

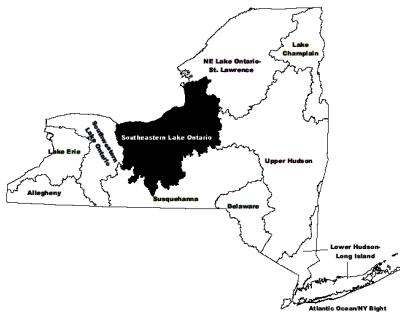
# Southeastern Lake Ontario Watershed Region

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Cornell University  
Cooperative Extension



**Over 45% of the Southeastern Lake Ontario watershed region is covered in forest of which at least 80% is privately owned.** Consequently, the health and prosperity of the watershed's wildlife populations depend on how well these owners protect and enhance the habitat on which hundreds of species of invertebrates, amphibians, reptiles, fish, birds and mammals depend. The good news is that most forest wildlife species are thriving, but unfortunately many are not. These 129 species of greatest conservation need (SGCN) in the Southeastern Lake Ontario watershed have been identified in the NY Comprehensive Wildlife Conservation Strategy (CWCS).

A major goal of the CWCS is to inform forest owners of the need for management practices that will enhance forest biodiversity and thereby keep these SGCN from becoming rare or endangered. So much of the critical habitats for these species exists on private lands that landowner cooperation will be the ultimate deciding factor on whether species declines can be halted. The plan further lists the threats to these species and management strategies that will improve their

habitat. Fortunately, for forest owners and wildlife alike, many species will benefit from sustainable forest practices, including sawtimber production, when implemented in accordance with NYS DEC timber harvesting guidelines (<http://www.dec.ny.gov/lands/5240.html>) to protect water quality.

Private forest owners are strongly encouraged to contact their regional DEC forester to seek professional management advice (<http://www.dec.ny.gov/lands/4972.html>).

Sometimes, simply letting nature follow the course of natural succession, where grasslands convert (or succeed) over time to shrublands, to pole-stand forests, and ultimately to old-age forest stands may not be best for all wildlife. There is a whole suite of species that depends on early successional forest as habitat. Humans have made an effort to suppress most of the natural forest disturbances that once generated young forest in the watershed. Without disturbances such as fire, pest outbreaks and disease to set succession back to younger forests, many of the species that rely on this habitat are now in decline. In the absence of these natural disturbances, there is now a need for forest owners to actively manage their land to create habitat for these SGCN.

Oftentimes the task of creating early successional forest is carried out through even-aged silvicultural methods such as clear-cutting. Permanent conversion of forests to non-forest development or clear-cutting in the tropical rainforest may be poor ecosystem management, but clear-cutting is a legitimate silvicultural tool for northeastern hardwood forests. It is an economically efficient manner to procure forest products for landowners and society, while simultaneously regenerating young forest habitat. Over time these young forests mature into older forests which also provide critical unique habitat for a different suite of wildlife species. When done correctly, this pattern of harvesting and growth over time, on a landscape scale, can provide a sustainable mix of habitats composed of stands of diverse tree species and diverse age- and size-classes. Recent research findings by the Audubon New York, has shown that many song bird species that generally prefer mature forests, actually do quite well in managed forests.

There are several SGCN that reside in forested habitats. When selecting a forest management regime (e.g., selection, shelterwood, clear cut, etc.) it may be difficult for public and private forest managers to coordinate the wide array of habitat needs of these species with their timber management goals. It is

important to understand the habitat needs of species that rely on various forested habitats (i.e., varying successional stages, vertical structure, tree and shrub species composition, etc.) and how to accommodate SGCN with seemingly competing habitat requirements. Obviously, no one forest stand or ownership parcel can supply all the habitat needs of all species simultaneously. Management objectives and activities should take into consideration the needs area sensitive species and the availability of adjacent habitat across the overall landscape.

For example, if your forest stand is home to an “area sensitive” species that needs large un-fragmented forest tracts (e.g., wood thrush, scarlet tanager, cerulean warbler, timber rattlesnake), it is best to manage your stand as a mature forest and use light to moderate partial harvests, so that harvests do not drastically alter the habitat. But, some early successional forest species such as the golden-winged warbler are also area sensitive and may require large patches of young forest/shrubland habitat. Harvest techniques that promote such habitats would include large clear-cuts. Large patches of any habitat are generally more rare across the landscape and are more valuable than smaller patches because they provide habitat for both area sensitive and non area sensitive species.

