

A photograph of a dense hardwood forest. The scene is filled with tall, slender trees with thick, textured trunks. The canopy is a vibrant green, with sunlight filtering through the leaves, creating dappled light on the forest floor. The ground is covered with a thick layer of green ferns and other undergrowth. A semi-transparent white banner is overlaid at the top of the image, containing the text "Northern Hardwood Forest".

Northern Hardwood Forest

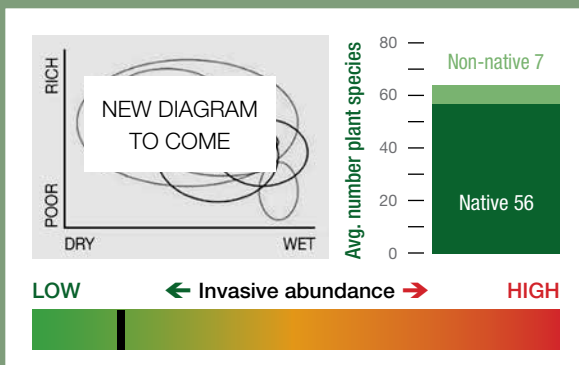
We consider this one of our rarer forest habitats, found only on deep, moist, nutrient-rich soils in cool microclimates. It is characterized by deciduous tree species with a generally northern distribution, often referred to as “northern hardwoods,” and is one of our prime habitats for spring wildflowers. It is also a forest particularly rich in birds, amphibians, and ground beetles. This habitat may be especially sensitive to climate change in our region. Remnants might thus deserve special protection. People generally feel attracted to these mature forest stands for recreation and nature appreciation. Northern Hardwood Forest is considered a prime destination for mushroom collectors and is sometimes managed for maple syrup production.

First Glimpse

In the summer, the Northern Hardwood Forest is a shady, cool place. The ground tends to be soft, and the deep, dark, and humus-rich soil is covered with moist and readily decomposing leaf litter. One might get a whiff of the “rich, earthy” smell indicative of an active soil life, including the underground network of fungi, which may or may not be visible as mushrooms. Ferns tend to be present in numerous clusters, often representing several species; some of these remain green through the winter. In the spring, one can often find abundant and diverse spring flowers, especially if a stream or calcareous outcrop is in the vicinity. The tree trunks support a high canopy of Sugar Maple (often the most common trees), Red Oak (usually the largest trees), and various other deciduous tree species. In addition, shady patches of Hemlock are sometimes present in this habitat.



Northern Hardwood Forest is often found along the banks of rocky headwater streams.

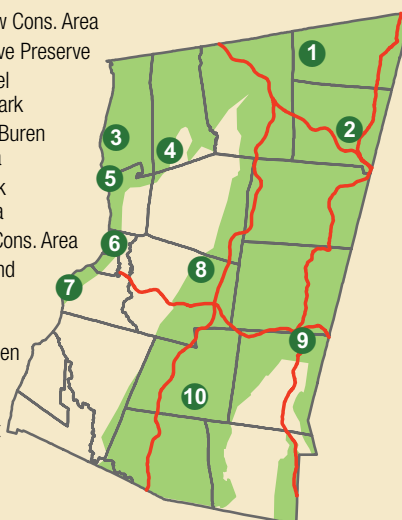


Location

Northern Hardwood Forest occurs mostly in the eastern half of the county, where it forms small stands at low to mid-elevation, usually on north- or west-facing slopes on a variety of soils and bedrock types. It is often associated with rocky headwater streams and rock outcrops (described respectively in the Streams and Wooded Rock Outcrop chapters), but is sometimes also found on high terraces in the floodplains of larger streams and in clay ravines along the Hudson River (see Clay Bluff and Ravine chapter).

Distribution of Northern Hardwood Forest and Places to Visit

1. Hand Hollow Cons. Area
2. Merlin's Cave Preserve
3. Ken Hummel Memorial Park
4. Martin Van Buren Nature Area
5. Nutten Hook Unique Area
6. Greenport Cons. Area
7. Rogers Island
8. High Falls Cons. Area
9. Roeliff Jansen Park
10. New Forge State Forest



Visiting

One of the most spectacular times of year to visit a Northern Hardwood Forest is in May when the spring flowers are in full bloom. But these cool and shady forests can also provide a welcome respite from the summer's heat. In the autumn, they erupt in yellow, orange, and warm hues of red as the Sugar Maples turn color.

