and frequent waterfalls block lowland fish species from upper valley streams.	480–1479 / 95–500	Pleistocene glacial till, glacial lake beach ridges and deltas, lacustrine sand, minor kame deposits, peat, and muck. Proterozoic biotite quartz plagioclase gneiss, leucogranitic gneiss, amphibolite, calcitic and dolomitic marble; Ordovician shale, limestone, and dolostone; Cambrian sandstone and dolostone.	Inceptisols (Epiaquepts, Eutrudepts), Alfisols (Endoaqualfs), Spodosols (Haplorthods)	Malone, Kalurah, Hailesboro, Pyrities, Coveytown, Trout River	Frigid / Udic, Aquic	34–50	90–145	6/26; 57/79	Second growth northern hardwoods such as sugar maple, beech, black cherry, and yellow birch. Aspen, birch, and balsam poplar are common. Red, white, and black spruce and balsam fir grow in saturated or shallow soils.	Deciduous forest, some mixed forest and evergreen forest, small- to moderate-sized farms, rural residential, and small towns. Farming for dairy, livestock, forage crops, and potatoes.
83f. Mohawk Valley	2263	Irregular valley with rolling hills, low mountains, river terraces, and a narrow incised river valley. Moderate gradient streams with cobble, gravel, and sand substrates. Many fishes introduced from the Great Lakes and alien zebra mussels established.	400–1812 / 200–800	Pleistocene glacial till, fluvial outwash sand and gravel, kame deposits, lacustrine sand, silt, and clay, and some exposed bedrock. Ordovician shale, siltstone, sandstone, greywacke, limestone, and dolostone; Cambrian limestone, dolostone, and chert.	Entisols (Udipsamments), Alfisols (Hapludalfs), Inceptisols (Dystrudepts)	Oakville, Windsor, Hudson, Nassau	Mesic / Udic, some Aquic	29–50	120–180	11/28; 58/81	Sugar maple and beech dominate forests on moist, fine-textured soils. Hemlock may be present in low numbers. Common shrubs include witch-hazel and hobblebush. Hemlock-northern hardwoods forest on north slopes and in ravines. In river floodplains, silver maple dominant with green ash, elm, ostrich fern, and a diverse herbaceous layer. Northern white cedar on exposed rocky balds.	Agricultural land, woodlots, and urban centers, barge canal. Farming for dairy and livestock, pasture, hay, and forage crops such as corn for silage, grain, and soybeans. Specialty crops include market vegetables and strawberries.