It is also important to consider the context of your land. If your forest is one of the only large forests within several miles, uneven-aged techniques that do not drastically change the habitat or a forest preserve would be best for the wildlife that relies on your land. On the other hand, if your forest stand is in a highly forested landscape, using even-aged techniques to create early successional forest (either large or small patches) will provide new and important habitat for some species without jeopardizing those that rely on the adjacent, more mature forest.

## **Prominent threats to SGCN**

### **Habitat loss and fragmentation:**

- loss of connectivity between forest patches
- increased negative edge effects (increases susceptibility to predation)
- decline of area sensitive species such as timber rattlesnake and cerulean warbler which need large continuous tracts of mature forest
- reduction of forest size also results in reduction of populations and reduction in the types of species the forest patch can support.
- increased urbanization and development

### **Degraded water quality:**

- destruction of vegetative riparian zones causes soil erosion and leads to increased sedimentation in streams and rivers
- agricultural pesticides are often broad in their action and may kill off additional non-target species such as benign and beneficial invertebrates and amphibians
- elevated mercury levels are found in almost every taxa
- runoff introduces toxins and excess nutrients into water
- chloride contamination from roads is a concern for smaller lakes
- sewage discharge can constrain nutrients, heavy metals and endocrine disrupting compounds
- acid precipitation (Tug Hill Region)

### **Inappropriate silviculture and agriculture practices:**

- a need exists for more ecologically based objectives on a landscape scale
- forestry operations that do not comply with best management practices and that are poorly planned and executed can damage habitat function and reduce habitat quality for SGCN
- mature and early successional forest habitats may suffer because of public reluctance or ability to engage in active management of these habitats

### **Human disturbance:**

- habitats fragmented by roads and power lines increase direct mortality of SGCN due to collisions.
- illegal and unregulated harvest, (migrating birds, bats and herps most susceptible)
- illegal capture and sale of herpetofauna
- public misconceptions about reptiles, particularly snakes, may promote the killing and/or collection of these animals

### **Invasive/Overabundant species:**

- threaten to reduce biodiversity
- exotic insects such as hemlock woolly adelgid, emerald ash borer and Asian longhorn beetle lack natural predators and threaten to alter the composition of forest stands.
- compete with species of concern for forage or nest sites (e.g. blue-winged vs. golden-winged warblers)
- pose a predation threat
- reduce habitat quality by altering vegetative composition and structure (e.g., deer overbrowse limiting forest regeneration)

- terrestrial invasive plants in the basin alter vegetation composition of common habitats and reduce food sources for SGCN

## Model Species of Greatest Conservation Need

### *Deciduous Mixed Forest Breeding Birds*

#### **Cerulean Warbler**

- prefers relatively mature forests and needs large unfragmented forest tracts
- increasing forest patch size can reduce the risk of predation
- implementing deer control where it is affecting forest and species regeneration can increase potential habitat



- requires low levels of forest management (light harvesting/patches)
- lengthen timber harvest cycle

### *Early Successional Forest/Shrubland Birds*

#### **Golden- Winged Warbler**

- there is an annual average decline of 5.8% of the populations of early successional forest/shrubland birds
- prefers shrubby openings near tree lines or scattered trees and herbaceous ground cover
- threats include: the reversion of shrubland to forest and early successional forest to mature forest; fire suppression; inadequate forest management that includes even-aged and heavy partial removal and the public perception that forest management is harmful to birds
- interbreeding with blue-winged warblers is lowering the golden-winged population
- conservation efforts should focus on areas where blue-winged warblers are absent
- the decline signals a need for more sound and planned timber and abandoned agriculture field management
- a landowner incentive program is needed to convert and create habitat.