What to Look For

Plants: The Northern Hardwood Forest is one of our prime habitats for spring ephemerals, a small category of plants that appear before the trees leaf out. These include such plants as Broad-leaved and Cut-leaved Toothwort, Carolina and Virginia Spring Beauty, Trout Lily, and Dutchman's Breeches. They flower, set seed, and disappear without a trace within weeks, only re-emerging the following spring. But many other spring flowering plants that persist later into the season and are found in few other forest types can be observed here too. Examples include Blue Cohosh, Red Trillium, Bloodroot, Red and White Baneberry, and several violet species. Spring flowers are particularly diverse on sweet (calcium-rich) soil, which is also where Basswood trees are most common. Please see the chapter on Wooded Rock Outcrops for more details on calcium-loving plants.

Northern Hardwood Forest is also a good habitat to see various fern species, such as Lady Fern, whose fronds die back in fall, and Evergreen Wood Fern, Marginal Wood Fern, and Christmas Fern, whose fronds stay green throughout the winter. While most of the canopy trees tend to be common and widespread species (see Characteristic Plants list), look for trees with the unique silvery-yellow, thin, and horizontally peeling bark typical for Yellow Birch and the smooth gray bark of Beech (when not yet afflicted by Beech Bark Disease). Beech trees beginning to succumb to the disease can be recognized by patches of cracked bark and are often surrounded by a shrubby thicket of root sprouts.



Three evergreen ferns often found in this habitat: Christmas Fern (left), Marginal Wood Fern (top), and Evergreen Wood Fern (right).

Characteristic Plants

The following species are common in this habitat, but not necessarily unique to it.

- * Indicator species ○ Non-native species
- Invasive species

TREES

- Basswood *
- Beech *
- Bitternut Hickory *
- Black Birch
- Hemlock
- Hop-hornbeam
- Red Maple
- Red Oak
- Sugar Maple *
- White Ash
- Yellow Birch *

SHRUBS

- Musclewood *r
- Witch-hazel
- Vines
- Virginia Creeper

FORBS (e.g. WILDFLOWERS)

- Blue Cohosh *
- Blue-stemmed Goldenrod
- Early Meadow-rue *
- Garlic Mustard ●
- Jack-in-the-pulpit
- Red Trillium *
- White Snakeroot
- White Wood Aster

FERNS

- Christmas Fern *
- Evergreen Wood Fern
- Lady Fern
- Marginal Wood Fern *



Red Trillium is a spring flower characteristic of this habitat.



Blue Cohosh is scarce throughout the Hudson Valley and associated with Northern Hardwood Forest on rich soils this habitat.

Birds and Mammals: The Northern Hardwood Forest harbors many of our typical forest mammals. An interesting possible addition from our site visits was a jumping mouse, presumably a Woodland Jumping Mouse although its identity was not confirmed. These rarely seen mice occur in moist forests where they feed largely on soil fungi.

Humans aren't the only mammals that tap Sugar Maple—look for squirrel tooth marks on pole-sized Sugar



A male Rose-breasted Grosbeak looks somewhat ruffled, having been caught in mid-preening by the photographer.



Pterostichus rostratus is a ground beetle of deep forest. As this photo shows, these two-thirds-of-an-inch-long beetles have impressive mandibles.

Maples. The squirrels (both Red and Gray) return periodically to lick the flowing sap.

Birds seem to be relatively abundant in this forest and include many of our typical, widespread forest birds such as Rose-breasted Grosbeak, Ovenbird, Red-eyed Vireo, Black-throated Green Warbler, Chickadee, Tufted Titmouse, Hairy and Downy Woodpeckers, Eastern Wood-Pewee, Wood Thrush, Veery, and American Redstart.

Amphibians and Reptiles: Thanks to the fairly moist soils, amphibians abound in Northern Hardwood Forests. This was the habitat where Red-backed Salamanders and Red Efts were most numerous, and it was our second-best habitat for American Toads. Spotted Salamanders and Wood Frogs were also quite common here, and Spring Peepers, Green Frogs, Gray Treefrogs, and Northern Dusky Salamanders were also found in these forests. We occasionally encountered Garter Snakes.

Insects and Other Invertebrates: Northern Hardwood Forest is ground beetle habitat rather than ant habitat; it



Red Eft is the juvenile, terrestrial form of the otherwise aquatic salamander Eastern Newt. These widespread salamanders are particularly common in Northern Hardwood Forest with relatively undisturbed forest floors.

had one of the highest average ground beetle occurrences of our forest types and one of the lowest ant occurrences. This fact is probably associated with its moistness. Ground beetle diversity and abundance generally tend to increase

Some Species of Conservation Concern

Geographic region of conservation concern is indicated by **CC** (Columbia County), **HV** (Hudson Valley), **NYS** (New York State), **US** (United States); see Introduction for explanation.