84. ATLANTIC COASTAL PINE BARRENS

Level IV Ecoregions	Area	Physiography		Geology	Soils			Climate			Natural Vegetation	Land Cover and Land Use
	Area (square miles)		Elevation / Local Relief (feet)	Surficial and Bedrock	Order (Great Group)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max (°F)		
84a. Cape Cod/Long Island	666	Level to rolling plains, some steeper slopes near moraines, and kettle topography with small lakes and ponds. Low gradient streams and rivers; most have been modified by urbanization. Carmens River has brook trout and once contained anadromous brook trout. Most other inland waters dominated by largemouth bass.	0–115 / 10–50	Pleistocene outwash sand and gravel, kames, moraines, and loose sandy till, outwash sand and gravel, Holocene dunes. Precambrian bedrock of granite, gneiss, and schist is covered by 200-400 feet or more of gravel, sand, silt, and clay.	Entisols (Quartzipsamments), Inceptisols (Dystrudepts)	Carver, Plymouth, Haven, Riverhead	Mesic / Udic	35–56	180–220	26/38; 68/85	Fragmented sandplain and dune woodlands with pitch pine, black, red, white, and scrub oak, black huckleberry, blueberry, and bearberry. Sandplain grassland with little bluestem, Pennsylvania sedge, poverty grass, bearberry, scrub oak, stiff aster, and bayberry. Sandplain heathlands with scrub oak, black huckleberry, bearberry, and lowbush blueberry. Sand dune grasslands with beach grass, beach-pea, seaside goldenrod, and beach heather. Some swamps and bogs with Atlantic white cedar, pitch pine, red maple, highbush blueberry, and leatherleaf. Salt marshes with saltmeadow and smooth cordgrass, spike-grass, and saltmarsh rush.	Mixed, deciduous, and some evergreen forest, urban and suburban development, pine barrens, shrublands, wetlands, grasslands, and cropland. Tourism, recreation, vegetable farming. Pine barrens in private conservation lands.
84c. Barrier Islands/ Coastal Marshes	203	Flat to gently sloping plains, coastal bays and inlets, islands, bluffs, dunes, beaches, tidal flats, and marshes. Marine fishes predominate.	0–50 / 0–10	Pleistocene outwash sand and gravel, Holocene dunes, beach strand. Coastal deposits, clay, sand, and gravel.	Inceptisols (Dystrudepts), Entisols (Quartzipsamments), Histosols (Sulfihemists)	Riverhead, Haven, Plymouth, Carver, Bridgehampton, Pawcatuck, Ipswich	Mesic / Udic, some Aquic	35–56	180–220	26/38; 68/85	Coastal forests of scarlet oak, black oak, post oak, beech, black gum, red maple, pitch pine, and American holly. Coastal forests may have dense shrub layer and vines including sassafras, greenbrier, poison ivy, Virginia creeper, beach plum, lowbush blueberry or grape. Beach strand with sea-rocket, dune grass, beach pea, and seabeach orache. Salt marshes with saltmeadow and smooth cordgrass, spike-grass, and saltmarsh rush.	Urban land, deciduous and mixed forest, beaches, wetlands, salt marshes, and grassland. Tourism, recreation, some commercial and sport fishing. Public land in Fire Island National Seashore, Gateway National Recreation Area, and several state parks.

SOURCES:

American Bird Conservancy, 2000, Partners in Flight Bird Conservation Plan for the Adirondack Mountains, Cornell Laboratory of Ornithology, Ithaca, New York, www.blm.gov/wildlife/plan/pl_26_10.pdf.

Atwood, J.L., Rimmer, C.C., McFarland, K.P., Tsai, S.H., and Nagy, L.R., 1996, Distribution of Bicknell's thrush in New England and New York: Wilson Bulletin, v. 108, no. 4, p. 650–661.

Bailey, R.G., 1995, Description of the ecoregions of the United States (2nd ed.): Miscellaneous Publication No. 1391, U.S. Department of Agriculture–Forest Service, 108 p. + map.

Bailey, R.G., Avers, P.E., King, T., and McNab, W.H., editors, 1994, Ecoregions and subregions of the United States (supplementary table of map unit descriptions compiled and edited by McNab, W.H., and Bailey, R.G.): Washington, D.C., U.S. Department of Agriculture–Forest Service, map scale 1:7,500,000.

Baker, J.P., Gherini, S.A., Christensen, S.W., Driscoll, C.T., Gallagher, J., Munson, R.K., Newton, R.M., Reckhow, K.H., and Schofield, C.L., 1990, Adirondack lakes survey - interpretive report: Ray Brook, New York, Adirondack Lakes Survey Corporation, 274 p.

Bierhorst, J., 1995, The Ashokan Catskills - a natural history: Fleischmanns, New York, Purple Mountain Press, 116 p.

Central Pine Barrens Joint Planning and Policy Commission, 1995, Central Pine Barrens comprehensive land use plan, Volume 2: Existing conditions: Great River, New York, Central Pine Barrens Joint Planning and Policy Commission.

Clark, J.S., 1986, Coastal forest tree populations in a changing environment, southeastern Long Island, New York: Ecological Monographs, v. 56, no. 3, p. 259–277.