#### **Red-Shouldered Hawk**

- relatively large forest tracts are needed for successful breeding
- clear-cutting is a major source of raptor breeding habitat fragmentation
- disturbance around the nest site during breeding can cause nest failure
- creating small openings with wetlands or small ponds benefits forest breeding raptors

### *Woodland/Grassland Snakes*

#### **Timber Rattlesnake**

- timber rattlesnakes provide many ecological benefits to a community and maintain an ecological balance through serving as both predator and prey
- prefers large tracts of relatively undisturbed forest habitats (mixed deciduous and coniferous) and open woodlands with talus/rocky outcrops
- threatened by public misconception about rattlesnakes, habitat degradation and fragmentation and unlawful killing and collecting

### *Vernal Pool Salamanders*

#### **Blue Spotted and Jefferson Salamanders**

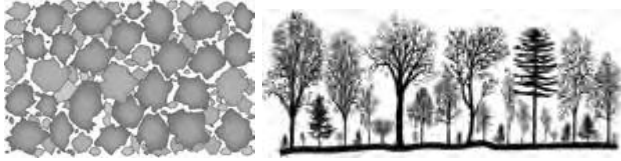
- vernal pools are small unregulated wetlands that dot forested landscapes
- conservation efforts include securing large blocks of habitat containing both forest and wetlands, limiting off-road vehicles in surrounding area (vehicular collisions are a

### **Forest Breeding Raptors**

large source of mortality) and pursuing the legal protection of wetlands under 12.4 acres that contain SGCN habitat

- keep forest harvesting at least 100 feet from any vernal pools or spring seeps and maintain overhead canopy

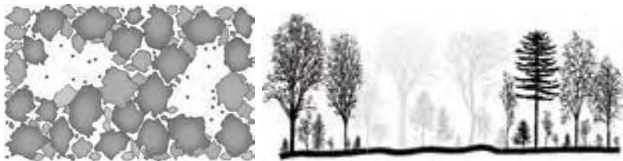
## Silvicultural Systems



**Single tree selection** creates relatively small breaks in the forest canopy and therefore also favors shade tolerant tree species. Deer browse can prevent the regrowth of more palatable species and can lead to long-term losses in plant biodiversity. This system is not a viable option in areas with high deer populations and leads to uneven-aged stands.



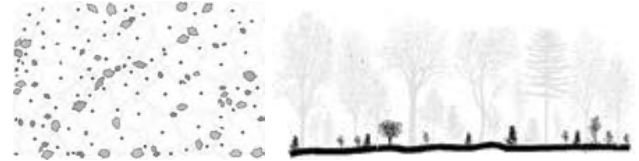
A **group selection/patch clear-cutting** regime creates larger openings in the forest canopy which encourages a greater diversity of regenerating species when patches are large enough to let shade intolerant species compete. Leads to un-even aged stands.



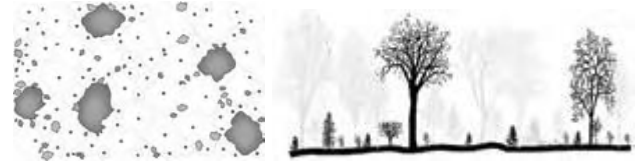
The **shelterwood** system clears trees in a series of 2 or 3 cuts over a decade and can increase the abundance of midtolerant and initially slow growing species such as oak, and leads to even-aged stands.



**Clear-cutting** provides the necessary amount of sunlight for shade intolerant species such as aspen, paper birch, oak, and eastern red cedar to develop. This silviculture system is oftentimes the most efficient at producing early successional habitat, and leads to even-aged stands.



A **reserve tree or seed tree** system can be described as a hybrid between a clear-cut and a shelterwood system. It preserves a few remaining trees from the clear-cut. These trees provide habitat for raptors and other birds and also serve as a seed source. This system promotes competition for shade intolerant and mid tolerant species. Leads to 2-aged stands if seed trees are not harvested for a number of years.



## Silvicultural Recommendations for Southeastern Lake Ontario Forest Types

### **Northern Hardwoods**

- clear-cutting creates dense shrub, herbaceous ground cover layers, soft mast, slash and low exposed perches that support more biodiversity than untreated sawtimber stands. However, leave some wildlife trees (high exposed perches, cavity trees, coniferous overstory inclusion, snag trees)
- a shelterwood system leads to a partial overstory, partial early successional forest and promotes regeneration and good biodiversity
- both clear-cutting and shelterwood techniques lead to an increase in raptor hunting areas and feeding areas for boreal forest birds such as the olive-sided flycatcher

- selection and thinning techniques have little effect on wildlife and are comparable to unmanaged stands

### **Eastern Hemlock**

- occurs with a broad array of associate tree species including many northern hardwoods
- valuable for den and cavity using wildlife
- developing stands are characterized by closed canopies, hardwood cavity trees and sparse herbaceous ground cover
- shelterwood method most effective at regeneration
- clear-cutting tends to convert the forest type
- very shade tolerant
- provides good winter shelter