PLANTS

American Fly-honeysuckle	HV
Spikenard	HV
Broad Beech Fern	HV
Hobblebush	HV
Leatherwood	HV
Mountain Maple	HV
Plantain-leaved Sedge	HV
Round-leaved Violet	HV
Silvery Spleenwort	HV

BIRDS

Cerulean Warbler	US
Kentucky Warbler	US
Red-headed Woodpecker	US
Wood Thrush	US

AMPHIBIANS

Jefferson Salamander	HV
Northern Dusky Salamander	HV

INSECTS

Bare-cheeked Bumblefly (Fly)	US
West Virginia White (Butterfly)	US

in moister situations, while ants show the reverse pattern. Many of our Northern Hardwood Forest sites had small streams running through them, and this is reflected in the presence of ground beetles such as *Agonum extensicolle*, *Bembidion lacunarium*, and *Pterostichus diligendus*, which are even more common along the streams themselves (see Streams chapter). These beetles occurred together with upland forest species, such as beetles of the genus *Pterostichus*. One of the most common was *Pterostichus rostratus*, a medium-sized ground beetle with enlarged mandibles. This species seems to be associated with more mature forests, but why it has such large mandibles is unclear.

The West Virginia White, a butterfly whose caterpillars feed on toothworts, has been occasionally seen in our Northern Hardwood Forests.

Similar Habitats and Variation within the Habitat

Northern Hardwood Forest can be quite similar to Oak-Maple Forest (large Red Oak trees are prevalent in both habitats), but is distinguished by the presence of Hemlock, Beech, Yellow Birch, and/or Basswood, and the rarity of any oaks other than Red Oak. Furthermore, the Sugar Maple trees in Northern Hardwood Forest tend to be larger, regularly reaching a DBH of at least 15 inches (the largest in each of our samples averaged 21 inches), while the largest Sugar Maple trees in Oak-Maple Forest rarely reach a DBH above 15 inches. Northern Hardwood Forest can be differentiated from Young Hardwood Forest by a relative scarcity of Black Cherry and White Pine, and by its larger Sugar Maple trees (the largest averaged again only 15 inches DBH in our samples of Young Hardwood



Caterpillars of the West Virginia White feed on toothworts, which are spring ephemerals. These butterflies have declined dramatically over the past century, perhaps because of the introductions of the Cabbage White butterfly and Garlic Mustard.



Sugar Maple tapped in a Northern Hardwood Forest. Maple sugaring is one of the regional industries expected to suffer if trends in climate change continue unchecked.

Forest). Generally, Northern Hardwood Forest differs from Hemlock Forest in the lower abundance of Hemlock trees, but in some stands of this habitat, Hemlock can be common. In that case, we consider it Northern Hardwood Forest if Sugar Maple is also abundant; Beech, Yellow Birch, and/or Basswood are present; Chestnut Oak is rare; and the ground flora is dense and diverse.

Some Northern Hardwood Forest stands in the higher elevations in the northeastern part of the county have a canopy mostly composed of Beech, Red Maple, and Red Oak, but very little, if any, Sugar Maple.

Stewardship

Northern Hardwood Forest is a rare habitat in our county and only persists in small stands. Therefore, these stands deserve special recognition and protection. We believe, all else being equal, that they would do fine and maintain their ecological character if left alone. However, there are several factors already in play that might substantially change this habitat, even if we avoid clear-cutting it.

Climate change is predicted to make our region less hospitable for Sugar Maple. Unless current trends can be reversed, the Northern Hardwood Forest might one day be considered a “Ghost Forest” in our county. In addition, Beech Bark Disease is currently afflicting many mature Beech trees, which respond with vigorous root shoots. Mature Beech trees may become a rarity in the future, with the species persisting in the understory as a shadow of its former self, a fate it would share with American Chestnut. However, we caution against salvage logging, because—as happened with American Chestnut—if many trees of the afflicted species are removed before they die, we preclude any chance for resistant individuals to survive and become the founders of a next generation. Finally, the slow-growing, shade-tolerant seedlings of northern hardwoods are susceptible to overbrowsing by Deer, and some Northern Hardwood Forests lack tree regeneration because of the current high Deer density in our county. Many factors affect Deer populations, but encouraging predators and hunting might be part of the stewardship picture.