Cleland, D.T., Freeouf, J.A., Keys, J.E., Jr., Nowacki, G.J., Carpenter, C., and McNab, W.H., 2007, Ecological subregions - sections and subsections of the conterminous United States: Washington, D.C., U.S. Department of Agriculture-Forest Service, General Technical Report WO-76, map scale 1:3,500,000.

Cline, M.G., and Marshall, R.L., 1977, Soils of New York landscapes: Ithaca, New York, Cornell University, New York State Extension Service, Information Bulletin 119, 61 p.

Cogbill, C.V., and White, P.S., 1991, The latitude-elevation relationship for spruce-fir forest and treeline along the Appalachian Mountain chain: Vegetatio, v. 94, p. 153–175.

Conard, H.S., 1935, The plant associations of central Long Island - a study in descriptive plant sociology: American Midland Naturalist, v. 16, p. 433–516.

Dickinson, N.R., 1983, Physiographic zones of southern and western New York: Delmar, New York, New York State Department of Environmental Conservation, Wildlife Resources Center, 11 p.

Edinger, G.J., Evans, D.J., Gebauer, S., Howard, T.G., Hunt, D.M., and Olivero, A.M., editors, 2002, Ecological communities of New York State, Second edition: Albany, New York, New York State of Department of Environmental Conservation, New York Natural Heritage Program.

Evans, D.J., and VanLuven, D.E., 2007, Biodiversity in New York's state park system - summary of findings: Albany, New York, New York Natural Heritage Program. http://www.nysparks.com/news/public/.

Fisher, D.W., Isachsen, Y.W., and Rickard, L.V., 1970, Geologic Map of New York, 5 map sheets, Albany, New York, New York State Museum, University of New York, map scale 1:250,000.

Glitzenstein, J.S., Canham, C.D., McDonnell, M.J., and Streng, D.R., 1990, Effects of environment and land-use history on upland forests of the Cary Arboretum, Hudson Valley, New York: Bulletin of the Torrey Botanical Club, v. 117, no. 2, p. 106–122.

Greller, A.M., 1972, Observations on the forests of northern Queens County, Long Island, from colonial times to the present: Bulletin of the Torrey Botanical Club, v. 99, no. 4, p. 202–206.

Greller, A.M., 1972, A classification of mature forests on Long Island, New York: Bulletin of the Torrey Botanical Club, v. 104, no. 4, p. 376–382.

Greller, A.M., Calhoon, R.E., and Mansky, J.M., 1978, Grace Forest - a mixed mesophytic stand on Long Island, New York: Botanical Gazette, v. 139, no. 4, p. 482–489.

Grier, N.M., 1925, The geology of Long Island with especial reference to the Cold Spring Harbor region and its flora: American Midland Naturalist, v. 9, no. 11, p. 531–563.

Griffith, G.E., Omernik, J.M., Bryce, S.A., Royte, J., Hoar, W.D., Homer, J., Keirstead, D., Metzler, K.J., and Hellyer, G., 2009, Ecoregions of New England (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey, map scale 1:1,325,000.

Heimburger, C.C., 1933, Forest-type studies in the Adirondack region: Ithaca, New York, Cornell University Agricultural Experiment Station Memo 165, 122 p.

Hunt, D.M., Edinger G.J., Schmid, J., Evans, D.J., Novak, P.G., Olivero, A.M., and Young, S.M., 2002, Lake Erie gorges biodiversity inventory and landscape integrity analysis: Albany, New York, New York State Department of Environmental Conservation, New York Natural Heritage Program, 99 p. + appendices and maps.

Johnson, E.A., and Smith, D., editors, 2006, Legacy: Conserving New York State's Biodiversity: Albany, New York, American Museum of Natural History, New York State Biodiversity Research Institute, New York State Department of Environmental Conservation, New York Natural Heritage Program, and The Nature Conservancy, 100 p.