### **Spruce-Fir/Boreal Forests**

- high biodiversity exists during successional stages due to the herbaceous shrub layer
- lowest biodiversity occurs during the pole timber stage because of the shrub layer being shaded out.
- highest biodiversity exists in mature and over-mature stands due to the increase in tree bole users
- shelterwood system most effective method at regeneration
- clear-cutting yields hardwood forests in the absence of herbicide use and planting

### **Oak-Pine**

- the number of wildlife species tends to be high because species associated with both coniferous and deciduous forest types are brought together and the production of acorns
- species diversity follows the same pattern as spruce-fir forests (high during regeneration, low during pole stage, high in mature forest)
- high trees can provide perching and nesting sites for hawks, Great blue herons, osprey and bald eagles
- prescribed fire may be needed for forest types such as pitch pine-scrub oak barrens
- threats to this habitat include suppression of fire resulting in the conversion of pine barrens to hardwood forest, and invasive exotic and invasive native plant species

- shelterwood and patch clearcut silviculture work well for regeneration

### **Swamp Hardwoods**

- home to salamanders, frogs, turtles and snakes
- swamp hardwoods are usually of low economic value so wildlife management is often the primary reason for timber harvest
- clear-cutting with reserved patches and wildlife, den, nest and cavity trees is the most common and effective silvicultural technique

### **Common Forest Communities**

#### **Appalachian Oak-Pine Forest**

**Description:** Appalachian oak-pine forests occur on sandy or rocky soils, on slopes, ravines, or in pine barrens. The canopy is dominated by any of several oak species, with white pine making up at least 25% of the total cover. On rocky slopes, the canopy abundance of pitch pine could be greater than that of white pine at some sites. The shrub layer is dominated by acid soil dependant shrubs such as lowbush blueberry and huckleberry. The herbaceous layer is usually sparse and low in species diversity (Edinger et al. 2002).

**Range:** This community is currently known from the Catskill Mountains, the Eastern Adirondack Low Mountains (Lake George Valley), the St., Lawrence Valley, the central High Allegheny Plateau, and the Lake Ontario Lake Plain.

#### **Balsam Flats**

**Description:** A conifer forest that occurs on moist, well-drained soils of low flats adjoining swamps, gentle low ridges, and knolls within swamps, often in a tight mosaic with spruce flats. The canopy is dominated by balsam fir with red spruce, red maple and a variety of possible associates. Seedlings of the canopy species dominate the sparse shrub layer, and the forest floor is a carpet of bryophytes and herbs.

**Range:** This community is known from the Adirondack Mountains and the Tug Hill Plateau.

## **Beech-Maple Mesic Forest**

**Description:** Beech-maple mesic forest communities are closed-canopy hardwood forests with codominating sugar maple and American beech. This is a broadly defined community type with several regional and soil based variants. These forests occur on moist, well drained, usually acid soils. There are many spring ephemerals that bloom before the canopy trees leaf out. Hemlock may be present at a low density (Edinger et al. 2002).

**Range:** This community is widespread throughout upstate New York. It is probably represented by different ecoregional variants. It forms the matrix forest of the Northern Appalachian Ecoregion in the Adirondacks and Tug Hill. Beech-maple mesic forest is also present in the Lower New England, the Great Lakes, and the High Allegheny Plateau ecoregions.

## **Hemlock-Northern Hardwood Forest**

**Description:** A mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist, well-drained sites at the margins of swamps. Eastern hemlock is codominant with any one to three of the following tree species: American beech, sugar maple, red maple, black cherry, white pine, yellow birch, black birch, red oak, and basswood. The relative cover of eastern hemlock is quite variable, ranging from nearly pure stands in some steep ravines to as little as 20% of the canopy cover. Striped maple is often prominent as a mid-story tree (Edinger et al 2002).

**Range:** This community is currently known from across the state north of the Coastal Plain. Numerous patches of hemlock-northern hardwood forest are known from the Catskill Mountains, the Shawangunk Mountains, the Hudson Highlands, the Rensselaer Plateau, the Adirondack Mountains, the southern Finger Lakes region, and the river valleys that flow into Lake Erie in western New York.