History

Where was Northern Hardwood Forest found in the county prior to European settlement? Was it widespread on much of the land later converted to agriculture, or did it tend to be mainly on the hillier ground? The answer may depend on the location. These forests may indeed have occurred down into the valleys of New Lebanon, but prime farmland farther south was probably in Oak-Maple Forest or something similar. This speculation is based largely on eighteenth-century deed records suggesting abundant oak in the southern part of the county (about 60 percent of all trees) and less oak, outside of the sand plains, as one moves farther north (for example, only 24 percent of all trees in the town of Canaan) and into Rensselaer County. In many cases, the remainder of trees were largely northern hardwoods.

Early farmers used trees as indicators of soil quality for agriculture. The likelihood that Northern Hardwood Forest was cleared for farming in the northern part of the county is indicated by the fact that, in much of New England, “beech and maple lands” were synonymous with good farmland. In New York, Amos Eaton, describing Rensselaer County agriculture, specifically records that Beech and Sugar Maple grew on the richer loams, and an early article in the Albany-published *Ploughboy* refers to the rich “beech land” farm soils. Other early observers noted that Dutchess County, to the south, was mainly forested with oak and Chestnut, and that the size of the oaks was a criterion of soil quality. It thus seems likely that, in at least the northeastern portions of the county, clearing for agriculture had a particularly strong impact on Northern Hardwood Forest.

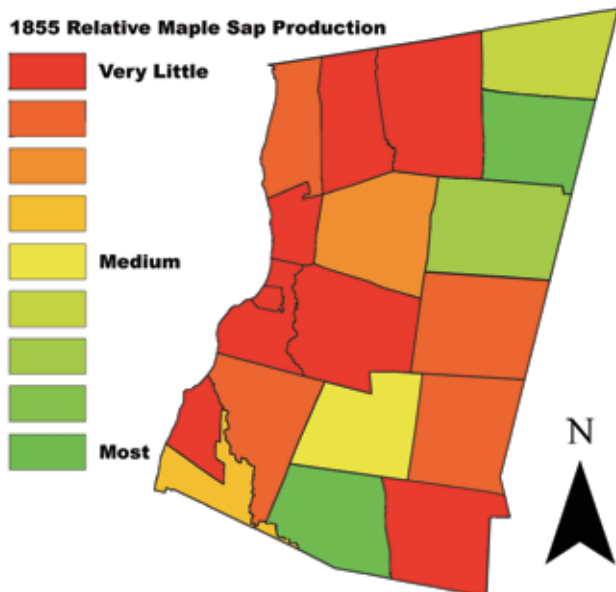
As the above description suggests, Columbia County is located on what ecologists call a tension zone—a place of marked vegetation change over a rather short distance, probably reflective of the fact that various plants are near the northern or southern bounds of their ranges. Aside from the forest’s interaction with agriculture, another way of seeing that tension zone is by considering the flammability of the forest.

Northern Hardwood Forests have been referred to as “asbestos” forests. Leaving aside modern connotations, this was meant to emphasize that these forests rarely burn, a fact remarked on in early descriptions. The relative coolness and ample rainfall in the favored microclimate means that crown-killing forest fires are, and were, rare. A map of the predicted fire-affinity of presettlement forests in the Northeast shows a strong increase in the southwestern part of the county and farther south. The trees of those southerly forests are the more fire-tolerant oaks, hickories and, formerly, Chestnut.

As this pattern implies, most trees in Northern Hardwood Forests are shade tolerant, which means that, once established, they can perpetuate themselves below their own canopy. Unlike some of our

other forest types, this habitat appears to depend more on the lack, rather than the presence, of profound disturbance. As a result, today we find mature Northern Hardwood Forest mainly on sites that have never been fully opened for agriculture, some of which are or were farm woodlots. However, as noted above, this does not mean that Northern Hardwood Forest never occurred on farmable soils, but rather that, when it did, such forests were often eagerly cleared. Some of those areas are still farmed, but those that have reverted to forest now support Young Hardwood Forest or other forest types.

The nineteenth-century distribution of Sugar Maples, a major component of the Northern Hardwood Forest (and a couple of other habitats), is reflected in this map of 1855 maple sugar and syrup production. Production has been converted to sap equivalents and standardized for estimated historical forest area. Sugar Maple was probably most common on the foothills of the northeastern and southcentral regions and reached down into the northeastern valleys.