Kahl, J.S., Stoddard, J.L., Haeuber, R., Paulsen, S.G., Birnbaum, R., Deviney, F.A., Webb, J.R., Dewalle, D.R., Sharp, W., Driscoll, C.T., Herlihy, A.T., Kellogg, J.H., Murdoch, P.S., Roy, K., Webster, K.E., and Urquhart, N.S., 2004, Have U.S. surface waters responded to the 1990 Clean Air Act Amendments?: Environmental Science and Technology, December 2004, p. 485A–490A.

Keys, J., Jr., Carpenter, C., Hooks, S., Koenig, F., McNab, W.H., Russell, W.E., Smith, M.L., 1995, Ecological units of the eastern United States - first approximation: Atlanta, U.S. Department of Agriculture-Forest Service, Technical Publication R8-TP 21, map scale 1:3,500,000.

Kiviat, E., 1991, The northern Shawangunks - an ecological survey: New Paltz, New York, Mohonk Preserve, Inc., 107 p.

Kuchler, A.W., 1964, Potential natural vegetation of the conterminous United States: New York, American Geographical Society, Special Publication no. 36, 116 p., map scale 1:3,168,000.

Kudish, M., 1992, Adirondack upland flora - an ecological perspective: Saranac, New York, The Chauncey Press, 320 p.

Kudish, M., 2000, The Catskill forest - a history: Fleischmanns, New York, Purple Mountain Press, 218 p.

Lake Champlain Basin Program, 2004, Lake Champlain Basin Atlas, Version 3: Grand Isle, Vermont, www.lcbp.org/Atlas/index.htm.

Lake Champlain Basin Program, 2007, Wetlands in the Lake Champlain Basin, Fact Sheet Series No. 4: Grand Isle, Vermont, www.lcbp.org/factsht/wetlands2007.pdf.

Lambert, J.D., McFarland, K.P., Rimmer, C.C., Faccio, S.D., and Atwood, J.L., 2005, A practical model of Bicknell's thrush distribution in the northeastern United States: Wilson Bulletin, v. 117, p. 1–11.

Lapczak, S., Wyllie, W.D., and Lawford, R.G., 1979, Climate of the St. Lawrence Islands National Park: Ottawa, Ontario, Parks Canada.

Lefkowitz, A., and Greller, A.M., 1973, The distribution of tree species on the uplands of Cunningham Park, Queens County, New York: Bulletin of the Torrey Botanical Club, v. 100, no. 5, p. 313–318.

Lewin, D.C., 1974, The vegetation of the ravines of the southern Finger Lakes, New York region: American Midland Naturalist, v. 91, no. 2, p. 315–342.

Loeb, R.E., 1987, Pre-European settlement forest composition in east New Jersey and southeastern New York: American Midland Naturalist, v. 118, no. 2, p. 414–423.

McIntosh, R.P., 1962, The forest cover of the Catskill Mountain region, New York, as indicated by land survey records: American Midland Naturalist, v. 68, p. 409–423.

McIntosh, R.P., 1972, Forests of the Catskill Mountains, New York: Ecological Monographs, v. 42, no. 2, p. 143–161.

McIntosh, R.P., and Hurley, R.T., 1964, The spruce-fir forests of the Catskill Mountains: Ecology, v. 45, no. 2, p. 314–326.

McMartin, B., 1994, The great forest of the Adirondacks: Utica, New York, North Country Books.

McNab, W.H., and Avers, P.E., compilers, 1994, Ecological subregions of the United States – section descriptions: Washington, D.C., U.S. Department of Agriculture-Forest Service Administrative Publication WO-WSA-5, 267 p.

Mills, E.L., Strayer, D.L., Scheuerell, M.D., and Carlton, J.T., 1996, Exotic species in the Hudson River basin - a history of invasions and introductions: Estuaries and Coasts, v. 19, no. 4, p. 814–823.

Mills, E.L., and Scheuerell, M.D., 1998, Biological invasions in the Hudson River basin, Circular No. 57: Albany, New York, New York State Museum, 51 p.