## **Maple-Basswood Rich Mesic Forest**

**Description:** A species-rich hardwood forest that typically occurs on well-drained, moist soils of around neutral pH. Rich-soil herbs are predominant in the ground layer and are usually correlated with calcareous bedrock, although bedrock does not have to be exposed. Where bedrock outcrops are lacking, surficial features such as seeps are often present.

The dominant trees are sugar maple, basswood, and white ash (Edinger et al. 2002).

**Range:** This community is currently known from calcareous areas across the Ontario Lake Plain, the St. Lawrence Valley, and the Adirondack Mountains.

## **Floodplain Forest**

**Description:** A hardwood forest that occurs on mineral soils on low terraces of river floodplains and river deltas. These sites are characterized by their flood regime; low areas are annually flooded in spring and high areas are flooded irregularly. This is a broadly defined community; floodplain forests are quite variable and may be very diverse. The composition of the forest apparently changes in relation to flood frequency and elevation of floodplain terraces along larger rivers (Edinger et al. 2002).

**Range:** Large examples of this community are currently known from dozens of rivers and large streams across the state. Several high quality floodplain forests are known from the Upper Delaware Valley, the Central Hudson Valley, the Lake Champlain Valley, the Adirondack Mountains, the Mohawk Valley, the Lake Ontario Lake Plain, and across the High Allegheny Plateau.

## **Rich Mesophytic Forest**

**Description:** Rich mesophytic forest communities are hardwood or mixed forests that resemble the mixed mesophytic forests of the Allegheny Plateau south of New York, but are slightly less diverse. This community occurs on rich, fine-textured soils that are favorable for the dominance of a wide variety of tree species. Canopy codominants of at least five species, a well developed, diverse shrub layer, and a relatively rich herbaceous layer are characteristic of rich mesophytic forests (Edinger et al. 2002).

**Range:** In New York, rich mesophytic forests are primarily restricted to the unglaciated portion of the Appalachian Plateau in Cattaraugus and Chautauqua counties. However, examples are also known from the Great Lakes Plain within the Eastern Ontario Till Plain in Monroe County, and within the Cattaraugus Finger Lakes Moraine and Hills in Tompkins County.

## Common Swamp Hardwood Communities

### Black Spruce-Tamarack Bog

**Description:** A conifer forest that occurs on acidic peatlands in cool, poorly drained depressions. The characteristic trees are black spruce and tamarack. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20% cover of evenly spaced canopy trees to closed canopy forests with 80 to 90% cover. In the more open canopy stands there is usually a well-developed shrub layer characterized by several shrubs typical of bogs including sheep laurel, Labrador tea, mountain holly and highbush blueberry. Characteristic herbs are three-seeded sedge, cotton grass, pitcher plant, cinnamon fern, and in shady areas where the canopy is dense, gold thread and creeping snowberry.

**Range:** This community is found primarily in the northern half of the state. It is concentrated in the Adirondacks, but is also common in the Great Lakes area. There are very small, scattered examples in the lower Hudson, Tug Hill Plateau, and possibly also the Allegheny area.

### Hemlock-Hardwood Swamp

**Description:** Hemlock-hardwood swamps are closed-canopy, mixed species swamps, dominated by hemlock, with abundant red maple, yellow birch, and blackgum. They occur on mineral soils and deep muck in depressions that receive groundwater discharge. The shrub layer is typically sparse, and features any of several shrub species, including highbush blueberry, great rhododendron, and winterberry. The ground layer may be sparse, and often includes cinnamon fern and sensitive fern

**Range:** Hemlock-hardwood swamps are found throughout upstate New York, north of the coastal lowlands/north Atlantic coast, except perhaps in localized regions such as the High Peaks area of the Adirondacks. The community is apparently concentrated in the lower New England and high Allegheny regions. Large occurrences are found on the Tug Hill. Small, scattered examples occur in the rest of the northern Appalachian region and throughout the Great Lakes plain.

### Northern White Cedar Swamp

**Description:** A rich conifer or mixed swamp that occurs on organic soils in cool, poorly drained depressions in central and northern New York and along lakes and streams in the northern half of the state. These swamps are often spring fed or enriched by seepage of cold, minerotrophic groundwater, resulting in a stable water table and continually saturated soils. The characteristic tree is northern white cedar, which makes up more than 30% of the canopy cover; characteristic short shrubs include dwarf raspberry and red osier dogwood. Mosses and liverworts are diverse and abundant

**Range:** This community is scattered and essentially limited to the northern half of the state. It is concentrated in the Great Lakes Ecoregion, but also common in the Adirondack Subsection of the Northern Appalachian Ecoregion where it is represented by large patch occurrences. There are scattered very small patch examples at the northern fringe of the Lower New England Ecoregion, Tug Hill Subsection of the Northern Appalachian Ecoregion, and the High Allegheny Plateau Ecoregion.