Perspectives

“Shady, nice in speckled sun,” was how one participant in our landscape photo survey described this forest. It was generally pleasing to participants in our habitat outing because of its cool, enclosed feeling. “It struck me as a place that I would stop and stay and was comfortable. And it felt secure, with the big, enveloping forest,” explained one.

When we guided people through a sensory experience of the soils of different habitats, the smell of the Northern Hardwood Forest soil was described by one person as, “like a swamp smell, very rich,” and by another as, “fungal-dominant woody soil.”

It is perhaps unsurprising, then, that these moist, rich, old forests are also the delight of mushroom hunters. According to an experienced mushroom forager, “The older the forest, the more mushrooms, definitely.”

When we walked through a Northern Hardwood Forest with another forager, he was assessing conditions for “oak mushrooms,” such as Hen of the Woods. “They grow at the base of an oak tree, no other tree,” he explained.

Say you’ve got the base of an oak and it’s got a whole bunch of heads [trunks] coming off of it. Those will throw [mushrooms] ... because one of the crowns might be dead so ... the mycelium will be there and that’s where they’ll grow.

Oaks seem to be associated with high numbers of mushrooms and, while oaks may be less common in Northern Hardwood Forest than in certain other forest types, this habitat’s age and moistness may make it prime habitat for oak mushrooms.

Another forager, who described Hen of the Woods as “feathery” and “delicious” also spoke of searching for them around oaks: “These old oaks, they seem to be the ones you’ve got to walk around to see the whole tree ... they [Hen of the Woods] hide in the leaf litter. They can be hard to see.”

This forager also looks for “milky” (*Lactarius* species) around oaks, and Oyster Mushrooms on rotten, fallen hardwoods. “I’ll find the oyster mushrooms, and they will come back, as long as there are the nutrients, as long as the environment is right, they’ll just bloom. And you can find trees covered with them.”

In this type of moist, old, Sugar Maple–rich forest, this forager also seeks out “tooth mushrooms,” which refers to a variety of genera of mushrooms that have teeth-like spines.

A Northern Hardwood Forest can also be ideal for maple syrup production. We spoke to one forest manager who taps a Northern Hardwood Forest behind his house. “Some of these big grandmother trees, grandfather trees, I have up here that are two, three feet in diameter, you can



This “botanical portrait” of a Northern Hardwood Forest was created by artist Jill Jakimetz using material collected by participants in the habitat outing to a Northern Hardwood Forest. The assignment was to collect items that best captured each person’s experience of the habitat. How does the portrait reflect your own experience of a Northern Hardwood Forest?

put four or five taps in those.” Slope is also an important factor for syrup production. “The critical thing is we’re on a hillside,” he explained, pointing to the network of tubing carrying the sap down.

For this forest manager, there is a close synergy between harvesting maple syrup and the firewood to make it. “It’s a seasonal thing. Go out, cut down the dead and dying trees and turn them into firewood and make maple syrup. So I’ve got this whole rhythm going.”



Hen of the Woods being foraged at the base of a hardwood tree. Photo courtesy of Hudson Valley mycologist Bill Bakaitis.



Interact with a Northern Hardwood Forest

Experience the soil through “soil tasting”

A stick and the willingness to probe the floor of this forest is all you need to explore one of this habitat’s distinctive features—its soil. Northern Hardwood Forests are typically forests that have never been plowed. Often (though not always) a deep probe of such soils will reveal clear bands of different soil colors and types.

For our “soil tasting” banquet, however, you only need to probe your stick a few inches beneath the surface to unearth a handful of soil. What is it like rubbed between your fingers, brought to your nose, or held to your ear?

The Soil Tasting Card below has a series of prompts designed to capture a sensory “soil print” of

your experience. This can then be compared to its drier cousin, the Oak-Maple Forest. If you’re inspired, you can also explore the even drier side of the spectrum by digging into a Dry Oak Forest and completing this exercise there as well. For comparative purposes, be sure to visit these different habitats in similar weather conditions. Once you’ve dug into the soils of both (or all three) habitats and have your “soil prints” to compare, what similarities or differences do you notice?

This “soil tasting” activity was originally developed by Jill Jakimetz from the Hawthorne Valley Institute for Mindful Agriculture in collaboration with the Farmscape Ecology Program. Please note the idea of “tasting” is metaphorical; no actual tasting is required!

Soil Tasting Card

I Smell:

I Feel:

I Hear:

I See:

I Wonder:



Participants in a “soil tasting banquet” at the Farmscape Ecology Program compare bowls of soil from a Northern Hardwood Forest and an Oak-Maple Forest.