National Oceanic and Atmospheric Administration, 2002, Monthly station normals of temperature, precipitation, and heating and cooling degree days, 1971–2000: Climatography of the United States No. 81- New York: Asheville, North Carolina, National Climatic Data Center.

New York Natural Heritage Program, 2009, Online Conservation Guides. http://www.acris.nynhp.org/guide.

New York State Department of Environmental Conservation, 1981, Forest Resource Assessment, LP-203 8/82, 110 p.

Omernik, J.M., 1987, Ecoregions of the conterminous United States: Annals of the Association of American Geographers, v. 77, no. 1, p. 118–125.

Omernik, J.M., Griffith, G.E., Irish, J.T., and Johnson, C.B., 1988, Total alkalinity of surface waters - a national map: Corvallis, Oregon, Corvallis Environmental Research Laboratory, U.S. Environmental Protection Agency, map scale 1:7,500,000.

Paleontological Research Institute. Glacial Features of the Inland Basin, www.priweb.org/ed/finger_lakes/nystate_geo3.html.

Rensselaer Plateau Alliance, www.rensselaerplateau.org/Home.html.

Rohm, C.M., Omernik, J.M., and Kiilsgaard, C.W., 1995, Regional patterns of total phosphorus in lakes of the northeastern United States: Lake and Reservoir Management, v. 11, no. 1, p. 1-14 + map.

Seischab, F.K., 1990, Presettlement forests of the Phelps and Gorham Purchase in western New York: Bulletin of the Torrey Botanical Club, v. 117, no. 1, p. 27–38.

Stalter, R., Lamont, E.E., Northup, J., 1986, Vegetation of Fire Island, New York: Bulletin of the Torrey Botanical Club, v. 113, no. 3, p. 298–306.

Tarr, R.S., and Turner, E.T., 1902, The physical geography of New York State: Ann Arbor, University of Michigan, 397 p.

U.S. Department of Agriculture–Natural Resources Conservation Service, STATSGO soils data.

U.S. Department of Agriculture–Natural Resources Conservation Service (formerly Soil Conservation Service), various county soil surveys of New York.

U.S. Department of Agriculture–Natural Resources Conservation Service, 2006, Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin: Washington, D.C., U.S. Government Printing Office, Agriculture Handbook 296, 669 p. + map.

U.S. Department of Agriculture–Soil Conservation Service, 1981, Land resource regions and major land resource areas of the United States: Washington, D.C., U.S. Government Printing Office, Agriculture Handbook 296, 156 p. + map.

U.S. Fish and Wildlife Service, 1997, Significant habitats and habitat complexes of the New York Bight watershed: Charlestown, Rhode Island, U.S. Fish and Wildlife Service.

Whitney, G.G., 1990, The history and status of the hemlock-hardwood forests of the Allegheny Plateau: Journal of Ecology, v. 78, no. 2, p. 443–458.

Whittaker, R.H., and Woodwell, G.M., 1969, Structure, production, and diversity of the oak-pine forest at Brookhaven, New York: Journal of Ecology, v. 57, no. 1, p. 155–174.

Wiken, E., 1986, Terrestrial ecozones of Canada: Ottawa, Canada, Environment Canada, Ecological Land Classification Series No. 19.

Will, G.B., Stumvoll, R.D., Gotie, R.F., and Smith, E.S., 1982, The ecological zones of northern New York: New York Fish and Game Journal, v. 29, no. 1, p. 1–25.

Woods, A.J., Omernik, J.M., Brown, D.D., Kiilsgaard, C.W., 1996, Level III and Level IV ecoregions of Pennsylvania and the Blue Ridge Mountains, the Ridge and Valley, and the Central Appalachians of Virginia, West Virginia, and Maryland: Corvallis, Oregon, U.S. Environmental Protection Agency, EPA/600/R-96/077, 49 p.

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