### Red Maple-Hardwood Swamp

**Description:** A hardwood swamp that occurs in poorly drained depressions, usually on inorganic soils with peat, if present, that is less than 20 cm deep. This is a broadly defined community with many variants. In any one stand red maple is either the only canopy dominant, or it is codominant with one or more hardwoods. Blackgum and sweetgum, if present, are only minor associates. The shrub layer is usually well-developed and may be quite dense. The herbaceous layer may be diverse and is often dominated by ferns.

**Range:** This community is known throughout the state. Different variants are concentrated in different ecoregions.

### Red Maple-Tamarack Peat Swamp

**Description:** A mixed swamp that occurs on organic soils (peat or muck) in poorly drained depressions. The dominant trees are red maple and tamarack. These species usually form an open canopy (50 to 70% cover) with numerous small

openings dominated by shrubs or sedges. The herb layer is often very diverse and usually includes calcium-rich indicator species. The bryophyte layer is dominated by several species of peat (*Sphagnum*) moss.

**Range:** This community is sparsely scattered but widespread throughout upstate New York, north of the North Atlantic Coast Ecoregion. It is concentrated in the Great Lakes Ecoregion and very uncommon in the Northern Appalachians Ecoregion.

### **Silver Maple-Ash Swamp**

**Description:** Silver maple-ash swamps are hardwood basin swamps that occur in poorly-drained depressions or on poorly-drained soils along the borders of large lakes or, less frequently, rivers. The sites are characterized by uniformly wet conditions, with minimal seasonal fluctuation in water levels. The tree canopy is dominated by silver maple and green ash, but typically includes a variety of other hardwood species such as American elm, red maple, swamp white oak, and ironwood. This community has a well-developed understory of tall shrub, short shrub, and herbaceous species. Silver maple-ash swamps often occur over calcareous bedrock, and the plant species composition may reflect this influence with the presence of calciphiles such as northern white cedar and alder-leaf buckthorn .

**Range:** This community is primarily limited to the lowlands of central and western New York. It is concentrated in the Great Lakes and High Allegheny Plateau Ecoregions, including the Saint Lawrence Lowlands, and the Lake Champlain Lowlands.

### **Spruce-Fir Swamp**

**Description:** A conifer swamp with little to no peat development that typically occurs in a drainage basin, at the edge of a lake or pond, or along gentle slopes of islands where there is some nutrient input from groundwater discharge or subsurface flow. These swamps are usually dense, with a fairly closed canopy (80 to 90% cover). The dominant tree is usually red spruce. Codominant trees include balsam fir and red maple. The shrub layer is often sparse; characteristic and dominant shrubs include

mountain holly and sapling canopy trees. Cinnamon fern is a characteristic herb and patches of peat mosses can be common.

**Range:** This community is widespread throughout the northern half of New York. It is concentrated in the Adirondack Subsection of the Northern Appalachian Ecoregion where it reaches large patch size. Scattered small patch examples occur in the Great Lakes, Lower New England, and High Allegheny Plateau Ecoregions, as well as the Tug Hill section of the Northern Appalachian Ecoregion.

### **Common Trees**

#### **•Maples**

Red and sugar maple are found throughout the Northeast. Red maple has become the most common tree in many Northeastern States and may account for one-quarter of all trees. This increase has been attributed to fire suppression and the increased use of partial cutting (as opposed to the earlier practice of clear-cutting). Red maples are also profuse stump sprouters. Their ability to grow in light (red maple) to heavy shade (sugar maple) allows both species to persist for decades as small saplings under the shade of larger trees. The large hollows commonly found in centenarians are favorite den sites of raccoons, porcupines, and flying squirrels. Chickadees, wrens, and cardinals eat the seeds; deer eat the leaves and twigs.

#### **Birches**

Common birch species in the Northeast include paper, black, and yellow birch. Paper birch is a cold-climate species adapted to a variety of soils. Black birch, a warmer climate birch, is found on average sites. The range of yellow birch overlaps the two—it is found on moist to wet sites throughout its range. Black birch is now a common tree species as a result of its ability to reseed disturbed soils following partial cutting. Yellow and black birch contain oil of wintergreen (methyl salicylate), which gives birch beer its distinctive taste. The presence of this chemical, poisonous at high doses, provides some protection from deer browse damage. Birch provide important spring food for ruffed grouse, a SGCN. Although birch seedlings can grow in partial shade, overstory removal or death is necessary for seedlings to



develop into mature trees. **Clear-cut and group selection**

### **American Beech**

Beech is a common species in forest preserves and high-graded stands. This slow-growing, long-lived species is our most shade-tolerant hardwood and can develop in all but the darkest shade. American beech nuts provide food for large mammals such as black bears and small mammals such as white-footed mice, as well as a variety of birds. American beech are prone to develop cavities. This tree is among the most shade-tolerant hardwood species in the Northeast. The proliferation of the beech scale disease has devastated mature stands throughout the northeast. Its ability to stump and root sprout and lack of palatability to deer has resulted in complete understory domination in many stands.

### **Spruces**

Red, white, and black spruce are the most common eastern spruces. Red spruce is a medium-sized, shade-tolerant tree that can live more than 400 years. It often grows in association with balsam fir and is tolerant to extremely shade tolerant. In early years especially, red spruce grows slower than its common associates (balsam fir, and hardwood trees and shrubs). Release and thinning may be needed to allow trees to reach upper canopy.

### **Oaks**

Oaks are disturbance-dependent species; most of our oak forests arose on lands that were burned or clear-cut in the late 1800s to early 1900s. Northern red oak is one of the most valuable timber trees. Although oak seedlings can grow in partial shade, overstory removal (final stage shelterwood, clear-cutting, or patch cutting) is eventually required to achieve the full sunlight conditions necessary for seedlings to develop into mature trees. Oaks need protection from browsing where deer herds are large. Prescribed burning can enhance seedling height growth.

### **Eastern White Pine**

Eastern white pine can grow on sites ranging from dry ridgetops to swampy valleys. Although eastern white pine seedlings can grow in partial shade, overstory removal (final stage shelterwood or clear-cutting) is eventually necessary for seedlings to develop into mature trees.

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### **Vernal Pools**

**Description:** Vernal pools are temporarily ponded, small, shallow depressions usually located within an upland forest. They are typically flooded in spring or after a heavy rainfall, but are usually dry during summer. Many vernal pools are filled again in autumn. The substrate is dense leaf litter over hydric soils. Vernal pools typically occupy a confined basin (i.e., a standing water body without a flowing outlet), but may have an intermittent stream flowing out of it during high water. Since vernal pools cannot support fish populations, there is no threat of fish predation on amphibian eggs or invertebrate larvae. Vernal pools are home to SGCN salamanders such as the blue-spotted salamander, Jefferson's salamander and marbled salamander.

**Range:** Widespread throughout New York State.

## References:

### **Cornell Lab of Ornithology**

Our mission: To interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds.

<http://www.birds.cornell.edu>

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<http://www.dec.ny.gov/animals/29392.html>

### **National Wild Turkey Federation**

The National Wild Turkey Federation is a national nonprofit conservation and hunting organization that, along with its volunteers, partners and sponsors, has worked for the conservation of the wild turkey and preservation of the hunting tradition.

<http://www.nwtf.org/>

### **New York Natural Heritage Program**

Our mission is to facilitate conservation of New York's biodiversity by providing comprehensive information and scientific expertise on rare species and natural ecosystems to resource managers and other conservation partners.

<http://www.nynhp.org/>

### **NYSDEC Comprehensive Wildlife Conservation Strategy**

[http://www.dec.ny.gov/docs/wildlife\\_pdf/ontariosetxt.pdf](http://www.dec.ny.gov/docs/wildlife_pdf/ontariosetxt.pdf)

### **The Ruffed Grouse Society**

Established in 1961 the Ruffed Grouse Society (RGS) is the one international wildlife conservation organization dedicated to promoting conditions suitable for ruffed grouse, American woodcock and related wildlife to sustain our sport hunting tradition and outdoor heritage.

[www.ruffedgrousesociety.org](http://www.ruffedgrousesociety.org)